1979

Academic Catalog Volume 8B: 1974-75 to 1978-79

State University of New York College of Environmental Science and Forestry

ANNOUNCEMENT
OF COURSES

GRADUATE AND
UNDERGRADUATE

STATE UNIVERSITY
OF NEW YORK
COLLEGE OF FORESTRY

Vol. 8B

1974-75
TO
1978-79

BIOCHEMISTRY • BIOLOGY • CHEMICAL ECOLOGY • BIOMETRY • BOTANY • BUILDING CONSTRUCTION • CHEMISTRY • CELLULAR ULTRASTRUCTURE • ECOLOGY • ENVIRONMENTAL STUDIES • ECONOMICS • ENGINEERING • FOREST TECHNOLOGY • FIBER PHYSICS • ENTOMOLOGY • LAND USE • LANDSCAPE ARCHITECTURE • LIMNOLOGY • PAPER SCIENCE • MATERIALS MARKETING • METEOROLOGY • PAPER ENGINEERING • MICROSCOPY • MYCOLOGY • SOILS • REGIONAL PLANNING • NATURAL PRODUCTS ENGINEERING • OPERATIONS RESEARCH • ORGANIC MATERIALS SCIENCE • WATER RESOURCES • RESOURCE POLICY • PATHOLOGY • PHYSIOLOGY • POLYMER CHEMISTRY • PHOTOGRAMMETRY • PRODUCTION SYSTEMS ENGINEERING • OUTDOOR RECREATION • REMOTE SENSING • RESOURCE MANAGEMENT • SILVICULTURE • URBAN ANALYSIS • THERMODYNAMICS • WILDLIFE • WOOD PRODUCTS ENGINEERING • ZOOLOGY • WORLD FORESTRY • PATHOLOGY • WOOD SCIENCE • LAND USE • METEOROLOGY

UNDERGRADUATE STUDIES

STATE UNIVERSITY OF NEW YORK — COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

CORRESPONDENCE DIRECTORY

Detailed information about the College may be obtained by addressing inquiries to:

The State University of New York
College of Environmental Science and Forestry
Syracuse, New York 13210

Telephone (315) 473–8611

Admission
Director of Admissions
110 Bray Hall

Financial Assistance
Coordinator of Financial Aid
109 Bray Hall

Transcripts and Academic Records
Registrar
111 Bray Hall

Housing
Coordinator of Undergraduate Housing
Office of Residential Life
Steele Hall
Syracuse University
Syracuse, New York 13210

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State University of New York

COLLEGE OF

ENVIRONMENTAL SCIENCE AND FORESTRY

1974-75
Undergraduate Studies Bulletin

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Academic Calendars

Fall 1974

Residences Open, New Students	September 1	Sunday, 8 a.m.
Orientation Begins	September 2	Monday
Counseling Begins	September 3	Tuesday
Registration	September 4–6	Wednesday–Friday 8 a.m.
Classes Begin	September 9	Monday, 8:30 a.m.
Yom Kippur	September 26	Thursday, no classes
Last Day To Drop/Add	September 27	Friday
Mid-semester	October 3	Thursday
College Barbecue Day	October 9	Wednesday, no classes
Fall Recess	November 27–December 2	Wednesday, 12 noon–Monday, 8:30 a.m.
Last Day of Classes	December 12	Thursday, 11:00 p.m.
Reading Period	December 14–15	Saturday–Sunday
Examinations	December 13–20	Friday–Friday
Vacation Begins	December 21	Saturday

Spring 1975

Registration	January 14–16	Tuesday–Thursday
Classes Begin	January 17	Friday, 8:30 a.m.
Last Day To Drop/Add	February 6	Thursday
Mid-semester	March 7	Friday
Mid-semester Vacation	March 8–16	Saturday–Sunday
Last Day of Classes	April 25	Friday
Reading Period	April 28–29	Monday–Tuesday
Examinations	April 30–May 7	Wednesday–Wednesday
Commencement	May 10	Saturday

1975 Summer Sessions at Syracuse University

First Session	May 19–June 27	6 weeks
Second Session	June 30–August 8	6 weeks

FOREST TECHNICIAN PROGRAM—WANAKENA CAMPUS

Fall 1974

Registration	August 22–23	Thursday–Friday
Fall Semester Begins	August 26	Monday
Thanksgiving Recess	November 23–December 1	Saturday–Sunday
Fall Semester Ends	December 20	Friday
Intersession	December 21–January 19	Saturday–Sunday

Spring 1975

Spring Semester Begins	January 20	Monday
Spring Recess	March 15–23	Saturday–Sunday
Spring Semester Ends	May 30	Friday
Commencement	May 31	Saturday

Admission

ADMISSION CRITERIA

Admission to the College of Environmental Science and Forestry is based on academic qualifications after careful analysis of information provided by the applicant's high school or other scholastic records, standardized tests and recommendations. In many cases, an interview may be conducted to assess interests and abilities.

Minimum requirements are at least 16 units along this pattern: English, 4 units; history (social studies), 2 units; science, 2 units (with at least 1 in chemistry or physics); mathematics (through trigonometry), 3 units; and electives, 5 or more units. Recommended electives are mechanical drawing and a foreign language.

WHEN TO APPLY

A candidate for freshman admission usually begins the application process in the fall of the senior year of high school. Review of candidates begins in January and the date for final decision on most freshman applications is May 1. Freshman applicants begin to receive notification of admission after February 15. A copy of the decision letter is sent to the applicant's high school guidance counselor. Freshmen are not usually admitted to the College for the spring semester.

FRESHMAN APPLICATION PROCEDURE

1. To apply for admission, residents of New York State should request the proper forms from their local high school guidance office. Nonresidents should request the forms directly from ESF's Office of Admissions. *In either case, however, the applicant must obtain directly from the Office of Admissions supplemental forms in addition to those obtained from guidance counselors.* Revised admission forms are available for entry the following year.

2. These supplemental forms will arrive after 3–4 weeks.

3. *Application deadline for freshman admission is March 1.*

4. State University of New York requires resident applicants to take the New York Regents Scholarship Examination (administered only in early October in most high schools in New York) if the applicant is residing or attending school in the state during the year prior to entrance to college. If an applicant does not take the Regents examination, the scores of the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB) or the American College Test (ACT) must be submitted. The Director of Admissions may waive the requirement for (1) applicants from outside New York State (who must substitute scores earned in the Scholastic Aptitude Test of the College Entrance Examination Board, or the American College Test) (2) late applicants and (3) applicants for admission as transfers from another college.

5. While a personal interview is not required for admission, it may be helpful in college planning. An interview with an admissions officer can be arranged by contacting the Office of Admissions.

CAMPUS VISITS

The College of Environmental Science and Forestry welcomes visits by students and their parents. The Office of Admissions is located in Room 110 Bray Hall. The office is open Monday through Friday from 8:30 a.m. until 5 p.m.

ENTRANCE WITH ADVANCED STANDING

Secondary school students may earn college credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry enriched course loads, and may be accomplished in two ways:

1. Courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After successful completion, an official transcript or other appropriate document should be sent to the College by the institution along with a catalog description of the course or courses.

2. College-level courses are given by some high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English and foreign languages offer opportunity for degree credit at this College. The determination of credit is made by faculty members to whom the student's final examination papers are sent after they have been graded.

COLLEGE PROFICIENCY EXAMINATIONS

The New York State College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. The College also accepts the College

Level Examination Program (CLEP) of the College Entrance Examination Board. These examinations are open to all who make application.

The College approves of the CPE and CLEP programs in general and will evaluate the performance of participants.

If all College policy requirements are met, grades A and B will receive credit; credit for a grade of C will be granted only upon recommendation of the department of the applicant's major; and no credit will be granted for a grade lower than C.

Application for credit should be made to the Office of Student Affairs. Application for deviation from the prescribed policy may be made to the Undergraduate Academic Affairs Committee.

TRANSFER STUDENTS

Students who are currently enrolled at another institution of higher education or who have previous college experience may apply for transfer. Any student who has been academically dismissed must wait at least one semester before applying to this College.

Application forms should be obtained directly from the College by writing to the Director of Admissions, Attn: Transfer. This material

will arrive after 4–5 weeks. Revised application forms are available in September for admission the following year.

Students with two years of college can generally arrange their programs to allow transfer to the College of Environmental Science and Forestry with junior standing. Courses transferred for credit must be appropriate to the student's curriculum choice and successfully completed with a passing grade of D or better. (It should be noted, however, that students who transfer courses in which a grade of D has been earned must be aware of possible deficiencies when that material is used in upper division classes.)

Furthermore, courses to be transferred as required courses in a curriculum must be comparable in content. Course credit hours are transferred, but grades and grade points are not.

In applying to the College for transfer, it is the students' responsibility to submit a recent official transcript from the college they are currently attending and similar documents from all colleges previously attended. No official transfer credit will be awarded until all final transcripts are received. Catalogs from each college may also be required.

Application deadline for transfer students is May 15.

DUAL ENROLLMENT WITH COLUMBIA-GREENE

The College of Environmental Science and Forestry and Columbia-Greene Community College have arranged a dual enrollment program. Any applicant for the liberal arts, math and science program with a forest management concentration at the two-year college is evaluated by both institutions. Upon acceptance and successful completion of the associate in applied science degree program, the student is automatically accepted at the College of Environmental Science and Forestry.

INTERNATIONAL STUDENTS

The College accepts international students on the undergraduate level if they can satisfy all regular admissions requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country, if at all possible, and apply to the College as graduate students. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. If an international student wishes to apply as an undergraduate, he must:

1. meet the secondary school requirements for entrance;
2. show that he is proficient in the English language through acceptable results of the Test of English as a Foreign Language (TOEFL) and/or College Entrance Examination Board Achievement Test in English;
3. provide competitive scores on the CEEB's Scholastic Aptitude Test in the verbal and math areas; and,
4. produce evidence that he can meet all financial obligations.

Undergraduate foreign students must file official State University of New York admissions forms. These may be obtained by writing to the Director of Admissions at the College. No fee is required for processing the application. *If the foreign student is accepted, adequate health and accident insurance must be obtained before the student will be allowed to register at the College.*

International students who are currently enrolled at an American college may apply for transfer to the College. They must meet all entrance requirements plus those of a transfer student as listed above. Permission to transfer must be obtained from the U. S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

HEALTH EXAMINATION REPORT

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice.

Student Expenses

APPLICATION FEE

When a student applies for admission to any of the State University of New York units, he pays to the University a nonrefundable application fee of $10 for the first application and $5 for each of the next three applications.

The applicant is billed after receipt of the applications. Students who apply for transfer from other units of the State University of New York pay no fee.

ADVANCED PAYMENT FEE

New and transfer students pay a fee of $50, which is credited to the student's first semester tuition. This payment should be sent to the Business Office, SUNY College of Environmental Science and Forestry, Syracuse, New York 13210, accompanied by the form provided by the Office of Admissions. The payment is required within 30 days after the date of acceptance and no later than May 1; it is refundable up to May 1.

TUITION AND FEES

The tuition and fee structure of the College of Environmental Science and Forestry includes library, health, infirmary, physical education, ROTC, special testing and other services, as well as an assessment for student activities and charges for expendable supplies and equipment.

Tuition is $650 per academic year for freshmen and sophomores who are residents of New York State. Tuition is $800 for juniors and seniors.

Tuition for nonresident freshmen and sophomores is $1,075 per academic year; nonresident juniors and seniors pay $1,300.

STUDENT ACTIVITY FEES

In addition to tuition, the student body has voted to assess each student $20 per year to cover the cost of student activities. ESF students

also pay yearly Syracuse University fees to cover the costs of the many student activities they participate in; these fees are $18 for full-time students and $9 for part-time students. An optional yearly fee of $3 supports Syracuse University's Public Interest Research Group (PIRG).

TERMS OF PAYMENT

A check or money order for tuition and fees should be made payable to *State University of New York College of Environmental Science and Forestry*. This payment is required by the last day of the registration period and can be paid at the College's Business Office either prior to registration or during registration. *A fee of $10 is charged for registering later than the established dates.*

HOUSING AND BOARD COSTS

Housing costs at Syracuse University, depending on the room, range from $640 to $790 for an academic year. Most rooms accommodate two students and all furnished with beds, mattresses, desks, chairs, study lamps and dressers. A commercial linen service is available for those who order it.

A variety of options on board offerings are available for all students. Costs range from $550 to $750 for an academic year.

Housing and board rates are subject to change and inquiries about them should be addressed to Office of Residential Life, Syracuse University, Syracuse, New York 13210.

Payment for housing and board is made directly to Syracuse University.

COMMENCEMENT FEE

A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

OTHER COSTS

Students majoring in Resource Management must attend a 5-week Summer Session in Field Forestry at the Warrensburg Campus between the sophomore and junior years. The cost is approximately $175.

Forest Biology majors must attend either the Summer Session in Field Forestry or the Summer Session in Environmental Biology at the Cranberry Lake Biological Station. Cost for the 8-week session is approximately $450.

An extended field trip of up to 3 weeks costs approximately $200 for *Wood Products Engineering students.*

Field trips for *Landscape Architecture students* range between $125 and $150. In addition, students enrolled in the 5-year Landscape Architecture program are required to spend one semester off campus. This is a self-described and student-budgeted program. Costs are not required

to exceed those of a semester on campus, but additional costs are often incurred depending upon the location chosen.

The cost of books and supplies is approximately $150 a year. Additional costs for personal expenses, recreation, clothes and travel depend on the individual, but they may range from $300 to $500 a year.

REFUNDS

The following policies apply to tuition liability and refunds for students canceling their registration.

A student who is given permission to cancel registration is liable for payment of tuition in accordance with the following schedule:

Liability During	*Semester*
1st week	0
2nd week	30%
3rd week	50%
4th week	70%
5th week	100%

No money will be refunded unless application for refund is made within one year after the end of term for which the tuition requested to be refunded was paid to State University. The first day of class session is considered the first day of the semester and Saturday of the week in which this first session occurs is considered the end of the first week for refund purposes. It is interpreted that a student who does not attend any class sessions after Saturday of the first week and who notifies the College of his intent to cancel registration on or before the second Saturday following the first day of classes will be considered to have canceled his registration during the first week.

There is no tuition or fee liability established for a student who withdraws to enter military service prior to the end of an academic term for those courses in which the student does not receive academic credit.

A student who is dismissed for academic or disciplinary reasons prior to the end of an academic term is liable for all tuition and fees due for that term.

A student who cancels registration at a unit of the State University, and within the same term registers at another unit of the State University, is entitled to full credit for tuition and fees paid for that term.

Notwithstanding any other provisions for refund, when a student has withdrawn through circumstances beyond the student's control, under conditions in which the denial of refund would cause undue hardship, the Chief Administrative Officer of the unit, may, at his discretion, determine that no liability for tuition has been incurred by the student, provided the student has not completed more than one half of the term and has not received or will not receive academic credit for the term. Such action, including the reason for withdrawal, must be in writing.

Financial Assistance

The College of Environmental Science and Forestry offers three basic forms of student financial assistance: scholarships or grants, part-time employment and long-term loans. These programs are coordinated to supplement parental support, summer work, savings and assistance from other sources. Since the source of funds for these programs, the guidelines for determining the recipients, the procedures for applying and the method of disbursement of funds vary greatly from one program to another, the individual is encouraged to contact the Office of Financial Aid to discuss specific questions.

Aware of the many problems of financing higher education and meeting day-to-day living expenses, financial aid advisors are always available to discuss individual student problems.

HOW TO APPLY

Each year students interested in receiving financial assistance must apply, or reapply. Two forms are necessary for the application process.

1. The candidate must complete a College financial aid application form and return it to the College.

2. The candidate's parents or legal guardians must complete the Parents' Confidential Statement (which is available from high school guidance counselors or from the College) and forward it to the College Scholarship Service, Box 176, Princeton, New Jersey 08540, where it is analyzed and sent to the College.

3. Applicants who are financially independent of their parents should write directly to the Office of Financial Aid for the necessary forms.

4. Applications should be submitted as early as possible. Applicants need not wait for notification of acceptance to the College before applying for financial aid. Applications will be accepted after April 1; it should be noted, however, that available funds may already be committed to other students.

5. Students are invited to discuss with the College's Coordinator of Financial Aid any problems in financing their education.

SELECTION OF RECIPIENTS

Applications will be reviewed as soon as they are complete.

In making award decisions, consideration is given primarily to comparative financial need; however, scholastic standing, character and potential contribution to the College community are also factors in making certain awards.

SCHOLARSHIP AND GRANT PROGRAMS

Supplemental Educational Opportunity Grants (SEOG)

The College is the recipient of funds authorized under Title IV-A of the Higher Education Act of 1965 as amended. These funds enable the College to award grants to students who have high financial need. Grants range from $200 to $1,500 per year and must be matched by other awards.

Forestry Educational Opportunity Grant Program (FEOP)

Students accepted into the FEOP receive partial tuition waivers and grants to help meet the cost of their education. Students must come from a socio-economically disadvantaged background to be eligible for this program. Interested students should apply to the program and for the corresponding financial assistance when they apply for admission to the College.

Basic Educational Opportunity Grants (BEOG)

The BEOG Program was authorized in the Education Amendments of 1972. Grants are available to eligible full-time students who have not attended college prior to July 1, 1973. The amount of the award can vary from $50 to $1,400 depending on the following:

1. The amount of funds made available by the federal government.
2. The amount determined by an entitlement computation formula.
3. The cost of the student's education as allowed by the program.

Applications are available from high school guidance offices or any college office of financial aid.

Private Scholarships and Grants

The College administers a number of programs which have been established by private individuals, companies, organizations and foundations. These scholarship and grant programs have varying eligibility requirements and are awarded to students according to these guidelines.

The following is a list of the programs: Alumni Memorial Awards, Alumni Educational Grants, Allied Paper Salesmen's Association, Inc., Harold L. Austin Memorial Scholarship, Boxboard Research and Development Association, Nelson Cortlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Award, Jack L. Krall Memorial Scholarship Fund, Federated Garden Clubs of New York State, Inc. and Heiberg Memorial Fund.

Other opportunities include: Joseph S. Illick Memorial Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, C. E. Libby Award, Milton Conservation Club Award, New York State College of Forestry Foundation, Inc., Portia Farrell Morgan Scholarship, Frank B. Myers Memorial Award, Charles Lathrop Pack Awards, Plastics Engineers' Awards, Phyllis Roskin Memorial Award, Student Association Grants, and State University at Syracuse Chapter of Civil Service Employees Association (CSEA) Scholarship.

Syracuse Pulp and Paper Foundation, Inc. Scholarships

Scholarships from this foundation are awarded to students majoring in Paper Science and Engineering. New York State residents receive $750, and students from out-of-state receive $1,050 annually. Incoming freshmen and transfer students entering the program should request a Pulp and Paper Scholarship application from the Office of Financial Aid. It is necessary to reapply each year for the scholarship.

State University Scholarships (SUS)

New York State residents who have a family net taxable income of $2,000 or less are eligible for assistance to pay the balance of the tuition charge after Scholar Incentive. Applications for this program are available at the time of registration.

Partial Tuition Waivers

In the Spring of 1972, the State University of New York Board of Trustees established a program of tuition waivers for New York State residents. The program reduces the cost of tuition for many students whose family taxable income is $12,000 or less. The amount of the waiver is based on the tuition charge and the amount of income reported on the Regents application. Students eligible for Regents awards will be asked to file the additional application after the Regents application has been processed. New York State residents who are not eligible for the benefits from Regents programs should write to the Office of Financial Aid for the appropriate application.

Tuition Waivers for International Students

Tuition waivers may be granted each year to qualified students from foreign countries. Interested students should contact the Vice President for Student Affairs or the Director of Admissions.

Regents Programs

Additional information and applications for the following Regents programs are available from:

Regents Examination and Scholarship Center
99 Washington Avenue
Albany, New York 12210

Regents College Scholarships (RC)

High school seniors who are New York State residents may qualify by taking the Regents Scholarship Examination.

Regents Scholar Incentive Awards (SI)

These awards are available to New York State residents who are enrolled in full-time degree programs.

Regents War Service Scholarships (WS)

Veterans are eligible to take a competitive examination administered during the summer.

Regents Grants for Children of Deceased or Disabled Veterans

These grants are awarded to children of parents who served during specific periods of war or national emergency and who died as a result of such service, or suffered a disability of at least 50 percent. The award entitles a New York State resident to $450 per year.

Vocational Rehabilitation Grants

Financial assistance and program counseling are provided by New York State through the Division of Vocational Rehabilitation for students who qualify.

Veterans' Benefits

The Veterans' Readjustment Benefits Act of 1966 as amended enables veterans to obtain financial aid for their college education.

Additional information and counseling are available from the Office of Veterans' Affairs at the College. Local veterans' administration offices, or the State Regional Office, 111 West Huron Street, Buffalo, New York 14202 can provide information and application forms.

Social Security Benefits

The 1965 Amendments to the Social Security Act extended the age limit for a child's benefits from 18 to 22, providing the child is a full-time student. Local Social Security offices have additional information.

EMPLOYMENT OPPORTUNITIES

College Work-Study Program (CW-SP)

The College participates in the Federal College Work-Study Program. This program provides part-time jobs during the academic year and full-time positions during the summer to students who need financial assistance to attend college.

Other Employment

The College coordinates and maintains lists of part-time and summer employment opportunities which do not require financial need as a prerequisite for employment. Interested students should contact the Office of Student Affairs for additional information.

LOANS

National Direct Student Loans (NDSL)

These loans are available to students with financial need who are enrolled at least half-time. An aggregate of $5,000 is the maximum an undergraduate can borrow, and $10,000 is the aggregate a graduate student can borrow. Repayment and 3 percent interest begin 9 months after leaving college. Deferment and cancellation benefits are available for certain situations.

Insured Student Loans

This program is administered by the New York Higher Education Assistance Corporation (NYHEAC) for New York State residents. These loans are available from a bank or other lending agent to students who are registered at least half-time. Undergraduates can borrow an aggregate of $7,500 for their undergraduate studies, and a graduate student can borrow an aggregate of $10,000. Repayment and 7 percent interest begin 9 months after leaving college (an additional $^1/_2$ percent interest is paid at the time the loan is received). Applications are available at local banks or at the Office of Financial Aid.

Emergency Loans

The College is able to provide registered students interest-free, short-term loans. These loans are available because of the interest and support of the following donors: Alumni Association Short-term Loan Fund, Karl T. Frederick Memorial Fund, C. Ives Gehring Memorial Fund, Milton Hick Memorial Fund, James D. Judson Memorial Fund, David B. Schorer Memorial Fund and Edward Vail Emergency Fund.

Students should contact the Office of Financial Aid when need arises for a short-term loan.

Student Life

HOUSING

The College of Environmental Science and Forestry does not operate its own residence facilities or food service. Students enter into a Room and Board Agreement with Syracuse University, which is adjacent to the state-operated College.

Residence in a Syracuse University living center or in an approved fraternity or sorority house (upperclasses only) is required of all single freshman and sophomore students under 21 years of age.

Permission may be granted by the Syracuse University Office of Residential Life allowing the student to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative. Any exceptions to this requirement are listed in the room and board agreements.

Students have a choice of living centers at Syracuse University—large halls, apartment houses, cottages, fraternities and sorority houses or co-operative units. Graduate student resident advisors live on each floor or in each unit and are available for counseling, advisement and referral services.

Syracuse University also has housing units available for married students and their families. While veterans are given preference, non-veterans too can usually find housing.

EXTRACURRICULAR ACTIVITIES

Students at the College of Environmental Science and Forestry have many extracurricular activities to choose from, both on campus and in the community.

At the College

ESF students elect class officers annually and the *Student Council* is the official representative body governing extracurricular affairs.

Among the departmental organizations which offer to students an opportunity to broaden their knowledge and to meet other students

with similar interests are: *Archery Club,* for those interested in field archery; *Bob Marshall Club,* an organization of students concerned about the future of the Adirondack Mountains; the *Forestry Club,* the traditional sponsor of the Woodsmen's Team; *Botany Club; Mollet Club,* an organization of landscape architecture students; the *Papyrus Club,* organized of paper science and engineering students as a way to keep up with new developments in the industry; the *Wood Products Engineering Club,* a group that sponsors guest speakers and noted lecturers; and the *Zoology Club,* which sponsors lectures, films and field trips.

Other groups on campus include *Vox Silvae,* a debate team; *Saengerbund,* the College glee club; *Robin Hood,* the all-junior honor society; and *Alpha Xi Sigma,* senior honorary society. There are also student chapters of the *Wildlife Society* and the *Society of American Foresters.*

The two major student publications at ESF are *The Knothole,* a weekly newspaper and *The Empire Forester,* an annual pictorial review which has won many awards in past years.

ESF students support both a basketball club, which has a schedule of 15 intercollegiate games, and a basketball intramural league.

At Syracuse University

Students at the College of Environmental Science and Forestry have all the privileges of Syracuse University students; participation in student government, organizations, sports and other extracurricular activities is open to them.

Archbold Gymnasium on the Syracuse University campus is the center of athletics and physical education. It is equipped with regulation basketball courts, volleyball and badminton courts, and handball and squash courts. There are also a weight training room, pool, rowing tank and rifle range.

Manley Field House provides indoor practice facilities for many sports including football, track, lacrosse; it is the site of Syracuse University home basketball games.

Facilities at Skytop recreation area include ski tows and a ski jump, a lodge and 22 tennis courts.

The Women's Building offers instructional, social and recreational facilities that include swimming, basketball, bowling and tennis.

In the Syracuse Area

The City of Syracuse and its surrounding countryside offer many cultural, educational and recreational opportunities. The City has several fine museums including the Everson, with its outstanding collection of works by local, regional and international artists; live theater by touring groups and local repertory theater; and several points of historical interest.

Eight parks lie within the city limits; numerous county and state parks, including Beaver Lake Nature Center and Montezuma Wildlife Reservation, are within a short drive.

In the summer, golf enthusiasts have 23 public courses to choose from; water sports fans travel to nearby Lake Ontario, Oneida Lake and the Finger Lakes. Winter sports, especially skiing and skating, abound in Central New York. Special annual events include the New York State Fair, the Scottish Games and Regatta Weekend.

COLLEGE SERVICES

Academic and Personal Counseling

The Office of Student Affairs is available throughout the students' college career as a place where they may seek, at any time, the advice of experienced counselors. This office should be the first contact when questions or personal problems arise. General advisement for international students is provided by the Office of International Forestry. The Registrar in the Student Affairs Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition, the Coordinator of Financial Aid in the Student Affairs Office provides information on available scholarships, long-term State and Federal educational loans, work opportunities at the College and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration the student is assigned to a faculty advisor for assistance as needed in curriculum decision, program development, and elective decisions. In curriculum selection, special advisors are assigned to provide academic advice as needed. Faculty in the major departments are also available for academic guidance. In addition, many classes are small, permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later professional life.

Career Counseling and Placement

Assistance is given to students in the development of plans for a career after graduation through the Office of Career Counseling and Placement. Part-time jobs, lists of potential employers and opportunities which are currently available are a part of the offerings in this office. Liaison is maintained with the placement efforts of Schools on campus as well as the Office of Career Services on the Syracuse University campus, thus offering the graduating student the possibility to develop a broader perspective of available employment.

Veterans' Counseling

Veterans can receive personal counseling around social, financial or academic problems through the Office of Student Affairs. Information and application forms for V. A. Educational Benefits, Tutorial Assistance, Work-Study Allowance, and the ESF Veterans' Tuition Deferral Plan are available upon request.

Other Counseling

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with several full-time and part-time denominational chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident advisors are located in all University dormitories, and are available for assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which the major work is taken. At the completion of the student's college career, placement counseling is available through the Office of Career Counseling and Placement.

Health and Medical Facilities

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service, and are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement per college year with ordinary medical care in the Infirmary. Infirmary usage over 10 days will be at prevailing Infirmary rates. The usual laboratory examinations, if necessary for treatment or diagnosis of common illness, are usually provided without cost. Most common legal drugs are provided without extra charge.

A student accident or sickness insurance plan is available at Fall registration and not only supplements the usual infirmary privileges, but is also a health protection during the summer months when students are not under care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made available to University students. *All international students are required to carry health and accident insurance.*

Military Service

The Registrar's Office keeps on file up-to-date information on Selective Service. Students reaching 18 years of age after arriving in Syracuse may register with Selective Service in the Office of Student Affairs.

Air Force and Army Reserve Officer Training Corps programs are available; however, a minimum of two years is required.

Hearing and Speech Center

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech and voice disorders. This service is without expense to students.

Psychological Services and Research Center

Students desiring an analysis of their aptitudes, abilities and interests may secure special testing programs at the Testing and Evaluation Service Center on the Syracuse University campus.

Reading and Language Arts Center

The Syracuse University School of Education, in cooperation with the College of Liberal Arts and the Psychological Services and Research Center, maintains a reading and language arts center for research in the learning skills and for training teachers and specialists in reading and language arts. Representatives from the fields of medicine, speech and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

Alumni Association

The Alumni Office serves as the liaison between the College, the Alumni Association Board of Directors and more than 6,000 alumni. The Association supports educational programs through scholarships, publishes a quarterly newsletter and represents alumni concerns.

Undergraduate Rules and Regulations

The complete listing of guidelines for all undergraduate students attending ESF and residing on the Syracuse University campus is found in a separate publication, the *Undergraduate Student Handbook*, which is distributed at registration. Also distributed at registration are copies of "Rules and Regulations of Conduct and Behavior" which pertain to all members of the College community. It is the student's responsibility to be familiar with these regulations and abide by them.

Academic Life

STUDENTS AND FACULTY

Education in the classroom, laboratory and field is a cooperative endeavor between students and faculty, and is an enriching experience for both. This two-way communication is traditional at the College, so much so that deans and department chairmen, with considerable administrative duties, still meet classes and consider it a privilege to do so.

Men and women are enrolled as students at the College, and in the Fall, 1973, numbered 2,095. Of these, 1,714 were undergraduates and 381 were graduate students. In addition, there were 21 students engaged in postdoctoral work. A growing number of students at the College transfer from community colleges and other institutions, and international students are encouraged to apply for admission.

The teaching and research faculty number about 150. Selected professors are designated as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultation. Many of them serve as advisors to undergraduates, a practice which is particularly helpful to students seeking advanced degrees.

ORIENTATION

To ease the adjustment to college life, *all freshmen and new transfer students* are required to attend an orientation period during registration week of the Fall semester. This is an opportunity for new students to meet classmates and members of the faculty and administration. It is also a good way to become acquainted with the College, its functions, operations and services. A special orientation session for international students is provided through the Office of International Forestry.

A weekly one-hour orientation course, *General Forestry 032*, is required throughout the first semester for all freshman and transfer students. The purpose of this course is to introduce the new undergraduate student to the College standards, counseling services and general College policy.

ACADEMIC ADVISEMENT

Upon arrival at the College, each student is assigned to a faculty advisor who can provide the student with information and advice on courses and programs both at the College and at Syracuse University. The success of this program rests largely upon the student to take the initiative in seeking assistance.

ATTENDANCE

In general, undergraduates are expected but not required to attend all of their scheduled classes. Faculty members may make regular class attendance a course requirement.

DROPPING OR ADDING COURSES

Changes in schedule may be made with the approval of the student's advisor and curriculum director. Such changes take place within the first three weeks of the semester.

CHANGE OF CURRICULUM

A student is allowed without petition one change of curriculum after beginning the major work.

WITHDRAWALS

A student who finds it necessary to withdraw from the College must notify the Office of Student Affairs. If the student withdraws before the official drop date for the semester, the student's permanent record card will be marked "no credit for the semester." After that date, entries will be based on the instructor's report as "withdrew passing" or "withdrew failing."

GRADES AND GRADE POINTS

College academic records list credit hours, grades and grade points. Grade points indicate the quality of work done according to the following scale:

Grade	*Quality*	*Grade Points Per Credit Hour*
A	Excellent	4
B	Good	3
C	Average	2
D	Minimum passing	1
F	Failure	0

CREDIT HOUR LOAD

A normal schedule for a full-time student at the College is defined as 12 or more credit hours per semester up to and including 20 hours.

GRADE POINT AVERAGE

The student's cumulative average is determined by dividing the number of credit hours into the total number of grade points earned for those hours. The student must obtain a C average (2.0) to be in academic good standing.

COLLEGE HONOR LIST

Students who have carried a minimum of 12 credit hours of course work and who have achieved a minimum semester average of 3.0 are placed on the College Honor List for that semester.

PROBATION

A student whose cumulative or semester grade point average falls below 2.0 will, after review by the Undergraduate Academic Affairs Committee, either be placed on probation or academically dismissed.

FAILURES AND INCOMPLETES

A student who fails a required course must repeat it.

A student is allowed one semester in which to make up an incomplete. Failure to do so results in an F.

GRADUATION REQUIREMENTS

To meet the academic requirements for graduation, a student must:

1. be in residence at the College during the final year;
2. complete the course requirements of the approved degree program;
3. have a minimum grade-point average of 2.00.

COMMENCEMENT HONORS

Commencement honors are awarded to those students who have attained one of the following academic averages: *cum laude*, 3.2; *magna cum laude*, 3.5; *summa cum laude*, 3.8.

Areas of Study

THE SCHOOL OF BIOLOGY, CHEMISTRY AND ECOLOGY

The School of Biology, Chemistry and Ecology offers two curricula which support the science and ecological areas of environmental science and forestry.

Forest Biology

The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions to a wide range of environmental problems.

The School's biology curriculum is designed to educate biologists and to provide them with a firm grounding in forestry principles. The program is directed at both those students planning graduate study in the biological sciences, as well as those students who will seek forest biologist positions in such areas as forestry research, disease and insect control, recreation, fish and wildlife biology and conservation.

Requirements

The curriculum is built around a core of required courses which provide the student with a general education, an introduction to forestry principles and a sound background in biology and the physical sciences. It is designed to achieve breadth in biology as well as depth in a selected area of concentration.

The flexibility of the curriculum allows for the development of a variety of programs within or across the several participating departments, according to the academic and professional goals of the student. All students are considered to be majoring in biology, and each student is assigned an advisor to aid in program decisions.

Attendance at a 5-week Summer Session program in Field Forestry at the College's Warrensburg Campus is required. In special cases, attendance at the Cranberry Lake Biological Station or its equivalent may be substituted.

FOREST BIOLOGY CURRICULUM

First Semester		Credit Hours	Second Semester		Credit Hours
Freshman Year					
CHE 106	General Chemistry ...	3	CHE 116	General Chemistry ...	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
FBO 100	General Botany	4	FZO 100	General Zoology	4
English		3	English		3
[1]Math		3	[1]Math		3
[2]Elective		3	[2]Elective		3
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			17
Sophomore Year					
FCH 221	Organic Chemistry I .	3	FCH 223	Organic Chemistry II .	3
FCH 222	Organic Chemistry Lab I	1	FCH 224	Organic Chemistry Lab II	1
PHY 103	General Physics	4	PHY 104	General Physics	4
FBL 320	General Ecology	3	FEC 300	Intro to Macro Economics	3
[2]Electives		6	[2]Electives		6
		17			17
Summer Session Alternate A[3]					
SUMMER SESSION IN FIELD FORESTRY. 5 weeks—6 credit hours. This program is conducted in two separate sessions during the summer period at the College's Pack Demonstration Forest near Warrensburg, New York.			ERM 300	Summer Session in Field Forestry	6
					6
[3]See Note 3 page 33.					
Junior Year					
FBO 315	Dendrology I	2	FBL 370	Principles of Genetics	3
FEN 350	Elements of Forest Entomology	3	FBL 371	Principles of Genetics Lab	1
FBL 330	Principles of General Physiology	3	APM 471 or APM 491	Introduction to Statistical Analysis .....(3) / Introduction to Probability and Statistics .....(3)	3
[2]Electives		6	GOL 105 or SIL 332	Earth Science ....(3) / Soils .....(3)	3
			[2]Electives		2
		14			12
Summer Session Alternate B[3]					
SUMMER SESSION IN ENVIRONMENTAL BIOLOGY 8 weeks, 8 credits. Courses selected require approval of the student's advisor. Program conducted in June-August at the Cranberry Lake Biological Station, Pack Experimental Forest, Cranberry Lake.					

Summer Session Alternate C[3]

Attendance at other approved biological field stations may be arranged. The courses selected must have the prior approval of the student's advisor.

Senior Year			
[2]Electives	16	[2]Electives	15
	16		15

[1]Mathematics through integral calculus (MAT 227 or the equivalent) is required.

[2]In addition to the specified courses, students must meet the following requirements:

(a) 12 Credit Hours in a selected biology concentration (Zoology or Wildlife Biology, Botany, Forest Entomology, or Silvics.)

(b) 6 Credit Hours in a second biological area.

(c) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.

(d) 3 Credit Hours in the Resource Management area.

(e) 9 Credit Hours in humanities & social sciences chosen with approval of Faculty Advisor.

(f) 27 Credit Hours in elective courses selected with approval of the Faculty Advisor.

[3]Students with a 2.5 academic average or better may substitute for this requirement 8 Credit Hours of courses at the Cranberry Lake Biological Station or minimum of 6 Credit Hours at other Biological Field Stations. The courses selected must have the approval of the student's advisor. It is preferable that the summer program be taken between the Junior and Senior Years.

NOTE: 5 credits of additional Forestry courses are recommended for those students not attending the summer session in Field Forestry.

A total of 131 credit hours is required.

In addition to the courses specified in the program, students must meet the following requirements:

1) 12 credits in a selected biology concentration (zoology or wildlife biology, botany, forest entomology, silvics).

2) 6 credits in a second biological area.

3) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.

4) 3 credits in the resources management area.

5) 9 credits in the humanities and social sciences selected with the approval of the faculty advisor.

6) 27 credits in elective courses selected with the approval of the faculty advisor.

General requirements for federal and state biology positions are met by the curriculum. Position requirements in a broad range of special biological fields related to natural resources may also be achieved by selection of electives. Requirements for federal and state forestry positions may be satisfied by choosing specified forestry subjects as electives.

Electives

Students planning graduate study are urged to take two semesters of a language (as approved by their faculty advisor) as a part of their humanistic-social sciences elective requirement.

Students planning to meet special requirements for biology specialty positions in federal and state service should review the available Civil Service publications and become familiar with the specific course requirements to be met by elective choice.

Students planning to meet special requirements for Federal Civil Service positions in forestry at the GS-5 and GS-7 levels may do so by electing 10 credits in additional forestry courses and attending the Summer Session in Field Forestry at Warrensburg, New York. These special forestry requirements may be fulfilled by courses selected with the approval of the faculty advisor.

Transfer Students

The curriculum is arranged to facilitate transfer of students from the State University community colleges at the end of their freshman or sophomore years. Recommended core courses for students planning to transfer as entering juniors total 64 credits or an associate degree and include: biology (8 credits); general chemistry (8); organic chemistry (8); physics (8); mathematics through integral calculus (8); economics (3); English (6); and electives (14).

Chemistry

By selecting proper electives, students in either of the two following options may be certified on graduation as having completed an American Chemical Society-approved curriculum. Both options are excellent grounding for professional work at the B.S. level or for advanced graduate study.

Because of cooperative arrangements among local institutions, students may also emphasize various aspects of environmental chemistry.

Recommended core courses for students planning to transfer as entering juniors total 64 credits or an associate degree and include: biology 8 credits; general chemistry 8; organic chemistry 8; physics 8; mathematics through integral calculus 8; economics 3; English 6; electives 14.

Biochemistry and Natural Products Option

This option is designed for students who wish to approach problems in the life sciences with the tools and point of view of the chemist. In addition to a major concentration in the several branches of chemistry, the student obtains a solid grounding in the fundamentals of physics, mathematics, and biology. Professional electives can provide a minor concentration in botany, ecology, entomology, zoology, or physiology. Collaborative efforts of chemists and biologists are providing new solutions to problems of environment, natural resources and health.

[1]One course of mathematics or Applied Mathematics beyond MAT 227 or MAT 397, or equivalent, is required.

[2]A sequence of professional electives should be chosen in the Junior year. In addition to the freshman biology courses, a student whose emphasis is in biochemistry must take three semester hours of genetics and at least another three semester hour biology course. A student whose emphasis is in natural products must take three semester hours of biology in addition to the freshman biology courses and an additional hour of organic chemistry laboratory (FCH 496) and a second hour of FCH 384.

[3]Introduction to Polymer Science, FCH 450 (3 credit hours) is suggested.

[4]Petition by student to Dept. for replacement of this requirement will be considered to allow time for special interest.

[5]ERM 402 may be substituted.

NOTE: A total of 133 credit hours is required.

CHEMISTRY CURRICULUM
BIOCHEMISTRY AND NATURAL PRODUCTS CHEMISTRY OPTION

First Semester		Credit Hours	Second Semester		Credit Hours
		Freshman Year			
FBO 100	General Botany	4	FZO 100	General Zoology	4
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
[1]Math		3	[1]Math		3
Elective		3	Elective		3
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			17
		Sophomore Year			
FCH 221	Organic Chemistry I	3	FCH 223	Organic Chemistry II	3
FCH 222	Organic Chemistry Lab I	1	FCH 224	Organic Chemistry Lab II	1
EGL 210	Advanced Composition and Literature	3	EGL 211	Technical Writing	3
[1]Math or Elective		3	[1]Math or Elective		3
PHY 211	General Physics for Science Students I	4	PHY 212	General Physics for Science Students II	4
Elective		3	FEC 290	Introduction to Economics for Forestry	3
		17			17
		Junior Year			
FCH 325	Organic Chemistry III	4	[1]Math or Elective		3
CHE 332	Quantitative Analysis	2	CHE 434	Instrumental Methods	2
CHE 333	Quantitative Analysis Lab	1	CHE 435	Instrumental Methods Lab	1
CHE 346	Physical Chemistry	3	CHE 356	Physical Chemistry	3
[2]Professional Elective		2–4	CHE 357	Physical Chemistry Lab	1
Elective		3	FCH 384	Spectrometric Identification of Organic Compounds	1
			[2]Professional Elective		2–3
			Elective		3
		15–17			16–17
		Senior Year			
FCH 495	Introduction to Professional Chemistry	2	[4]FCH 498	Introduction to Research	5
FCH 475	Wood Chemistry I	2	FCH 497	Undergraduate Seminar	1
FCH 478	Wood Chemistry Lab	1	FCH 532	Biochemistry II	3
FCH 530	Biochemistry I	3	FCH 477	Wood Chemistry III	2
FCH 531	Biochemistry Lab	2	[5]PAD 215	Public Speaking	3
[3]Elective		3	Elective		3
Elective		3			
		16			17

Natural and Synthetic Polymer Chemistry Option

This option is designed for students interested in the structure and physical properties of man-made and natural materials, the giant molecules of wood, plastics, polysaccharides, proteins, rubbers, and fibers. The recently discovered chemistry of these materials constitutes one-half the concern of chemical industry and is the origin of a major revolution in our way of life and our understanding of nature. This special subject area is an advanced core of studies beyond the basic courses of the classical undergraduate chemistry curriculum.

[1]One course of Mathematics or Applied Mathematics beyond MAT 227 or MAT 397, or equivalent, is required.

[2]A sequence of two or more professional electives in related disciplines with a minimum of 5 credits should be chosen in the fall of the Junior Year from the College of ES&F offerings. Wood Products Engineering and Paper Science and Engineering courses are recommended.

[3]Biochem I, FCH 530 (3 credit hours) is suggested.

[4]Petition by student to Dept. for replacement of this requirement will be considered to allow time for special interest.

[5]ERM 402 may be substituted.

NOTE: A total of 133 credit hours is required.

CHEMISTRY CURRICULUM
NATURAL AND SYNTHETIC POLYMER CHEMISTRY OPTION

First Semester		Credit Hours	Second Semester		Credit Hours
		Freshman Year			
FBO 100	General Botany	4	FZO 100	General Zoology	4
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
[1]Math		3	[1]Math		3
Elective		3	Elective		3
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			17
		Sophomore Year			
FCH 221	Organic Chemistry I	3	FCH 223	Organic Chemistry II	3
FCH 222	Organic Chemistry Lab I	1	FCH 224	Organic Chemistry Lab II	1
EGL 210	Advanced Composition and Literature	3	EGL 211	Technical Writing	3
[1]Math or Elective		3	[1]Math or Elective		3
PHY 211	General Physics for Science Students I	4	PHY 212	General Physics for Science Students II	4
Elective		3	FEC 290	Introduction to Economics for Forestry	3
		17			17
		Junior Year			
FCH 325	Organic Chemistry III	4	[1]Math or Elective		3
CHE 332	Quantitative Analysis	2	CHE 434	Instrumental Methods	2
CHE 333	Quantitative Analysis Lab	1	CHE 435	Instrumental Methods Lab	1
CHE 346	Physical Chemistry	3	CHE 356	Physical Chemistry	3
[2]Professional Elective		2–4	CHE 357	Physical Chemistry Lab	1
Elective		3	FCH 384	Spectrometric Identification of Organic Compounds	1
			[2]Professional Elective		2–3
			Elective		3
		15–17			16–17
		Senior Year			
FCH 495	Introduction to Professional Chemistry	2	[4]FCH 498	Introduction to Research	5
FCH 450	Introduction to Polymer Science	3	FCH 451	Polymer Processing and Technology	3
FCH 551	Polymer Techniques	2	FCH 497	Undergraduate Seminar	1
FCH 475	Wood Chemistry I	2	FCH 477	Wood Chemistry III	2
FCH 478	Wood Chemistry Lab	1	[5]PAD 215	Public Speaking	3
[3]Elective		3	Elective		3
Elective		3			
		16			17

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE ENGINEERING

The School of Environmental and Resource Engineering applies the principles and professional skills of engineering analysis and design to creative environmental stewardship, with emphasis on responsible use of renewable natural resources for the benefit of society. The curricula, programs and activities of the School are oriented toward multiple use of forest resources, wood products, paper and related fibrous materials. Environmental considerations, including pollution abatement, waste recovery and recycle, energy conservation, noise control and safety optimization, are basic to all courses and studies.

In each curriculum, fundamental professional requirements are met by a core of required courses, supplemented by optional choices and electives. Students may enter either as freshmen or as transfers from other colleges or universities. Applicants with associate degrees in engineering science or science and mathematics usually enter as juniors. Graduates of two-year technology programs may also earn junior standing if their previous studies include one year each of English, general chemistry and general physics, plus mathematics through integral calculus. Courses in general botany, engineering mechanics and economics are also desirable.

The School offers bachelor of science degrees in forest engineering, paper science and engineering and wood products engineering. Specific requirements in the programs leading to these degrees are described below.

Forest Engineering

The primary objective of this curriculum is to prepare qualified graduates who will operate with professional engineering competence within the context of forestry and natural resources development. It is an engineering curriculum, fundamentally interwoven with essential principles of forestry to develop environmental understanding and ecological awareness.

Students who successfully complete this four-year curriculum will be awarded a bachelor of science degree by the College. This degree is a starting point for a wide range of career opportunities, since minimum professional requirements, both in engineering and in forestry, are met by the core of required courses. This core may then be supplemented in areas suited to the students' goals through proper advisory use of the many electives within the curriculum.

Qualified graduates in search of further formal education will find easy access to engineering graduate schools throughout the country as well as a number of graduate programs here at the College and Syracuse University. In addition, graduates may enter an established five-year program in either civil, industrial or mechanical engineering at Syracuse University. A bachelor of science degree in engineering will be awarded

by Syracuse University upon completion of requirements in the fifth year.

Graduates with associate degrees in engineering science or science and mathematics usually find transfer acceptance as entering juniors. Students looking forward to career opportunities in forest engineering are urged to obtain guidance on specific requirements from the Admissions Office of the College as early as possible in their preparatory programs.

FOREST ENGINEERING CURRICULUM

First Semester		*Credit Hours*	*Second Semester*		*Credit Hours*
Freshman Year					
FBO 100	General Botany	4	FZO 100	General Zoology	4
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
[1]Math or Elective		3	[1]Math or Elective		3
Elective		3	Elective		3
PED or ROTC		0	ERE 100	The Engineer and the Environment	1
GFO 032	Orientation	0	PED or ROTC		0
		17			18
Sophomore Year					
[1]Math or Elective		3	[1]Math or Elective		3
GRA 280	Technical Drawing	1	APM 360	Introduction to Computer Programming	3
FEC 301	Introduction to Micro-Economics	3	FEC 300	Introduction to Macro-Economics	3
PHY 103	General Physics	4	PHY 104	General Physics	4
MEE 225	Engineering Mechanics	4	MEE 226	Engineering Mechanics	3
Elective		3			
		18			16

Junior Year

FEG 371	Plane and Geodetic Surveying	3	FEG 302	Forest Eng. Problems	3
FBO 315	Dendrology I	2	FEG 340	Hydrology	3
APM 491	Introduction to Probability and Statistics	3	FEG 363	Photogrammetry	3
MAT 585	Higher Mathematics for Engineers and Scientists I	3	[3]SIL 324 or FEG 352	General Silviculture / Intro. to Remote Sensing	3
CIE 327	Principles of Fluid Mechanics	4	CIE 325	Mechanics of Deformable Bodies	3
[2]Engineering Science Elective		3	Elective		3
		18			18

Senior Year

FEG 410	Structures	4	FEG 437	Transportation Systems	3
FEG 422	Principles of Production (Harvesting)	3	[4]FEG 447	Hydrologic Controls	3
FMG 430	Forest Management	4	FEG 489	Forest Engineering Planning	4
CIE 437	Soil Mechanics and Foundations I	3	Electives		6
Elective		1–3			
		15–17			16

Optional Senior Year—Surveying Emphasis

FEG 460	Theory of Errors and Adjustments	3	FEG 437	Trans Systems	3
FEG 464	Photogrammetry II	3	FEG 477	Survey Systems Design	3
FEG 474	Geodesy	4	FEG 489	Forest Engineering Planning	4
FEG 486	Cartographic Surveying	2	Electives		6
ERM 482	Legal Aspects of Surveying	3			
Electives		0–3			
		15–18			16

[1]12 credit hours must be elected in social sciences or humanities, at least 3 of which must be from the College. Mathematics through Differential Equations is required.

[2]Electrical Engineering, thermodynamics, or advanced engineering materials, each beyond freshman physics or the equivalent of CIE 325.

[3]SIL 324 required for forest engineering; FEG 352 required for optional senior year—surveying emphasis. Students may take both courses.

[4]An advisor approved engineering design or synthesis course may be substituted. To be approved, the course must fit the objectives of professional forest engineering. Advanced courses in production or operational systems are suitable examples.

NOTE: A total of 136 credit hours is required for the B.S. degree from the College of E.S.&F. in this curriculum.

Paper Science and Engineering

The curricula in the Department of Paper Science and Engineering are designed to provide a broad base of study and to prepare students for a variety of careers in the paper and related industries. Two options are offered: paper science and paper engineering.

PAPER SCIENCE & ENGINEERING CURRICULUM
PAPER SCIENCE OPTION

First Semester		*Credit Hours*	*Second Semester*		*Credit Hours*
		Freshman Year			
FBO 100	General Botany	4	FEC 300	Introduction to Macro-Economics	3
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
[1]Math		3	[1]Math		3
Elective		3	Elective		3
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			16
		Sophomore Year			
[1]Math or Elective		3	[1]Math or Elective		3
FCH 221	Organic Chemistry I	3	FCH 223	Organic Chemistry II	3
FCH 222	Organic Chemistry Lab I	1	FCH 224	Organic Chemistry Lab II	1
PHY 103	General Physics	4	PHY 104	General Physics	4
ACC 204	Financial Accounting Systems	3	EGL 211	Technical Writing	3
FEC 301	Introduction to Micro-Economics	3	Elective		3
		17			17
		Junior Year			
FCH 475	Wood Chemistry I	2	GRA 181	Graphics I	2
FCH 476	Wood Chemistry II	2	CHE 332	Quantitative Analysis	2
CHE 346	Physical Chemistry	3	CHE 333	Quantitative Analysis Lab	1
PSE 300	Introduction to the Pulp & Paper Industry	3	CHE 356	Physical Chemistry	3
WPE 387	Wood Structure & Properties	4	CHE 357	Physical Chemistry Lab	1
Elective		3	PSE 301	Pulp and Paper Process	3
			PSE 302	Paper Processes Lab	1
			PSE 370	Principles of Mass and Energy Balance	3
		17			16

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—5 credit hours. Twelve weeks' full-time pulp or paper mill employment approved by the Department between the junior and senior years.

		Senior Year			
PSE 461	Pulping Technology ..	4	PSE 456	Economics of Pulp and Paper	3
PSE 465	Paper Properties	5			
PSE 472	Pulp & Paper Unit Operations Lab I ...	1	PSE 466	Paper Coating	3
			PSE 468	Papermaking Processes	3
PSE 575	Unit Operations I: Fluid Mechanics & Heat Transfer	3	PSE 496	Special Topics	1
			PSE 578	Unit Operations III: Mass Transfer	3
PSE 576	Unit Operations II: Process Control and Mass Transfer	2	PSE 579	Unit Operations IV: Recovery Processes Operations	2
		15			15

[1]Mathematics through MAT 227, or the equivalent, is required; it is recommended that students in this option also complete MAT 328.

NOTE: A total of 135 credit hours is required.

Paper Science Option

This program provides basic training in the physical sciences, mathematics, and engineering, combined with a specific understanding of the chemistry and anatomy of wood, pulping of wood, chemistry and physics of paper and paper formation, and the chemical engineering of pulp and paper processing. The option permits the student a range of elective courses with a choice between the sciences or management.

Paper Engineering Option

A student may earn a chemical engineering degree in one year following the completion of this option. This program is designed to provide a basic education in the physical sciences and mathematics, with emphasis on chemical engineering. Courses include fundamental studies in wood chemistry, wood anatomy, pulping and the chemistry and physics of paper and paper formation.

Students having an associate degree in engineering science can complete their baccalaureate degree program in two years. Students who do not have an associate degree in engineering science may also enter and obtain a baccalaureate degree in two years provided they have acceptable transfer credits of 66 credits. These credits shall include the following core courses:

English ..... *6 credits*
General Chemistry ..... *8 credits*
Organic Chemistry ..... *8 credits*
General Physics ..... *8 credits*
Mathematics ..... *9 credits*
Economics ..... *6 credits*
Electives ..... *As required*

To fulfill the mathematics requirement, paper science option students need analytical geometry, differential and integral calculus; Paper Engineering Option students need 3 additional credits in an advanced mathematics course beyond integral calculus.

If a student desires to take more than two years to complete his bachelor of science degree program, deficiencies in the core courses may be completed during the regular academic year. Credit hours for core courses taken in addition to the associate degree cannot be substituted for credit hours in either the junior or senior year. If a student has taken a course during the first two years that is considered equivalent to any of the required courses in the final two-year program at the College of Environmental Science and Forestry, substitution of other appropriate courses can be made, but the total credit hours required for graduation will not be reduced.

PAPER SCIENCE AND ENGINEERING CURRICULUM
PAPER ENGINEERING OPTION

First Semester		*Credit Hours*	*Second Semester*		*Credit Hours*
		Freshman Year			
FBO 100	General Botany	4	FEC 300	Introduction to Macro-Economics	3
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
[1]Math		3	[1]Math		3
Elective		3	Elective		3
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			16
		Sophomore Year			
[1]Math or Elective		3	[1]Math or Elective		3
FCH 221	Organic Chemistry I	3	FCH 223	Organic Chemistry II	3
FCH 222	Organic Chemistry Lab I	1	FCH 224	Organic Chemistry Lab II	1
PHY 103	General Physics	4	PHY 104	General Physics	4
ACC 204	Financial Accounting Systems	3	EGL 211	Technical Writing	3
FEC 301	Introduction to Micro-Economics	3	Elective		3
		17			17

[1]Mathematics through MAT 328, or the equivalent, is required; it is recommended that students in this option also complete MAT 585.

Junior Year

FCH 475	Wood Chemistry I ...	2	GRA 181	Graphics I	2
FCH 476	Wood Chemistry II ...	2	CHE 332	Quantitative Analysis .	2
CHE 346	Physical Chemistry ...	3	CHE 333	Quantitative Analysis Lab	1
PSE 300	Introduction to the Pulp & Paper Industry	3	CHE 356	Physical Chemistry ...	3
			CHE 357	Physical Chemistry Lab	1
WPE 387	Wood Structure & Properties	4	PSE 301	Pulp and Paper Processes	3
Elective		3	PSE 302	Paper Processes Lab ..	1
			PSE 370	Principles of Mass and Energy Balance	3
		17			16

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—5 credit hours. Twelve weeks' full-time pulp or paper mill employment approved by the Department between the junior and senior years.

Senior Year

PSE 461	Pulping Technology ..	4	PSE 466	Paper Coating	3
PSE 465	Paper Properties	5	PSE 468	Papermaking Processes	3
PSE 472	Pulp & Paper Unit Operations Lab I ...	1	PSE 474	Pulp & Paper Unit Operations Lab II ..	3
PSE 575	Unit Operations I: Fluid Mechanics & Heat Transfer	3	PSE 496	Special Topics	1
			PSE 578	Unit Operations III: Mass Transfer	3
PSE 576	Unit Operations II: Process Control and Mass Transfer	2	PSE 579	Unit Operations IV: Recovery Processes Operations	2
		15			15

NOTE: A total of 135 credit hours is required.

WOOD PRODUCTS ENGINEERING CURRICULUM
WOOD SCIENCE OPTION

First Semester		*Credit Hours*	*Second Semester*		*Credit Hours*
	Freshman Year				
FBO 100	General Botany	4	FZO 100	General Zoology	4
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
MAT 125	Elementary Analytic Geometry	3	MAT 226	Differential Calculus	3
Elective		3	GRA 181	Graphics I	2
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			16
	Sophomore Year				
FCH 221	Organic Chemistry I	3	FCH 223	Organic Chemistry II	3
FCH 222	Organic Chemistry Lab I	1	FCH 224	Organic Chemistry Lab II	1
EGL 210	Advanced Composition and Literature	3	EGL 211	Technical Writing	3
MAT 227	Integral Calculus	3	MAT 328	Topics in Calculus	3
PHY 103	General Physics	4	PHY 104	General Physics	4
[1]Elective		3	FEC 290	Introduction to Economics for Forestry	3
		17			17
	Junior Year				
CHE 346	Physical Chemistry	3	CHE 356	Physical Chemistry	3
WPE 322	Mechanical Processing	3	WPE 326	Fluid Treatments	3
FBO 315	Dendrology I	2	WPE 320	Polymeric Adhesives and Coatings	3
APM 491	Introduction to Probability and Statistics	3	[1]Electives		6
Wood Anatomy Sub-option: FBL 330 or Wood Physics Sub-option: APM 360	Principles of General Physiology / Introduction to Computer Programming	3			
WPE 387	Wood Structure and Properties	4			
		18			15

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

[1]It is recommended that at least 9 credit hours of these electives be in the Social Sciences or Humanities.

NOTE: A total of 133 credit hours is required.

Senior Year

WPE 422	Composite Materials	3	WPE 362	Timber Mechanics	4
Wood Anatomy Sub-option:			WPE 498	Research or Design Problem	3
Elective	(3)		Wood Anatomy Sub-option:		
PHY 261	Introduction to Modern Physics	(3)	WPE 688	Commercial Timbers of the World	(3)
Wood Physics Sub-option:		6–7	FBO 585	Plant Anatomy	(3)
MEE 225	Engineering Mechanics	(4)	Wood Physics Sub-option:		
Elective		(3)	MEE 226	Engineering Mechanics	(3) 6
Elective		3	FCH 520	Nuclear and Radiation Chemistry	(2)
[1]Elective		2–3	FCH 521	Nuclear Chemical Techniques	(1)
			[1]Elective		3
		15			16

Wood Products Engineering

The purpose of the department of wood products engineering is to prepare students for a wide variety of professional occupations all of which are concerned with the use of wood as a primary structural material. Four options are available in the department's curriculum: building construction, materials marketing, production systems engineering, and wood science. Brief descriptions of these options are shown in the following sections.

Because wood is the only major construction material that comes from a renewable natural resource, attention is being focused on it as a substitute for other classes of materials which originate from, and therefore deplete, nonrenewable resources. Thus, one of the aims of the departmental program is to teach students the fundamentals of efficient wood processing, distribution or final use, whether that be a piece of furniture or a complete house.

Students may enter this curriculum either as freshmen or as transfers from other colleges or universities. Students with associate degrees may enter with full junior standing if certain subject matter requirements are met. These requirements are different for the various options and are specified in detail under the option descriptions below. Students considering transfer into the wood products engineering department are urged to consult with College Admissions personnel for detailed guidance concerning option requirements.

Wood Science Option

The basic aim of the wood science option is to give students a sufficiently basic and broad scientific background so that they will be prepared to enter graduate school for advanced degrees and ultimately go into positions in research and/or development work in industry, government laboratories, or universities.

WOOD PRODUCTS ENGINEERING CURRICULUM
BUILDING CONSTRUCTION OPTION

First Semester		Credit Hours	Second Semester		Credit Hours
Freshman Year					
FBO 100	General Botany	4	FEC 300	Introduction to Macro-Economics	3
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
MAT 125	Elementary Analytic Geometry	3	MAT 226	Differential Calculus	3
[1]Elective		3	GRA 181	Graphics I	2
PED or ROTC		0	ERE 100	The Engineer and the Environment	1
GFO 032	Orientation	0	PED or ROTC		0
		17			16
Sophomore Year					
WPE 322	Mechanical Processing	3	APM 360	Introduction to Computer Programming	3
FEC 301	Introduction to Micro-Economics	3	GOL 101	General Geology	3
MAT 227	Integral Calculus	3	PHY 104	General Physics	4
PHY 103	General Physics	4	[1]Electives		6
[1]Elective		3			
		16			16
Junior Year					
MEE 225	Engineering Mechanics	4	WPE 362	Timber Mechanics	4
APM 471	Introduction to Statistical Analysis	3	FEG 342	Hydraulics in Construction	4
FEG 371	Plane and Geodetic Surveying	3	WPE 360	Engineering Materials Testing & Properties	3
ACC 204	Financial Accounting Systems	3	ACC 205	Managerial Accounting and Financial Decisions	3
[1]Elective		3	[1]Elective		3
		16			17

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the Junior year.

Senior Year					
WPE 422	Composite Materials	3	WPE 326	Fluid Treatments	3
FEG 410	Structures	4	WPE 320	Polymeric Adhesives and Coatings	3
CIE 437	Soil Mechanics and Foundations I	3	WPE 450	Construction Equipment	3
OPM 365	Management of Operations	3	WPE 454	Construction Management	3
[1]Elective		3	[1]Elective		3
		16			15

The wood science option has two major subdivisions: 1) The biological aspects of wood science in which the relationships between the pure biological sciences and the anatomy-property relationships of wood are brought out, and 2) The physical science aspects of wood science in which the basic physical sciences are used to help characterize the structure-property relationships in wood. Students may further broaden their background in either of these programs through the wise use of electives.

Transfer students with an A.A.S. or A.S. degree may enter with full junior standing if their previous course work includes one year each of general chemistry, organic chemistry, and physics, plus mathematics through topics in calculus. Any deficiencies in botany or zoology may be fulfilled later.

Building Construction Option

The current pressures for new housing and urban reconstruction have led to an option that develops a deep awareness of the effects of construction on the environment, as well as the efficient use of materials, particularly wood. There is an increasing demand for technically trained specialists in the construction industry and supporting fields who have the skills to use efficiently the wide variety of wood-based building materials, with consideration to their place in respect to other materials and to the purpose of the end product.

The specialty electives are designed to allow the opportunity for concentration areas related to the individual's career objectives. It is felt that the wide range of construction activities found in practice cannot be adequately serviced by a rigid program of study.

Suggested areas and available courses have been grouped below. Many courses are not mentioned, but most relevant material should be under the following areas:

Engineering	*Management*	*Environment*
Structural Analysis	Marketing	Urban Planning
Building Systems	Business Law	Solid Waste Disposal
Adv. Soil Mechanics	Accounting	Waste Water Treatment
Photogrammetry	Finance	Environmental Sanitation
Thermodynamics	Industrial Management	Land Use
Transportation	Operations Research	Landscape Architecture
Systems Analysis	Real Estate	General Ecology

[1]It is recommended that 12 credit hours of electives be taken in the Social Science-Humanities areas. The remaining electives shall be selected from the following areas:

a. From another engineering discipline at the College of E.S.&F. or S.U.
b. General technical or management areas.

NOTE: A total of 131 credit hours is required.

Transfers with A.A.S. or A.S. degrees will be accepted with full junior standing. They are required to have at least one semester each of chemistry and physics and recommended to have calculus and engineering mechanics. Calculus and engineering mechanics may be taken after transfer with some sacrifice of elective courses and the possibility of delayed graduation.

With careful planning and use of electives, students can obtain a B.S. degree in civil or mechanical engineering at Syracuse University with an additional year's work.

WOOD PRODUCTS ENGINEERING CURRICULUM
PRODUCTION SYSTEMS ENGINEERING OPTION

First Semester		*Credit Hours*	*Second Semester*		*Credit Hours*
		Freshman Year			
FBO 100	General Botany	4	FEC 300	Introduction to Macro-Economics	3
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
MAT 125	Elementary Analytic Geometry	3	MAT 226	Differential Calculus	3
[1]Elective		3	GRA 181	Graphics I	2
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			15
		Sophomore Year			
FEC 301	Introduction to Micro-Economics	3	APM 360	Introduction to Computer Programming	3
EGL 210	Advanced Composition and Literature	3	EGL 211	Technical Writing	3
MAT 227	Integral Calculus	3	MAT 328	Topics in Calculus	3
PHY 103	General Physics	4	PHY 104	General Physics	4
[1]Elective		3	[1]Elective		3
		16			16
		Junior Year			
WPE 322	Mechanical Processing	3	WPE 320	Polymeric Adhesives and Coatings	3
WPE 387	Wood Structure and Properties	4	WPE 326	Fluid Treatments	3
IOR 548	Engineering Economic Analysis	3	WPE 362	Timber Mechanics	4
APM 491	Introduction to Probability and Statistics	3	FMG 461	Operation Cost Control	3
MEE 225	Engineering Mechanics	4	MEE 351	Fundamentals of Thermodynamics	3
		17			16

WPE: 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

SUMMER EXPERIENCE: 2 months' experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required. Usually fulfilled between the junior and senior years.

Senior Year

WPE 422	Composite Materials ..	3	WPE 472	Production Systems II: Synthesis	3
WPE 470	Production Systems I: Analysis	3	WPE 498	Research or Design Problem	3
WPE 497	Senior Seminar for Wood Products Engineering Majors .	2	ELE 222	Electrical Science II ..	3
ELE 221	Electrical Science I ...	3	[1]Electives		6
IOR 575	Industrial Methods & Systems Engineering	3			
Technical Elective		3			
		17			15

[1]It is recommended that students elect at least 9 credit hours from the Social Sciences or the Humanities.

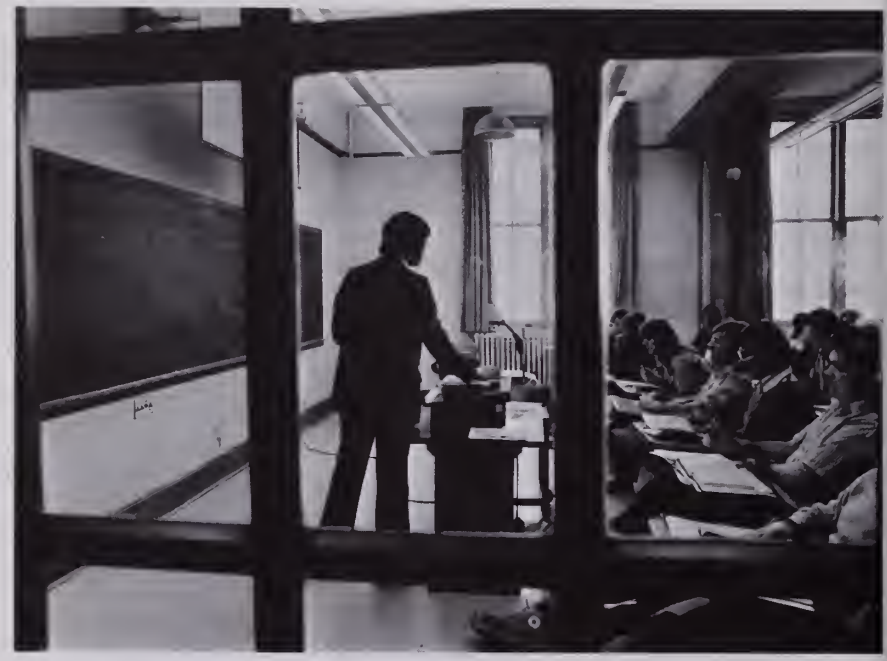
NOTE: A total of 131 credit hours is required.

Production Systems Engineering Option

The goal of this option is to provide an engineering background in the fields of process development, plant design, and production management of modern industries utilizing wood and related materials. Modern production plants are complex systems of machines, men, money and management integrated for production in highly competitive markets. Because the design and operation of such systems are essentially an engineering problem, this option provides a solid foundation in fundamental sciences and applied mathematics which are the basic tools needed. Beyond the basics, students take courses in engineering and management sciences essential to the planning and development of production processes and to the design and operation of modern manufacturing facilities.

Transfer students with A.A.S. or A.S. degrees may enter with full junior standing if their previous course work includes one year each of chemistry and physics plus mathematics through integral calculus. Students who have questions concerning their status after transfer into this option should consult Admissions Office personnel.

Production systems engineering students may arrange with their advisors to prepare for special program options leading to admission into a bachelor of science degree program at Syracuse University in either industrial or mechanical engineering. Seniors presenting acceptable Graduate Record Examination scores may be admitted to an M.S. program in industrial engineering at Syracuse University. With adequate planning such degrees can usually be obtained after one year's additional work.



Materials Marketing Option

This option is designed to prepare students for professional careers in the field of technical sales and management of distributive enterprise in the wood products and allied industries. The marketing of wood products with their related materials and services brings together the essential elements of production distribution and consumption of our renewable natural resource. Preparation for successful marketing involves development of basic knowledge of the materials and their properties, their efficient processing and fabrication, and the effective use of finished products. Because marketing channels vary widely in nature, size and complexity to meet the equally varied needs of commercial, industrial and consumer markets, preparation must also include the sound general business orientation required of any segment of the economy.

Transfers with an A.A.S. degree will be accepted with full junior standing. They are required to have at least one semester each of chemistry and physics and are recommended to have one semester each of accounting and economics. Accounting and economics may be taken after transfer with some sacrifice of elective courses and the possibility of delayed graduation.

With careful planning, students electing the materials marketing option may obtain the degree of Master of Business Administration from Syracuse University with one year's additional work beyond the bachelor's degree.

WOOD PRODUCTS ENGINEERING CURRICULUM
MATERIALS MARKETING OPTION

First Semester		Credit Hours	Second Semester		Credit Hours
	Freshman Year				
FBO 100	General Botany	4	PAD 215	Public Speaking	3
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
MAT 125	Elementary Analytic Geometry	3	MAT 226	Differential Calculus	3
Elective		3	ERE 100	The Engineer & the Environment	1
PED or ROTC		0	Elective		2
GFO 032	Orientation	0	PED or ROTC		0
		17			16
	Sophomore Year				
ACC 204	Financial Accounting Systems	3	ACC 205	Managerial Accounting and Financial Decisions	3
EGL 210	Advanced Composition and Literature	3	EGL 211	Technical Writing	3
MAT 227	Integral Calculus	3	APM 471	Introduction to Statistical Analysis	3
PHY 103	General Physics	4	PHY 104	General Physics	4
GRA 280	Technical Drawing	1	Elective		3
Elective		3			
		17			16
	Junior Year				
WPE 322	Mechanical Processing	3	WPE 320	Polymeric Adhesives and Coatings	3
APM 360	Introduction to Computer Programming	3	WPE 326	Fluid Treatments	3
MAR 355	Marketing & Society	3	WPE 362	Timber Mechanics	4
WPE 387	Wood Structure & Properties	4	FEC 290	Introduction to Economics for Forestry	3
Elective		3	Elective		3
		16			16

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

	Senior Year				
WPE 422	Composite Materials	3	WPE 444	Materials Marketing	3
WPE 442	Light Construction	3	FEC 420	Economics of Wood-Using Industries	3
WPE 497	Senior Seminar for Wood Products Engineering Majors	2	LPP 557	The Law of Commercial Transactions	3
LPP 355	Introduction to the Legal System	3	FIN 355	Money and Banking	3
Electives		6	Elective		3
		17			15

NOTE: A total of 132 credit hours is required.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE MANAGEMENT

The School of Environmental and Resource Management prepares students for the critical role of managing forest and related resources and their associated environments for human benefit. Management in this sense embraces the integration of basic ecological and social principles into comprehensive programs of planning, manipulation and use of forest and open lands for the sustained production of timber, forage, water, wildlife and recreational values consistent with national needs and the protection and enhancement of environmental quality. It includes further the effective implementation of these programs via the administrative process in accordance with established policies and goals and in cooperation with individuals and organizations, both public and private.

Students completing the resource management curriculum are qualified for professional practice as foresters and land managers with public and private organizations or as private consultants serving a wide array of clients. The significance of such service to human welfare and the potential it offers for a meaningful career can be more fully appreciated when it is recognized that forest lands comprise nearly 60 percent of the land area of New York State and roughly a third of that, respectively, of the United States and the world. The goods and services that flow from this vast resource base are of critical and growing importance to the needs of modern society and influence in a major way the quality of the environment.

The program also offers opportunity for students to pursue special interests, to prepare for advanced study or to develop their capabilities for service in a variety of fields pertinent to renewable natural resources and the environment, but not specifically forest oriented.

Environmental and Resource Management Curriculum

Though it represents the oldest area of professional instruction in the College, this is a newly-revised curriculum which was implemented with the entering Freshman class in 1973. A core of required courses, totaling 99 semester hours, presents the basic principles and practices that underly the purposeful management of forest and open lands for optimum production and use of any one or more of their potential products and services.

Extensive elective opportunities, totaling 38 semester hours, are available to help broaden the student's general education, to strengthen perceptions and integration of knowledge and to enable the student to enhance depth of understanding in areas of environmental and resource management of special interest or as a base for subsequent study at the graduate level. Several areas of concentration are defined which serve as a guide to faculty advisors and students in the process of selecting elective courses which will provide a meaningful sequence in terms of subject matter coverage. Such areas currently include *forest resources science,*

management science, applied management, environmental education and communications, urban forestry and *world forestry.*

Additional areas of concentration are under consideration for development in cooperation with other disciplinary units of the College, especially in relation to regional planning, resource engineering, and environmental studies. Students need not select a given area of concentration, but may choose elective courses in accordance with their respective interests and needs, the only restriction being that such selections have the approval of the student's faculty advisor.

A significant feature of the elective component of the curriculum is that the spring semester of the senior year consists wholly of electives and thus is available for a variety of independent or group study activities. These may be conducted in whole or in part on any one of the College's several campuses, or off campus at another institution, in cooperation with some resource management agency or firm or in conjunction with an overseas academic program operated by the College. Proposals for off-campus study are subject to faculty review and are carried out with varying degrees of faculty guidance to insure adherence to academic standards.

Considerable emphasis in the curriculum is placed on field instruction to provide students with intimate knowledge of how the forest ecosystem functions and how it is manipulated and used. Attendance at a 5-week, 6-credit hour Summer Session in Field Forestry is required following completion of the sophomore year. This session serves as the major avenue of entrance into the curriculum for transfer students.

Transfer Students

The curriculum is designed to facilitate to the fullest extent possible the transfer of qualified students from liberal arts and science programs in community colleges and other institutions of higher learning. For students contemplating such *transfer as entering juniors*, it is recommended that they have at least 64 semester hours of credit or an associate degree with from 37 to 54 of their credits distributed among specific course areas as presented below. Transfer students having the minimum level of credits shown will be able to complete the requirements of the curriculum beyond the Summer Session in Field Forestry with four additional semesters of course work. With anything less than the minimum credits shown, it will be necessary for a student to extend the period of study to include courses during the summer or an additional semester.

	Minimum Credit Hours	*Desired Credit Hours*
Botany	4	4
Zoology		4
Chemistry	8	8
Physics (mechanics, heat and sound)	4	8
Mathematics (Differential Calculus)	3	6
Social Sciences:		
Introductory Sociology . . . . . 3 *Introductory Psychology* 3	12	18
Introductory Economics . . . . . 6 *Introductory Political Science* . 6		
English	6	6
	37	54
Electives	27	10
	64	64

[1]Mathematics through Integral Calculus is required.

[2]Elective hour requirements are free to the extent that (a) they are in courses selected with the approval of a faculty advisor and (b) at least *nine* such elective hours are centered in forest biology and environmental and resource engineering, but with no less than one elective course in each of these broad fields.

NOTE: A total of 137 credit hours is required.

RESOURCE MANAGEMENT CURRICULUM (NEW CURRICULUM)

(Note: Available to Freshmen and Sophomores only)

First Semester		Credit Hours	Second Semester		Credit Hours
		Freshman Year			
FBO 100	General Botany	4	FZO 100	General Zoology	4
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	ERM 201	Social Sciences I—Sociocultural Processes	6
[1]Math		3	[1]Math		3
ERM 100	Introduction to Forestry and Environmental Management	3	PED or ROTC		0
PED or ROTC		0			
GFO 032	Orientation	0			
		14			17
		Sophomore Year			
ERM 202	Social Sciences II: Economic Processes	6	ERM 203	Social Sciences III: Political Processes	6
English		3	PHY 104	General Physics	4
PHY 103	General Physics	4	[2]Electives		6
[2]Elective		3			
		16			16
SUMMER SESSION IN FIELD FORESTRY—5 weeks, 6 credit hours: Required of all students following the sophomore year and prior to registration for the junior year (including junior year transfer students who elect this curriculum).			ERM 300	Summer Session in Field Forestry	6
		Junior Year			
ERM 423	Introduction to the Physical Environment	6	ERM 452	Management Models	3
ERM 424	Silvics—Silviculture	8	ERM 460	Forest Information Systems	4
ERM 451	Principles of Management	3	APM 491	Introduction to Probability and Statistics	3
			[2]Electives		6
		17			16
		Senior Year			
APM 492	Forest Biometrics	3	[2]Electives		17
ERM 465	The Social Environment of Resource Management	3			
ERM 467	Management of the Forest Enterprise	3			
[2]Electives		6			
		15			17

RESOURCE MANAGEMENT CURRICULUM (OLD CURRICULUM)

(Note: Available to Juniors and Seniors only)

First Semester		*Credit Hours*	*Second Semester*		*Credit Hours*
		Freshman Year			
FBO 100	General Botany	4	FZO 100	General Zoology	4
CHE 106	General Chemistry	3	CHE 116	General Chemistry	3
CHE 107	General Chemistry Lab	1	CHE 117	General Chemistry Lab	1
English		3	English		3
[1]Math		3	[1]Math		3
Elective		3	Elective		3
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		17			17

Sophomore Year

FBO 315	Dendrology I	2	FEC 300	Introduction to Macro-Economics	3
GRA 280	Technical Drawing	1			
FMG 201	Plane Surveying	3	GOL 101	General Geology	3
PHY 103	General Physics	4	PHY 104	General Physics	4
Electives		6	Electives		6
		16			16

SUMMER SESSION IN FIELD FORESTRY—5 weeks, 6 credit hours: Required of all students following the sophomore year and prior to registration for the junior year (including junior year transfer students who elect this curriculum).

FBL 301	Field Biology	1
FMG 303	Introduction to Forest Measurements	1
SIL 302	Silvics	1
ERM 304	Silviculture-Resource Management	3
		6

Junior Year

APM 471 or APM 491	Introduction to Statistical Analysis / Introduction to Probability and Statistics	3	FMG 322	Mensuration	3
			FEN 300	Principles of Forest Entomology	2
			FMG 340	Harvesting	2
			SIL 421	Principles of Silviculture	3
FBO 330	Plant Physiology	2	WPE 386	Elementary Wood Technology	2
FEC 301	Introduction to Micro-Economics	3	Elective		3
SIL 332	Soils	3			
Electives		6			
		17			15

Senior Year

FEC 410	Principles of Forestry Economics	3	ERM 472 or SIL 440	Fundamentals of Outdoor Recreation / Forest Hydrology	3
FMG 454	Forest Administration & Policy	3			
SIL 424	Practices of Silviculture	3	FMG 452	Management Planning and Operation	3
WPE 400	Introduction to Forest Products	2	ERM 495	Resources Management (or other Forestry Elective)	3
[2]Electives		6	[2]Electives		6
		17			15

[1]*Six credit hours of mathematics are required.* Two semesters of calculus are highly recommended to be taken prior to the Junior year, particularly for students interested in graduate work.

[2]At least one of the following two courses must be chosen from these electives: SIL 351—Meteorology and Fire Behavior, FZO 352—Wildlife Ecology.

NOTE: Three elective courses (totalling 9 credits) must be selected *from forestry and allied subject areas.*

Three elective courses (totalling 9 credits) must be selected *from the Humanities and Social Science areas* with at least one course from each area. *Additional electives* should be chosen *from these areas or from natural and physical sciences not directly related to the student's course of study.*

A total of 136 credit hours is required.

THE SCHOOL OF LANDSCAPE ARCHITECTURE

The School of Landscape Architecture offers two undergraduate curricula in environmental design—a four-year program in Environmental Studies and a five-year professional program in Landscape Architecture.

Landscape Architecture

Education in the design professions today is witness to a great deal of concern for school objectives, programs, and organization. The central issue relates to the force and pace of change that characterizes the work of the environment designer and brings him into ever new challenging situations. The present condition of cities, depletion of natural resources and pollution of air and water all pose severe and complex threats to society. Concurrently, a greater awareness and desire for environmental quality tax the resources and ingenuity of those in the design profession.

Several trends have emerged in recent years that suggest conditions for present and future educational programs. It is clear that an interdisciplinary approach to environmental problems is indicated and includes landscape architecture, architecture, engineering, and planning, with specific attention to the biological and behavioral sciences. It is also clear that the educational purpose must relate more directly to the health and well-being of man and be designed for versatility rather than the narrow concerns of career orientation. Finally, that contemporary education should orient the student to systems thinking in his approach to knowledge, society and the individual.

In an effort to recognize and respond to the demands and responsibilities of the times, the following curriculum is offered in environmental studies and landscape architecture. The major characteristics of the programs are: an expansive frame of reference for landscape architects as major contributors to the solution of environmental problems, with a concurrent broad educational base for their professional training; provision for flexibility to accommodate shifts in educational goals, particularly within the design professions; articulation with the programs of the two-year colleges to permit ready transfer to professional programs; and professional training to adequately meet the educational standards of accrediting bodies, the American Society of Landscape Architects and the Division of Professional Education of the New York State Education Department.

The curriculum is based on three consecutive educational sequences: The *first two years* may be taken at this college or at any other school or college. Students may transfer into the freshman, sophomore, or junior programs, depending upon acceptable transfer credit. Requirements for students planning to *transfer* as entering juniors are as follows: (a) Associate degree or acceptable transfer credit totaling a minimum of 62 semester credit hours or their equivalent; (b) Botany, 3 credits; and (c) the equivalent of college algebra and trigonometry plus

high school chemistry or physics. A recommended course series prior to transfer would include English (composition) (4 credits); English (literature) (6); speech (3); biological sciences (6); social sciences (9); art media (2); geology (3); geography (3); and humanities (6). This series is strongly recommended but not required, except as noted above. Deficiencies in these areas will be accommodated as possible during subsequent semesters and summer school sessions.

The *third and fourth years* are devoted to a broad spectrum of courses dealing with a variety of aspects of environment and man's relationship to it, synthesized through development of ability in both the functional and creative design processes. The successful completion of this 127-hour program qualifies the student to receive a bachelor of science degree with a major in environmental studies. The education is broad but with sufficient training to focus the student's concerns for the physical environment and its significance. At this point, students may pursue graduate study, or may apply to continue study toward the first professional landscape architectural degree.

The *fifth year* is comprised of three major components beginning with a short summer session course in plant materials. The fall semester is devoted to a unique program of off-campus study coupled with a concentration of professional course work in the final semester. The off-campus experiential studio is described and conducted by small groups of students with study topics correlated with locational opportunities throughout the world. Successful completion of this 33-hour program of 500 level course work leads to the degree of Bachelor of Landscape Architecture, the first professional degree. Study beyond this point is accommodated by the MLA programs.

Concentration in Environmental Studies

The College of Environmental Science and Forestry has historically provided educational programs focusing on the scientific, managerial, engineering, and design skills basic to the solution of environmental problems. The concentration in environmental studies is designed (1) to provide the specialist trained in these areas with an introduction to and appreciation of the nature of man and of his institutions and their profound effect on any solution proposed for an environmental problem, and (2) to allow students in diverse areas of specialization to work together on real environmental problems in such a manner that they learn to appreciate the multifaceted nature of these problems and to work comfortably and knowledgeably with persons of diverse subject matter background.

Students electing this concentration will take a two-course sequence designed to establish an environmental awareness early in their undergraduate careers. The first of these courses—Environmental Studies 100: Introduction to Environmental Studies—will explore the cultural, socioeconomic, and political factors that condition mankind's view of the

LANDSCAPE ARCHITECTURE CURRICULUM

First Semester		Credit Hours	Second Semester		Credit Hours
First Year					
English		3	English		3
FBO 100	General Botany	4	FZO 100	General Zoology	4
Philosophy Elective		3	Economics Elective		3
GRA 182	Art Media I	1	GRA 183	Art Media II	1
EST 100	Introduction to Environmental Studies	3	Anthropology Elective		3
			Elective		3
PED or ROTC		0	PED or ROTC		0
GFO 032	Orientation	0			
		14			17
Second Year					
English		3	English		3
GRA 284	Art Media III	1	Philosophy Elective		3
Psychology elective		3	Sociology Elective		3
Electives		8	GRA 285	Art Media IV	1
			Electives		6
		15			16
Third Year					
LSA 320	Introduction to Landscape Architecture and Design Theory	2	LSA 327	Landscape Design Studio II	4
LSA 326	Landscape Design Studio I	4	LSA 343	Structural Materials and Elements	3
FBL 320	General Ecology	3	LSA 345	Elements of Site Engineering	3
FEG 271	Plane Surveying	3	APM 360	Introduction to Computer Programming	3
FBO 315	Dendrology I	2	EIN 211	General Geography	3
Elective		3			
		17			16
Fourth Year					
FEN	TBA	1	[1]LSA 425	Orientation for Experiential Studio	3
FBO	TBA	1			
LSA 432	Plant Materials Culture	1	LSA 423	Landscape Design Studio IV	4
LSA 422	Landscape Design Studio III	4	EIN 471	History of Landscape Architecture	3
LSA 440	Site Development Systems	3	ARC 294	Introduction to Architecture	3
EIN 470	Art History	3	EIN 451	Fundamentals of City and Regional Planning	3
EIN 411	Principles of Land Use	3			
		16			16

Summer Session

LSA 533: Plant Materials. Three-week course in Plant Materials. 3 credit hours.

environment. The second course—Environmental Studies 101: Human Ecology—will build upon the student's awareness of human values and their importance in environmental study. Students will analyze the components, first of simple and then of progressively more complex ecosystems; study the interaction of these components via the flow of energy and natural nutrient cycles, goods, and services in qualitative and simple quantitative terms; and finally, impose and evaluate the influence of man's attitudes and value systems on these ecosystems. Subsequently, as the student's disciplinary competence develops, he will elect at least two seminars (Environmental Studies 497), and two hours of problems courses (Environmental Studies 498). These are designed to provide students of diverse backgrounds to bring their special skills to focus and to work together on problems of environmental importance.

In addition to the courses listed above, and the course requirements of the diverse curricula of the College, there are a wide diversity of additional courses available for election of students interested in environmental studies, provided elective hours are available. Members of the Undergraduate Environmental Studies Advisory Group are available to discuss these with the students.

This program will educate a person to both a disciplinary specialization and a keen appreciation of how this specialization can be applied in the environmental decade of the "70's."

Fifth Year

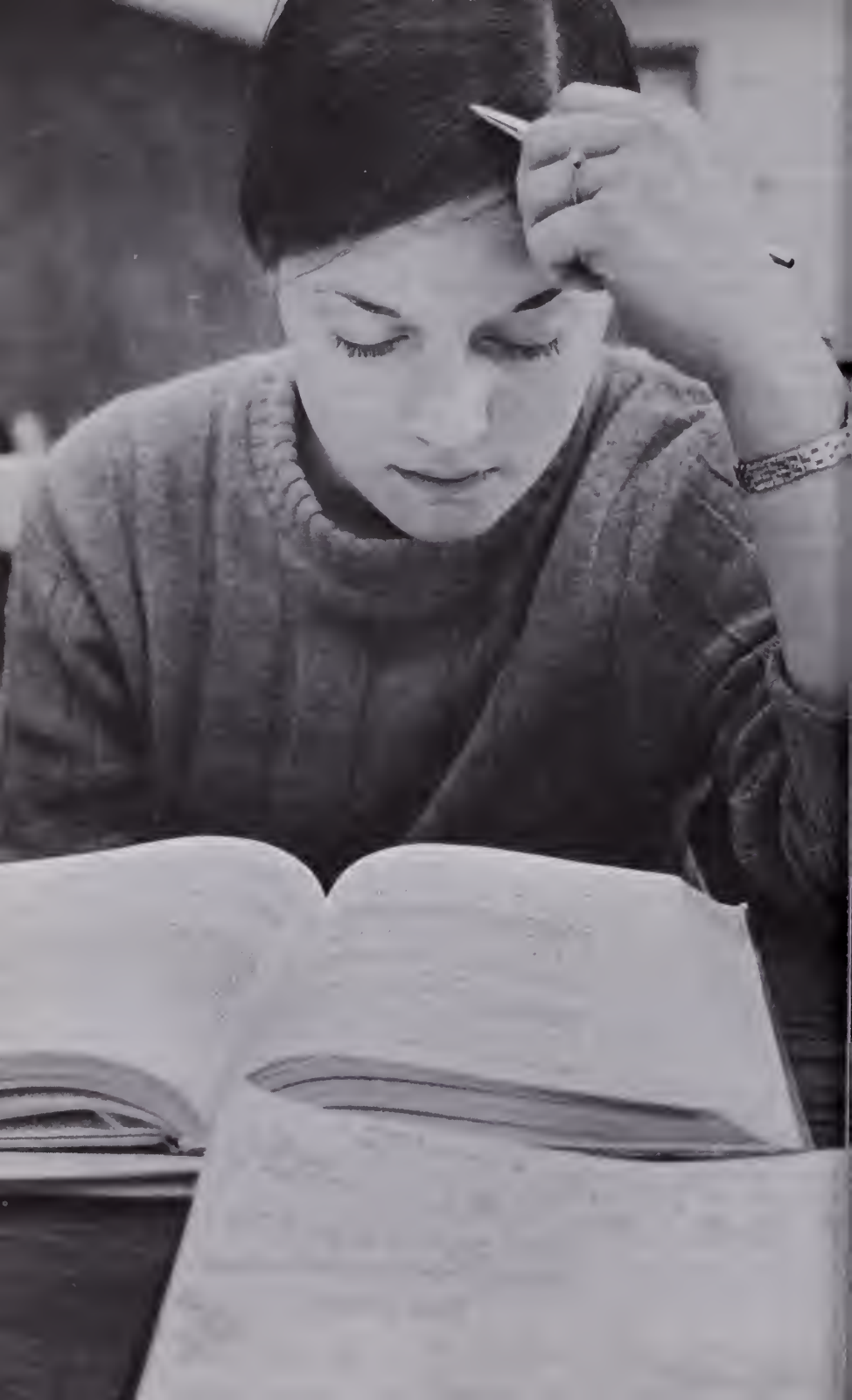
OFF-CAMPUS PROGRAM		LSA 522 or LSA 525 or LSA 527	Landscape Design Studio VI ..... Landscape Design Studio VI ..... Landscape Design Studio VI	4
LSA 524	Experiential Landscape Design Studio V	16		
		LSA 545	Professional Practice Studio II	2
		LSA 547	Principles of Professional Practice ...	2
		LSA 562	Architecture	3
		Elective		3
		16		14

[1]All students must have completed the equivalent of college algebra and trigonometry plus H.S. chemistry or physics and botany and 62 credit hours before entering third year.

NOTE: At the beginning of the 4th year students will state their degree intentions at Registration; applications for the BLA program will be accepted during Spring Registration. Approval of the SLA Faculty is necessary for admission to the BLA program. Students in the Terminal B.S. program may elect to take LSA 524 (16 hrs.) in place of the courses listed for the 8th semester. These students will substitute LSA 425 for LSA 440 or EIN 470 or (LSA 430, FBO — FEN —).

Students in the terminal B.S. program on campus will substitute an elective for LSA 425. *The B.S. degree requires a total of 127 credit hours.*

The BLA degree requires 33 hours of 500-level course work. A total of 160 credit hours is required.



Course Offerings

Undergraduate students at the College of Environmental Science and Forestry not only have the academic resources of their own institution, but also the resources of nearby Syracuse University and State University Upstate Medical Center.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, English, business law, personnel relations and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics and the arts. Descriptions of required Syracuse University courses are included following College of Environmental Science and Forestry courses.

DESCRIPTION OF COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

Course Numbering System (Effective June, 1973)

Code Levels:

000–099 Noncredit courses
100–199 Freshman courses
200–299 Sophomore courses
300–499 Junior and Senior courses designed primarily to serve as an undergraduate elective and/or as a requirement in an undergraduate curriculum with the number appropriate to the level where the course appears as a requirement

or is normally scheduled as an elective in the major program.

500–599 Graduate courses designed expressly for graduate students in areas supporting their specialization or interdisciplinary program, or for fifth year professional students with a baccalaureate degree (e.g. BLA students with B. S. in Environmental Studies), and available for undergraduate credit by selected upper division undergraduate students with superior academic records.

600–699 Graduate courses designed for beginning graduate students. Undergraduates are permitted admission only by petition with a well-documented justification approved by the undergraduate advisor and curriculum director and the instructor of the course. (See the *Graduate Studies Bulletin* for these courses.)

ESF COURSES—SYRACUSE CAMPUS

APM—APPLIED MATHEMATICS

360. Introduction to Computer Programming (3)

The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages or problem solving. The course will cover instruction in Fortran IV, and an Assembly language plus some discussion of PL/1, Algol, APL, and use of software operating systems. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring. Mr. C. N. Lee and Staff.

460. Information Processing Fundamentals (3)

Three hours of lecture per week. The course presents problem solving and analytical structures, and practice in their application by use of a digital computer. Selected portions from the two general processing categories of numerical analysis and information systems are presented for discussion and study. The purpose is to develop an awareness with some understanding and proficiency in automated problem-solving systems. Fall. Mr. C. N. Lee and Staff.

Prerequisites: Integral calculus and proficiency in computer programming.

471. Introduction to Statistical Analysis (3)

Two hours lecture and 3 hours lab. Elementary probability, sampling distributions, statistical estimation, hypothesis testing, inferences regarding means and variances, simple regression and correlation, and determination of sample size. Fall and Spring. Mr. Kasile.

Prerequisite: Junior or senior standing.

Note: This course will be dropped, effective Fall semester, 1975.

491. Introduction to Probability and Statistics (3)

Two hours lecture, 3 hours laboratory. Elementary probability, theoretical and sampling distributions, hypothesis testing, statistical estimation, analysis of variance, regression and correlation, nonparametrics and sampling concepts.

Prerequisite: Two semesters of calculus.

492. Forest Biometrics (3)

Two hours lecture, 3 hours laboratory. Analysis of variance including nested and cross-classification. Matrix approach to multiple linear regression and weighted least squares. Nonlinear regression. Sampling methods and design. Applications to forestry problems. Fall.

Prerequisite: APM 491 or equivalent.

500. Introduction to Computer Programming for Graduate Students (3)

The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages for problem solving. The course includes a rather detailed study of Fortran IV, plus some discussion of an Assembly language and moderate study of Cobol and APL. To provide completeness, some attention is also afforded to techniques of representing information, managing files, error control, and to operating systems and job control. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring.

593. Introduction to Analysis of Variance (3)

Two hours of lecture, 3 hours lab. One and two-way analysis of variance, multiple comparisons, subsamples, unequal sample size, tests of hypotheses, statistical estimation, determination of sample size. Fall. Mr. Kasile.

Prerequisites: APM 471 or APM 491 or equivalent.

Note: This course will be dropped from the College offerings, effective Fall, 1976.

EGL—ENGLISH (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES)

210. Advanced Composition and Literature (3)

Further development of reading and writing skills acquired in freshman English. Understanding of imaginative literature promoted through the study of selected works in American literature in their historical context. Practice in the principles and techniques of critical writing coordinated with reading assignments. Fall. Mrs. Sutton and Mr. Lalor.

211. Technical Writing (3)

Instruction in the principles and techniques of technical writing in general; in the letter, memorandum and report, and in the special techniques of technical writing in particular. Course work includes lectures and discussions, reading assignments in the required text and supplementary materials, and numerous written assignments including a formal report presenting the results of an investigation. Spring. Mrs. Sutton and Mr. Lalor.

215. Fundamentals of Public Speaking (3)

Study of and practice in the application of the principles of good oral communication in extemporaneous person-to-group format. Students participate in information and problem-solving group discussions and prepare, deliver, listen to and criticize information and persuasive talks. Fall. Mr. Lalor.

400. American Writers and the Natural Environment (3)

The tracing of the changing concepts of the natural environment in American writings from the Puritans to the present. Fall. Mrs. Sutton.

EIN—ENVIRONMENTAL INFLUENCES (LANDSCAPE ARCHITECTURE)

211. General Geography (3)

Three hours of lectures, assigned readings, written reports per week. Discussion of basic geographic concepts and methods, explanation of the significance of man-land relationships as exemplified through the regional distribution and spatial patterns of natural and cultural features, description of geologic processes and other physical features such as soils, climates and natural vegetation. Not open to geography or geology majors. Spring.

411. Principles of Land Use and Planning (3)

Three hours lecture, reports, assigned readings. Explanation of factors which influence the use, development and control of land. Discussion of government's role in land development and control. Consideration of unique values of land completion for the use of space, planning for better land use, introduction to planning concepts and techniques and other topics. Fall.

451. Fundamentals of City and Regional Planning (3)

Three hours of lectures, assigned readings, written reports per week. Dis-

cussion of the meaning and purposes of city and regional planning. Examination of the historical development of urban places. Explanation of the principal elements of the comprehensive planning process, including goal formulation and decisionmaking, social and advocacy planning, planning for community facilities and planning administration. Discussion of the methods and objectives of city and regional planning. Spring.

Prerequisite: Permission of instructor.

470. Art History (3)

Three hours of lecture per week. Informal lectures and class discussion will emphasize and review assigned text and other readings and handout notes. Slides will be shown regularly; notebooks, reports, quizzes and examinations. Evolutionary nature of the main cultural periods of Western man and fine arts as man's selected environment will be the course emphasis. Fall.

471. History of Landscape Architecture (3)

Three hours of lecture per week. Informal lectures, and class discussion, notebooks, reports, assigned text, and assigned reserve shelf reading, optional text, and handout notes, weekly quizzes and exams. Slides. Historical study and style analysis of Western man's efforts to design his environment and his changing attitudes and relationships to environment. Also, non-Western coverage where significant or influential on Western Man. Study of historical personalities as well as periods that are of environmental concern up into the modern period. Spring.

Prerequisites: EIN 470, or equivalent History of Arts course.

ERE—ENGINEERING (ENVIRONMENTAL AND RESOURCE ENGINEERING)

100. The Engineer and the Environment (1)

One hour of lecture per week. Introduction to engineering practice in relation to environmental considerations and the needs and resources of society. Historical development of engineering and technology. Mission and content of engineering curricula. Representative case studies and project assignments. Open to all students. Mr. Jelinek and staff. Spring.

496. Special Topics (1–3)

Lectures, readings, problems, and discussions. Topics as announced in the areas of environmental or resource engineering. Fall and/or Spring. Staff.

ERM—RESOURCES MANAGEMENT (ENVIRONMENTAL & RESOURCE MANAGEMENT)

100. Introduction to Forestry and Environmental Management (3)

Two 1½ hour meetings per week. An introduction to environmental and resources management. Emphasis is placed on the breadth of the field and on the important interrelations among the social, physical and managerial aspects within which the environmental manager operates. Specific topics include: resources, institutions, values, the physical environment, the organism, the biological system, goals, management problems, information and analysis and dealing with people. Fall.

201. Social Sciences I—Socio-Cultural Processes (6)

Six hours lecture and discussion. Introduction to the concepts, theories and terminology of psychology, anthropology and sociology, which are relevant to the understanding of the interrelationships of human social groups with their environments and resources. Human social and cultural behavior as possible reflections of adaptations to past environments; human cultural and social organization as adaptations to resources of present-day environments; human ecology as it relates to human economic and political systems. Spring.

202. Social Sciences II: Economic Processes (6)

Five 1-hour lectures and one 1-hour discussion per week. The course has two major subdivisions: macroeconomic processes are concerned with the composition, measurement and determination

of national income, with the financial institutions of the United States and with fiscal and monetary policies; microeconomic processes are concerned with pricing of output and resource allocation, the theory of consumer demand, the theory of the firm and industrial organization, the role of labor unions in the United States and microeconomic policies of the Federal Government. Fall.

203. Social Sciences III—Political Processes (6)

Introduction to the concepts, theories and terminology which will provide students with a general understanding of the American political system, with emphasis upon how this system carries out and affects environmental and resource administration. The need and potential for, and direction of, change within and through the political system, and the roles of experts in defining and effecting change receive special consideration. Spring. Mr. Muniak.

300. Summer Session in Field Forestry (6)

Fundamental training in forestry disciplines demonstrating elements of resource inventory, ecology and utilization within the context of total resource management. Course consists of five 6-day weeks of field exercises, reports and projects in areas of surveying and cartography, forest and tree measurements, dendrology, ecology and utilization of forest goods and services. Daily exercises develop understanding through active physical participation by students. Two repeating sessions per summer held at Warrensburg Campus. A service charge is required covering individual expenses while in residence at Pack Demonstration Forest, Warrensburg, New York. Staff.

341. Soil and Water Conservation (3)

Three lectures per week. An integrated historical survey of water and related land resource conservation in the United States. Interrelationships of planning, administration, and evaluation of policies, programs and projects by all levels of government and private units. Spring. Mr. Black.

402. Applied Communications (3)

Two hours of lecture. Three hours of laboratory during first part of course. Major media production project required. Course objective is to acquaint students with the basic principles of instructional communications in the teaching-learning process. Various media including television, motion pictures, exhibits, illustrated lectures, slide talks, newspapers, etc. are examined with emphasis on their utilization in environmental education. Also, consideration is given to instructional design for meeting predetermined learning objectives in various publics—lay and professional adult audiences, school children, etc. Spring. Mr. Hanselman and Staff.

423. Introduction to the Physical Environment (6)

Lectures, discussions, field and laboratory work blocked in time and subject matter with ERM 424, Silvics-Silviculture. Study of the environmental media: air, soil and water, through examination of the flow of energy and matter within and between these components of the environment. Drawing together information from geology, physical geology, soil science, water science and meteorology, this course provides understanding of these areas, their interactions, and the interface with the biological system. Fall.

Prerequisite: Junior year standing in ERM curriculum or equivalent. Course should be taken concurrently with ERM 424, Silvics-Silviculture because of the blocking of these two courses.

Note: This course will be offered for the first time in the Fall, 1975.

424. Silvics-Silviculture (8)

Three 1-hour lectures and five 3-hour labs or field trips per week. Fundamentals of silvics and practices of silviculture enabling manipulation of forests to attain objectives of the forest owner. Emphasis is placed on the biological interrelationships within the forest community, including site factors and forest stand dynamics, and the consideration of these in silvicultural operations. Fall.

Prerequisites: Summer Session in Field Forestry, Physical Environment

(taken concurrently) or permission of instructor.

Note: This course will be offered for the first time in the Fall, 1975.

429. Environmental Impact: Principles and Strategy (3)

Three hours of lecture and discussion. Principles and theory of environmental impact and statements of impact as required by Federal law. Administrative procedures for review and evaluation. Procedural strategy and effective constitution before various governmental levels. Means of obtaining and sources of authoritative information. Spring. Messrs. Black, Herrington and Staff.

Prerequisite: Senior standing.

450. Range Management (2)

Two hours of lecture. Range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring.

451. Principles of Management (3)

Three hours of lecture and recitation. Basic principles and concepts of management which are universally applicable to any organization, business enterprise or public agency. The various approaches to management including the classical, behavioral and quantitative concepts with emphasis upon the integrative approach, now required to meet modern society's changing life styles and values and the new awareness of the public regarding environmental matters and natural resources management. Fall.

Note: This course will be offered for the first time in the Fall, 1975.

452. Management Models (3)

Two hours of lectures, 3 hours of laboratory. Introduction to the various models used in managerial decisionmaking. Emphasis is on the characteristics of the various models: their formulation, assumptions, uses and limitations. The major topics covered will include: the role of models in management; simple optimization; constrained optimization; multivalued choices; time adjustment of value; simulation; and models in nondeliberated decisions. Integration of the deliberative and intuitive models is stressed. Spring. Staff.

Note: This course will be offered for the first time in the Spring, 1976.

460. Forest Information Systems (4)

Data needs, as specified by management goals and resource constraints, and the manner in which these needs influence acquisition, storage, retrieval and prediction. Spring.

Note: This course will be offered for the first time in the Spring, 1976.

465. The Social Environment of Resource Management (3)

Three hours of lecture and discussion. This course describes the institutional framework within which the resource manager practices his profession. It intends to show how economics, law, public policy, pressure groups and financial considerations constrain the professional judgment of the resource manager and the goals and objectives of the institution employing him.

Prerequisites: Silvics - Silviculture, Principles of Management, Management Models, Information Systems, Senior standing.

Note: This course will be offered for the first time in the Fall, 1976.

467. Management of the Forest Enterprise (3)

Two hours of lectures and one discussion/laboratory. This course is concerned with the management alternatives, both of a technical and social nature, that are available in the planning for and the production of timber, recreation, wildlife, forage and water from the forest and with the criteria for choice to meet management objectives. Fall.

Note: This course will be offered for the first time in the Fall, 1976.

472. Fundamentals of Outdoor Recreation (3)

Three hours of lecture per week. Introduction to the programs and practices of Federal, state and local agencies and private organizations involved in planning, administration and management of outdoor recreation areas. Emphasis is on major recreational issues and conflicts faced by area managers, and how they integrate solutions into their plans. Spring. Mr. Gratzer.

473. Planning and Development of Forest Recreation Areas (3)

Three hours of lectures or equivalent laboratory and assignments per week. Planning and designing forest recreation areas, structures and facilities. Development of construction plans for camp and picnic sites, for waterfront areas and for trails. Emphasis is on the functional relationship between planning and design, management and maintenance. Field trips required. Fall. Mr. Gratzer.

Prerequisite: ERM 472 and permission of instructor.

482. Legal Aspects of Surveying (3)

Three credit hours of lecture and discussion. Fundamental principles of real property law with special reference to boundary survey, conveyances, rules of evidence, title insurance, rights, duties, and liability of professional land surveyors. Case material and appropriate New York State statutes will be discussed. Fall. Mr. Horn.

495. Resources Management (3)

The interrelationships between man and forest resources and the multiple services which those resources provide; the extent and nature of responsibilities of the forester to the community and to society in his stewardship of natural resources. Spring. Staff.

497. Resources Management Seminar (3)

Three hours of group discussion and analysis. Current literature, plans and principles, and new developments in forest management. Fall or Spring. Staff.

558. The Law of Natural Resource Administration (3)

Three hours of lecture and discussion. An introduction to the law concerning the procedures, powers and judicial review of public agencies responsible for the management of natural resources. Topics will include the extent of an agency's rulemaking power and the rights of aggrieved parties to appeal from agency decisions. Spring. Mr. Horn.

Prerequisite: FMG 454 or equivalent course in public administration.

EST—ENVIRONMENTAL STUDIES

100. Introduction to Environmental Studies (3)

Lecture and discussion on the nature of man, his social, cultural, economic and political institutions and how these condition his views of the environment. Fall. Staff.

101. Human Ecology (3)

Study of the principles of ecosystem structure and function developed in the context of human values and societal structures. Spring. Staff.

Prerequisite: EST 100.

497. Undergraduate Seminar (1)

Seminars on problems of environmental concern. The subject of the seminar will be announced prior to registration. Fall and/or Spring. Staff.

498. Undergraduate Problem (1–3)

Interdisciplinary research designed to solve environmental problems. Selection of subject matter to be determined by students in conference with the Undergraduate Environmental Studies Advisory Group. Problem analysis and programs for solution in the form of a final report required. Fall and/or Spring. Staff.

Prerequisite: Consent of instructor.

FBL—BIOLOGY (FOREST BIOLOGY)

320. General Ecology (3)

Two hours lecture, 3 hours of field trips during the first half of the semester. Three hours lecture during the second half of the semester. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography, and representative ecosystems. The ecological impact of man is reviewed. Fall. Mr. Alexander.

Prerequisite: A year course in biology or equivalent.

330. Principles of General Physiology (3)

Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Fall. Mr. Brezner.

Prerequisite: One semester of organic chemistry.

370. Principles of Genetics (3)

Three hours of lecture and discussion. A general course covering concepts of genetics and evolution basic to upper division biology and biochemistry courses. Includes the inheritance and analysis of Mendelian and quantitative traits, the chemical nature of the gene and its action, the genetic structure of populations and their evolution. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.

Prerequisites: Forest Botany 100 and Forest Zoology 100 or a 1-year college introductory biology course.

371. Principles of Genetic Laboratory (1)

Three hours of autotutorial laboratory. Experiments with plants and animals and computer simulation exercises demonstrate the basic principles of inheritance of Mendelian and quantitative traits and changes in populations caused by major forces in evolution or by breeding procedures. Numerical methods for characterizing quantitative traits and for testing hypotheses are introduced. Spring.

Corequisite: FBL 370 or equivalent.

372. Introduction to Quantitative and Population Genetics (1)

Ten lecture-discussions and four autotutorial laboratories the second half of the semester (incl. Lecture-Lab Modules 5 and 6 of FBL 370 and 371). Basic genetic concepts of quantitative inheritance, the structure of populations and evolution. Laboratory experiments and computer simulations are used to demonstrate these concepts. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.

Prerequisite: An introductory genetics lecture-laboratory course deficient in these areas of genetics and permission of instructor. (Not open to students taking FBL 370 and 371.)

421. Ecology of Freshwaters (2)

Note: SUNY, Albany No. BIO 421.

Two full days a week for 4 weeks. Experimental and observational studies of environmental and biotic interactions, influencing productivity of freshwaters. Basic concepts at the organismic, population and community level. Summer Session I, Cranberry Lake Biological Station. Staff, SUNYA.

Prerequisite: A course in ecology.

496. Topics in Biology (1–3)

Experimental, interdisciplinary, or special coursework in biology for undergraduate students. Subject matter and method of presentation varies from semester to semester. May be repeated for additional credit. Fall or Spring. Staff.

497. Undergraduate Seminar (1)

Literature surveys and seminars on topics of biological interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Spring and Fall. Staff.

498. Research Problem in Biology (1–3)

Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring. Staff.

Prerequisite: Consent of instructor.

540. Chemical Ecology (3)

Two hours of lecture and 1 hour of discussion. A treatment of biological phenomena incorporating elements of ecology, physiology and chemistry as a basis for development and behavior and survival. Emphasis is on intra- and interspecific relationships involving chemical messengers at the organismal population and community levels. Spring. Mr. Simeone.

Prerequisites: Organic chemistry, general ecology, general physiology.

575. Evolutionary Genetics (3)

Note: Syracuse University No. BIO 545

Three hours of lecture. Principles of evolution and the role of factors causing

population changes, such as selection, breeding system, mutation, population size and structure, migration, and genetic drift are discussed. Theoretical population genetics models and experimental population studies are related to evolutionary theory and studies of natural populations. Species formation and the evolution of isolating mechanisms are considered. Spring (even calendar years). Mr. Valentine and Mr. Drugar.

Prerequisite: FBL 370, or permission of the instructor.

576. Laboratory in Evolutionary Genetics (1)

Note: Syracuse University No. BIO 546

Three hours of laboratory. Techniques and procedures for population studies and their application in experimental population genetics and in the analyses of natural populations. Spring (even calendar years). Mr. Valentine and Mr. Drugar.

Corequisite: FBL 575.

FBO—BOTANY (FOREST BOTANY AND PATHOLOGY)

100. General Botany (4)

Prerequisite to all other courses in Botany. Two hours of lecture and 4 hours of lecture-laboratory in the Autotutorial Learning Center. An introduction to plant biology with special emphasis on the structure and function of the green plant. Fall. Mr. Geis.

310. Classification of the Plant Kingdom (3)

Two hours of lecture and 3 hours of lab. Introductory study of the plant kingdom with emphasis on the angiosperms. Spring. Mrs. Wang and Staff.

315. Dendrology I (2)

One hour lecture and one 3-hour laboratory/field trip each week. Field study, identification, taxonomy and elementary silvics of important forest trees of North America. Fall. Mr. Ketchledge.

330. Plant Physiology (2)

Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Will not satisfy the plant physiology requirement of botany majors. Fall. Mr. Schaedle.

Prerequisite: FBO 100 or equivalent.

360. Forest and Shade Tree Pathology (3)

Two hours of lecture and 3 hours of autotutorial laboratory. Major diseases of forest, shade and ornamental trees and deterioration of forest products will be discussed with emphasis on disease identification, principles of disease development, effects of disease on the host and practical control measure. Spring. Mr. Silverborg and Mr. Manion.

415. Dendrology II (1)

One 3-hour field trip/laboratory each week. A continuation of DENDROLOGY I emphasizing trees and shrubs ecologically important in the central New York region and economically important in North America. Fall. Mr. Ketchledge.

422. Ecology of Forest Communities (2)

Note: SUNY Albany No. BIO 422.

Cranberry Biological Station. Session II. Two full days per week for 4 weeks. Study of the structural and functional characteristics of selected Adirondack forest ecosystems; techniques of vegetational and environmental analysis. Special requirement: students must be prepared to go on two overnight camping trips to an isolated study area. Mr. Ketchledge.

Prerequisites: At least 1 semester of general ecology plus 15 hours of other biological sciences.

425. Plant Ecology (3)

Two hours of lecture and discussion and one laboratory session per week. A first course in plant community ecology dealing with the dynamics of community development and change and the process of community analysis and description. Spring.

Prerequisites: FBL 320, SIL 424, or equivalent.

460. Field Problems in Forest Pathology (2)

Two full days per week for 4 weeks.

Field study of important tree diseases in the Adirondacks, including heartrots, root-rots, cankers, rusts, foliage diseases, mistletoe, and physiological diseases. Also field study of mycorrhizae and other tree-root mutualisms. Summer Session I, Cranberry Lake Biological Station.

510. Mycology (3)
Two hours of lecture, 3 hours of laboratory. Fundamentals of the morphology, taxonomy, cytology, life histories and ecology of fungi. Laboratory experience in culturing and identification of fungi. Fall. Mr. Griffin.

515. Systematic Botany (3)
Two hours of lecture, 3 hours of laboratory. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. Fall.
Prerequisite: FBO 310 or permission of the instructor.

530. Plant Physiology (2)
Two hours of lecture. Internal processes and conditions in higher plants with emphasis on physiological and biochemical concepts. For students majoring in the biological sciences. Spring. Mr. Wilcox.
Note: Botany majors electing this course for their concentration must also take FBO 531.

531. Plant Physiology Laboratory (2)
Two lab sessions. Introduction to current methods and procedures of physiological research including nutrition, tissue culture, photosynthesis, respiration and hormonal regulation of growth. Spring. Mr. Schaedle.
Prerequisites: FBL 330, corequisite FBO 530, or permission of the instructor. Advance tentative registration with the instructor is required.

561. Principles of Forest Pathology (3)
Three hours of lecture and discussion. Concepts and principles of tree diseases in relation to forest practice. Fall. Mr. Manion.
Prerequisite: FBO 360 or consent of instructor.

585. Plant Anatomy (3)
Two hours of lecture, 3 hours of laboratory. An introductory course in plant anatomy designed to familiarize the student with the organization and development of the primary and secondary plant body of higher plants. Spring. Mr. Tepper.
Prerequisite: FBO 100.

FCH—CHEMISTRY

221. Organic Chemistry I (3)
Two hours of lecture, 1 hour of recitation. A survey of representative classes of carbon compounds with an emphasis on structure, nomenclature and fundamental reactivity and other important properties, uses and characteristics. Fall. Mr. Silverstein and Staff.
Prerequisite: One year of freshman chemistry.

222. Organic Chemistry Laboratory I (1)
One 3-hour laboratory period. Laboratory techniques in organic chemistry. Melting points, distillation, recrystallization, extraction, column and thin layer chromatography. Qualitative functional group analysis. Fall. Staff and laboratory assistants.
Prerequisite: One year of freshman chemistry.

223. Organic Chemistry II (3)
Two hours of lecture, 1 hour of recitation. A study in depth of the reactivity characteristics of the various classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three-dimensional characteristics of carbon compounds. Spring. Mr. LaLonde and Staff.
Prerequisites: One year of freshman chemistry and 1 semester of organic chemistry.

224. Organic Chemistry Laboratory II (1)
One 3-hour laboratory period. Continuation of FCH 222. Simple physical, quantitative and instrumental techniques applied to organic chemistry. Gas chromatography, polarimetry, kinetics. Introduction to synthesis. Spring. Staff and laboratory assistants.
Prerequisite: FCH 222 or equivalent.

325. Chemistry III (4)
Two hours of lecture, one 6-hour laboratory period. Classical and recent literature synthesis of organic compounds, employing advanced techniques. Fall. Mr. LaLonde.

Prerequisite: Two semesters of elementary organic chemistry.

384. Spectrometric Identification of Organic Compounds (1–2)
Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the second half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultraviolet spectometry will be applied to identification of organic natural products. Fall or Spring. Mr. Silverstein.

Prerequisites: Organic chemistry; 1 semester of advanced organic chemistry for second credit.

450. Introduction to Polymer Science (3)
Three hours of lecture. Introduction to the chemistry, physics and properties of synthetic polymers. Description and classification of polymers. Polymer synthesis. Polymer solutions. Polymer solid states, including discussion of rubber elasticity, glass transition, crystallization, viscoelasticity. Structure and properties of fibers, films, elastomers, foams. Fall. Mr. Sarko and Mr. Smid.

Prerequisites: One year of organic chemistry and 1 year of physical chemistry.

475. Wood Chemistry I (2)
Four hours of lecture first half of semester. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses, and lignin. Cellulose derivatives. Wood extractives. Bark chemistry. Distribution of the cell wall constituents in wood. Fall. Mr. Timell.

Prerequisites: FCH 221–224 or equivalent.

476. Wood Chemistry II (2)
Four hours of lecture second half of semester. Interaction of cellulose with water and alkali. Effect of acids on cellulose, hemicelluloses and lignin. Sulfonation and oxidation of lignin. Action of alkali on cellulose, hemicelluloses and lignin. Topochemistry of the major wood delignification reactions. Wood defects. Chemical by-products from wood. Manufacture of cellulose acetate and rayon. Fall. Mr. Timell.

Prerequisite: FCH 475.

477. Wood Chemistry III (2)
Two hours of lecture. Chemistry of starch, pectin and callose. Biosynthesis of cellulose, hemicelluloses, starch, pectin, callose and lignin. Chemistry of the cambium and formation of xylem and phloem. Lignification. Earlywood, latewood, juvenile wood and reaction wood. Aging and chemistry of the biodegradation of wood. Spring. Mr. Timell.

Prerequisite: FCH 475.

478. Wood Chemistry Laboratory (1)
One 3-hour laboratory period. Wood analyses. Isolation of holocellulose and xylan. Proof of structure of cellulose. Preparation of carboxymethylcellulose. Characterization of wood polysaccharides by chromatographic techniques. Fall. Mr. Timell.

Prerequisites: FCH 221–224 or equivalent.

495. Introduction to Professional Chemistry (2)
Professional ethics and responsibilities of the practicing chemist. Employer-employee relations, legal and legislative relations. Alternate employment opportunities. Professional organizations. Safety in the laboratory. Organization and use of chemical literature. Selection of research topic and literature survey. Fall. Mr. Schuerch and Staff.

Prerequisite: Upper division status. Senior status preferred.

496. Special Problems in Chemistry (1–3)
An opportunity for a special problem, technique development, independent or unstructured study in an area related to the chemical profession. The work may be technical, professional or interdisciplinary. Advisors outside this department may be solicited. A brief proposal must be presented for approval with specific arrangements outlined including faculty advisor and objectives of the study. Evidence of competence and appropriate effort is required for

credit. A written report will be expected. Fall and Spring. Staff.

Prerequisite: Upper division status.

497. Undergraduate Seminar (1)

One hour per week. Literature surveys and seminars on topics of current research interest and recent advances in chemistry. Spring. Staff.

498. Introduction to Research (5)

Eighteen hours of laboratory per week, library search and report writing. Solution of a selected research problem using special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring. Staff.

520. Nuclear and Radiation Chemistry (2)

The two 1-hour lectures will cover the information required for the basic understanding of nuclear reactions, the types of radiation emitted, the instrumentation necessary to detect and measure this radiation, the principles of radioisotope tracer techniques, and radiation chemistry which is the effect of radiation on organic systems. Visits to the Cornell Reactor and the Nuclear Medicine Department of the Upstate Medical Center will be arranged. Spring. Mr. Meyer.

Prerequisites: Physical, organic and inorganic chemistry or by permission of the instructor.

Note: This course can be taken independently of FCH 521.

521. Nuclear Chemical Techniques (1)

The laboratory will consist of one 4-hour laboratory class every 2 weeks, with 1 hour to be made up at the student's discretion to accommodate counting periods which extend over several weeks. A short movie by the AEC each week will be required for the sixth hour. The laboratory will give each student the opportunity to use the individual counting instruments, gain experience in the handling and preparation of radioactive samples and the use of the 1000 Curie cobalt source in radiation chemistry. Spring. Mr. Meyer.

Prerequisite: Physical, organic and inorganic chemistry or permission of the instructor. Advance tentative registration is required.

Corequisite: FCH 520.

530. Biochemistry I (3)

Three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers, and biological oxidations will also be covered. Fall. Mr. Walton.

Prerequisite: One year of organic chemistry.

Pre- or corequisite: One year of physical chemistry.

531. Biochemistry Laboratory (2)

Six hours of laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry and methods involved in the isolation, purification, and assay of enzymes. Fall. Mr. Walton.

Prerequisite: One semester of quantitative analysis with laboratory.

532. Biochemistry II (3)

Three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and biochemical properties of lipids, theories on the origin of life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins and other aspects of nitrogen metabolism. Spring.

Prerequisites: FCH 530 and its pre- and corequisites.

539. Principles of Biological Chemistry (3)

Three hours of lecture. Principles of biochemistry with emphasis on their relationship to biology. Topics include basic metabolic pathways, structure and function of proteins, enzymes, and nucleic acids, energy relationships, and biochemical control mechanisms. Fall. Mr. Walton.

Prerequisite: A 2-semester course in organic chemistry is desirable, but a 1-semester course is acceptable. This course is not open to chemistry majors.

540. Chemical Ecology

This course is the same as FBL 540. Refer to description on page 74.

551. Polymer Techniques (2)

One hour of lecture and discussion and 3 hours of laboratory; lab reports. Techniques of polymer preparation: free radical solution and emulsion polymerization, copolymerization. Molecular weight determination by light scattering, osmometry, viscosity, ultracentrifugation. Structure characterization by X-ray diffraction, electron microscopy, nuclear magnetic resonance, optical rotatory dispersion, polarized microscopy, stress-strain and swelling equilibrium. Fall. Mr. Sarko.

Prerequisites: One year of organic and 1 year of physical chemistry.

552. Polymer Processing and Technology (3)

Industrial methods of production and processing of polymeric materials such as fibers, films, plastics, elastomers, foams, composites, adhesives and coatings, including discussions on the correlation between polymer structure and polymer properties. Spring. Mr. Smid and Staff.

Prerequisites: Introduction to Polymer Science, FCH 450.

FEC—ECONOMICS (FORESTRY ECONOMICS)

290. Introduction to Economics for Forestry (3)

Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. Mr. Petriceks.

300. Introduction to Macroeconomics (3)

Three hours of lecture and discussion. Composition, measurement and determination of national income. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. Spring. Mr. Bennett and Staff.

301. Introduction to Microeconomics (3)

Three hours of lecture and discussion. Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in antitrust policy. The Theory of International Trade. Fall. Mr. Bennett and Staff.

410. Principles of Forestry Economics (3)

Two hours of lecture, 3 hours of laboratory. Economics of the production of forest goods and services. Land, labor and capital and their combination in forest production. Supply and demand of various forest products and their changes over time. Economics of taxation and public policy formation. Emphasis is placed upon principles and methods of analysis useful in understanding and in making resource management decisions. Fall. Mr. Christiansen.

Prerequisite: FEC 301 or equivalent.

420. Economics of Wood-Using Industries (3)

Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decisionmaking by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring. Mr. Armstrong.

Prerequisite: FEC 290 or equivalent.

496. Special Topics in Resource Economics (1–3)

Guided readings, lectures and tutorial conferences for the undergraduate student from any school of the College, designed to help him apply economic analysis to questions within his area of interest. Illustrative topics include the economics of land use and planning; of forest culture; of outdoor recreation; of water or timber management, or related resource production; of wood-using industry; and of the distribution or consumption of forest resources. Fall and Spring. Staff.

Prerequisite: Consent of instructor.

FEG—ENGINEERING (FOREST ENGINEERING)

271. Plane Surveying (3)
Two hours of lecture and recitation, 3 hours of field or office practice. A comprehensive development of the theoretical principles of plane surveying. Use of modern instruments and methods, computations related to forest activities. Fall. Staff.

Prerequisite: Plane Trigonometry.

300. Forest Engineering Problems (1)
One hour of lecture and discussion. An introduction to methodologies for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall and Spring. Staff.

Prerequisite: Junior standing in Forest Engineering.

302. Forest Engineering Problems (3)
Three hours of lecture and discussion. An introduction to methodologies of forest measurements for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall. Staff.

340. Hydrology (3)
Two lectures and 3 hours of laboratory per week. The mechanics of water storage and dispersion; hydrostatics; stream function; velocity potential; dimensional analysis and momentum theory. The natural hydrologic cycle is studied in relationship to changes and structural controls imposed by man. Spring. Mr. Tully.

Prerequisites: Dynamics (or concurrent), Introductory Statistics.

342. Hydraulics in Construction (4)
Three hours of lecture, 3 hours of laboratory. The physical, mechanical, thermal and hydraulic properties of fluids relevant to the construction industry. A study of solutions to hydraulic problems in contemporary construction activities. Not open for credit to forest engineering students. Spring. Staff.

Prerequisites: Physics and differential calculus.

363. Photogrammetry (3)
Two hours of lecture and discussion, 3 hours of laboratory. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation and unique requirements are considered. Fall and Spring. Mr. Brock.

Prerequisite: FMG 201 (or FEG 371 concurrent).

371. Plane and Geodetic Surveying (3)
Two hours lecture and recitation, 3 hours of laboratory. A treatment in depth of the principles of plane surveying, with particular emphasis on the analysis of errors, curvilinear survey, astronomical observations and potential computer relationships. Spring. Mr. Bender.

Prerequisite: APM 491.

410. Structures (4)
Three hours of lecture, 3 hours of laboratory. Engineering principles in the analysis, planning, design, construction and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems and other facilities. Properties of timber, concrete, steel and other structural materials. Fall. Mr. Tully.

Prerequisite: CIE 325 or concurrent registration.

422. Production Systems Engineering (3)
Three hours of lecture per week. Concepts of production systems and principles of their design and management, with special treatment of wood products harvesting. Applications of engineering economic analysis and mathematical programming to problems of resource allocation and systems control. Fall. Mr. Palmer.

Prerequisite: FEC 301, FEG 302, APM 491.

430. Soil Mechanics (2)
Two hours of lecture, 3 hours of laboratory (9 weeks only). The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. A 9-week course, concluding with specifica-

tions of engineering soils. Credit towards forest engineering degree may be granted only by the completion of additional assigned work. Fall. Mr. Tully.

Prerequisite: Senior class standing or permission of instructor.

Note: A student may not enroll in and receive credit for both FEG 430 and FEG 432.

432. Soil Mechanics for Engineers (3)

Two hours of lecture, 3 hours of laboratory. The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. Application of these and other engineering principles to the design of earthen structures common to the forest environment. Fall. Mr. Tully.

Prerequisites: FEG 340; also, CIE 325 concurrently.

Note: A student may not enroll in and receive credit for both FEG 430 and 432.

437. Transportation Systems (3)

Two hours of lecture and 3 hours of laboratory. Interrelationships among natural features, transportation types, design and management objectives to provide the most effective system within the given framework. Basic engineering principles in the planning location, design, construction and maintenance of suitable transportation systems to serve various aspects of forest resource management. Spring. Staff.

Prerequisites: FEG 371 and FEG 432 or equivalents.

442. Hydraulic Operations (2)

Three hours of lecture, 3 hours of laboratory. A 7-week course beginning at mid-semester, which studies solutions to hydraulic problems in contemporary construction operational activities. Not open to students having previous credit for FEG 342. Spring. Staff.

Prerequisites: Senior class standing in engineering or permission of instructor based on a background in hydraulics.

447. Hydrologic Controls (3)

Three hours of lecture and discussion. A continuation of FEG 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring. Mr. Tully.

Prerequisites: FEG 340, FEG 430 or FEG 432, CIE 327, or equivalents as evaluated by the instructor.

452. Introduction to Remote Sensing (2)

Two hours of lecture and 3 hours of laboratory per week. The fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys and site development analyses. Oriented for multidisciplinary participation.

Prerequisite: Junior standing.

460. Theory of Errors and Adjustments (3)

Two hours of lecture and 3 hours of laboratory. The theory of errors and adjustment of observations oriented toward geodesy and photogrammetry. Topics include error definitions, weighted observations, method of least squares, matrix algebra in adjustments, variance-covariance matrix, the error ellipse and the general case of adjustment. Fall or Spring. Mr. Brock.

Prerequisite: Calculus, APM 491, or equivalent.

464. Photogrammetry II (3)

Two hours lecture, 3 hours laboratory. Mathematical theory of photogrammetry including space resection, orientation and intersection. The theory and use of photogrammetric analogue computers in providing resource engineering maps. Fall. Mr. Brock.

Prerequisite: FEG 363 or equivalent.

474. Geodesy (4)

Three hours of lecture, three hours of laboratory. An introduction to Geodesy, including ellipsoidal geodesy, the direct and inverse problems, spherical triangles, conformal maps, astronomic methods of position determination, time, gravity field of earth. Fall. Mr. Bender.

Prerequisite: Calculus through MAT 328 and FEG 371 or equivalent.

477. Survey Systems Design (3)

Three hours of lecture and discussion. A study of the development and present status of Land Surveys, including the U. S. Public Land System, plane coordinate system, land use and resource systems such as New York's LUNR sys-

tem. The impact of survey upon land use. The design of future systems. Spring. Mr. Bender.

486. Cartographic Surveying (2)
Six hours of field or laboratory exercise each week. A complete topographic mapping project will be planned and conducted utilizing photogrammetric techniques. An introduction to the elements of cartography related to large scale mapping will be incorporated during the performance of the project. Staff.
Prerequisite: FEG 371 and FEG 363 or equivalent.

489. Forest Engineering Planning (4)
Three hours of lecture and 3 hours of laboratory. A synthesis of the fundamental areas of forest engineering in the planning of the physical development of the forest resources. Specific design studies will be made emphasizing the interrelationship of man, forest resources and their multiple services. These studies will lead to the development and application of planning to simulated realistic conditions. Spring. Staff.

497. Undergraduate Seminar (1)
Literature surveys and seminars on topics of Forest Engineering interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring. Staff.

498. Research Problem in Forest Engineering (1–3)
Independent research in topics in Forest Engineering for the highly motivated undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

552. Remote Sensing Interpretation (3)
Two hours of lecture, 3 hours of laboratory. An introduction to remote sensing technology as applied to detection and analysis of the forest environment, soil, water, climate and vegetation, as an aid to multiple use management. Fall and/or Spring. Staff.

563. Photogrammetry I (3)
Two hours of lecture and discussion, three hours of laboratory and discussion. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. Fall and Spring.
Prerequisite: FEG 271 (or FEG 301 concurrent) or equivalent.

FEN—ENTOMOLOGY (FOREST ENTOMOLOGY)

300. Principles of Forest Entomology (2)
Elements of insect classification, living requirements, and control manipulations that are prerequisite, with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, 3 hours of laboratory field work. Spring. Mr. Allen.

350. Elements of Forest Entomology (3)
Two hours of lecture, 3 hours of laboratory/field work. General classification of insects, morphology, physiology, ecology behavior, and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall. Mr. Simeone.
Prerequisites: FBO 100 and FZO 100.

402. Forest and Shade Tree Entomology (3)
Two hours of lecture, 3 hours of laboratory/field trip. Important forest and shade tree insects; detection, evaluation, prevention and control of their damage; their relation to silviculture and management of forests and shade trees. Spring. Mr. Lanier.
Prerequisite: FEN 350 or FEN 300.

404. Insects Affecting Forest Products (3)
Two hours of lecture and 1 hour of laboratory. Biology, identification, ecology of insect and wood interrelations, prevention of injury and control of insects injurious to forest products and wood in use. Spring. Mr. Simeone.
Prerequisite: FEN 350 or FEN 300.

Exceptions with permission of instructor.

Note: FEN 404 will next be offered in the Spring of 1975.

450. Forest and Aquatic Insects (2)

The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer (4-week period). Cranberry Lake Field Biology Station. Mr. Lanier.

Prerequisites: Background in botany, zoology, systematics and ecology.

490. Medical Entomology (3)

Two hours of lecture, 3 hours of lab. Study of arthropods affecting man, domestic animals and wildlife with emphasis on their biology, control, and relationship to vertebrate disease. Spring. Staff.

Prerequisite: A beginning course in biology, entomology, zoology or consent of instructor.

580. Insect Morphology (3)

Two hours of lecture, 3 hours of laboratory. A comparative study of the external morphology of insects emphasizing evolutionary trends, especially modifications of homologous structures. Topics of special importance include intersegmental relationships, feeding, sensory mechanisms, locomotion and reproduction. Fall. Mr. Kurczewski.

Prerequisite: FEN 350.

FMG—MANAGEMENT (FOREST MANAGEMENT)

310. Roads (3)

Two hours of lecture, 3 hours of field and laboratory practice. Engineering principles in the planning, location, design, construction and maintenance of forest roads. Contract specifications, costs, drainage, typical sections, grades, curves, surfacing materials, use of heavy equipment and explosives. Principles in the location, installation and maintenance of communications. Spring. Mr. Koten.

Prerequisite: FMG 201 or FEG 301.

322. Mensuration (3)

Two hours lecture and discussion, one 3-hour laboratory. Principles and methods of estimating and projecting net volumes of trees and products; tree form; timber volume determination of logs, trees and stands; growth determination analyses by graphical and mathematical methods; stand structure adjustments; numerous problems. Spring. Mr. Sullivan.

Prerequisites: APM 471 or APM 491; FMG 201 or FEG 371.

340. Harvesting (2)

Two hours of lecture. Principles of harvesting primary forest products. Equipment, methods and economics of the logging industry. Spring. Mr. Koten.

430. Forest Management (4)

Three hours of lecture supplemented by 1 hour of discussion and/or lecture. Public and private forest policy formation; principles of modern management; overall management and operation of a productive forest property. Primarily for forest engineers. Not available to Resource Management undergraduates. Spring or Fall. Mr. Koten.

Prerequisite: Mensuration and Silviculture or by permission of the instructor.

452. Management Planning and Operations (3)

Three hours of lecture and recitation. The overall management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration and human relations in the context of a practical operating land ownership. Spring. Mr. Horn.

454. Forest Administration and Policy (3)

Three hours of lecture and recitation. Administrative and executive aspects of forestry. Public and private forest policy formulation; basic principles of organization, planning, public relations, personnel management, budget and administrative practice. Work and organization of the major agencies engaged in forestry. Fall.

461. Operation Cost Control (3)
Three hours lecture. Management uses of accounting data. Essentials of cost accounting and the uses and misuses of historical cost data in management decisionmaking. Concepts of financial analysis of past and projected cash flows, and various methods of comparing alternatives. Fall and Spring. Staff.

Prerequisite: Permission of instructor.

462. The Structure of Management Decisions (3)
Three hours of lecture. Introductory course in managerial decisionmaking. Covers theory, concepts and methodology of management practices and relates these to the realities of decisionmaking. Uses the problem solving approach in preparing the prospective resource manager or administrator for an understanding of the application of decisionmaking models. Spring. Staff.

Prerequisites: FMG 454, APM 471 or equivalent and permission of instructor.

475. Sociology of Outdoor Recreation (3)
Two hours lecture, 3 hours laboratory. Introduction to theory and research findings dealing with the sociological aspects of outdoor recreation: field work and lectures suggest administrative applications. Spring. Staff.

Prerequisite: An introductory course in sociology or psychology; instructor's permission.

498. Problems in Forest Management (1–3)
Independent study in special problems of Forest Management. The selection of a subject area will be determined by the student and an appropriate faculty member designated by the Department Chairman. A final written report is required for department records. Fall and Spring. Staff.

Prerequisites: Senior standing in Resources Management and permission of instructor.

556. Management of the Forest Business (3)
Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to FEC 611. Fall or Spring. Mr. Horn.

FZO—ZOOLOGY (FOREST ZOOLOGY)

100. General Zoology (4)
Prerequisite to all other courses in Forest Zoology. An autotutorial course with 2 hours of lecture and recitation, 4 hours in the learning center. A brief survey of major phyla with emphasis on morphology, taxonomy, evolution and ecology followed by an introduction to the processes of maintenance, perpetuation and adaptation by animal species. The importance of other animals to man and the ecosystem is emphasized. Spring. Mr. VanDruff.

200. Wildlife Conservation (3)
Two hours of lecture, 1 hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not designed for students concentrating in the area of Forest Wildlife Management. Fall. Mr. Payne.

Prerequisite: One semester of biological science.

312. Vertebrate Taxonomy (3)
Two hours of lecture, 3 hours of laboratory. Identification and classification of vertebrates of central New York. Included are the principles of taxonomy, evolution, and distribution, collection procedures, and the use of field keys. Spring. Mr. Alexander.

313. Biology of Birds and Mammals (3)
A course surveying the taxonomy, anatomical-behavioral-physiological adaptations and natural history of birds and mammals. Techniques for the field study of a vertebrate species will be discussed. Fall. Mr. VanDruff.

330. Animal Physiology (3)
Three hours lecture. Principles of digestion, circulation, respiration, excretion, physiologic defense mechanisms,

muscle contraction, electrophysiology, neural and endocrinologic regulation, and reproduction. Spring. Mr. Hartenstein.

Prerequisite: FBL 330 or equivalent.

352. Wildlife Ecology (3)

Two hours of lecture, 3 hours of laboratory. A study of the principles governing forest and range wildlife and of the biological mechanisms involved. Spring. Mr. Chambers.

Prerequisite: FBL 320, or permission of instructor.

385. Vertebrate Anatomy (4)

Three hours of lecture and recitation, 3 hours of laboratory. Comparative study of the anatomy of representative vertebrates, emphasizing structural, functional and developmental characteristics. Fall. Mr. Graves.

411. Invertebrate Zoology (3)

Two hours of lecture, 3 hours of laboratory. Structure, classification and evolution of invertebrates. Emphasis on role of specific invertebrates in their natural habitat. Spring. Mr. Dindal.

416. Ichthyology (3)

Two hours of lecture, 3 hours of laboratory. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring. Mr. Werner.

423. Microcommunity Ecology (2)

Note: SUNY Albany No. BIO 423.

Two full days a week for 4 weeks. Study of terrestrial invertebrate microcommunities; descriptive and comparative assay of microhabitats incorporating experimental and field techniques. Summer Session I, Cranberry Lake Biological Station. Mr. Dindal, College of Environmental Science and Forestry.

Prerequisites: General biology, general ecology; invertebrate zoology is recommended.

424. Vertebrate Ecology (2)

Note: SUNY Albany No. BIO 425.

Two full days a week for 4 weeks. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics, and ecological role of vertebrates; standard field and laboratory techniques. Summer Session II, Cranberry Lake Biological Station. Staff, SUNYA.

Prerequisite: 12 hours of biology.

440. Fishery Biology (3)

Two hours of lecture, 3 hours of laboratory. Principles and techniques of handling fisheries resources in freshwater environments. Fall. Alternate even years. Mr. Young.

Prerequisites: FZO 525 and FZO 416, or permission of instructor.

455. Wildlife Methods (3)

Two hours of lecture, 3 hours laboratory. Field and laboratory techniques, with emphasis on demonstration and experience. One weekend and Saturday field trips are scheduled. Fall. Mr. Chambers.

Prerequisite: FZO 352.

470. Principles of Animal Behavior (3)

Three hours of lecture per week. A study of the basic principles of animal behavior, stressing exogenous and endogenous mechanisms of control. Fall. Mr. Price.

Prerequisite: General Zoology.

475. Behavioral Ecology (2)

Cranberry Lake Biological Station. Session I. Half time for 4 weeks. Study of the behavioral adaptations of animals to their environment. Emphasis will be placed on animal orientation and social behavior. Habitat selection and interspecific interactions will also be considered. Mr. Price, College of ES and F.

Prerequisites: General biology and general ecology.

Note: Credit may not be received for both FZO 475 and FZO 470.

480. Histology (3)

Two hours of lecture; 3 hours laboratory. A study of mammalian tissues in the healthy and diseased states. Covers all tissues of the body: cartilaginous, bony, cardiovascular, lymphoid, integumentary, digestive, respiratory, urinary, endocrine, reproductive and nervous. The laboratory deals with the preparation and examination of various kinds of tissues. Fall. Mr. Hartenstein.

Prerequisite: FZO 100 or equivalent.

520. Terrestrial Community Ecology (3)

Two hours of lecture, 3 hours of

laboratory. Relations of terrestrial animals to their physical, chemical and biological environment. Emphasis on community principles, succession and terrestrial adaptations. Fall. Mr. Dindal.

Prerequisite: A course in basic ecology.

525a. Physical and Chemical Limnology (1)

Modular format, two hours of lecture/week for first seven weeks of fall semester. An introduction to the physics and chemistry of inland waters with particular emphasis on lakes.

Prerequisites: Junior standing, an introductory physics course and an introductory chemistry course. Fall. Mr. Werner.

525b. Introduction to Biological Limnology (1)

Modular format. Two hours of lecture/week for last seven weeks of fall semester. An introduction to the biology of inland waters. Particular emphasis is placed on the aquatic environment as a habitat and the effect of changes in this environment on the structure and function of the biological communities contained therein.

Prerequisites: FZO 525a. Fall. Mr. Werner.

525c. Limnology Laboratory (1)

One laboratory or field trip/week. An introduction to Limnology techniques and the taxonomy of aquatic organisms. Field trips to local aquatic habitats. FZO 525a and FZO 525b must be taken concurrently or previously. Fall. Mr. Werner.

GFO—GENERAL FORESTRY

451. World Forestry Resources: Problems and Prospects (3)

Three hours of lecture and discussion plus guided readings, pertaining to world forest resources and the problems and opportunities associated with their use and development. Major topics include: world forest resources; production and trade; principal wood-producing countries; forestry and the problems of underdevelopment; and special areas and topics of interest to world forestry. Spring. Staff.

Prerequisite: Upper division status. Senior status preferred.

GRA—GRAPHICS (LANDSCAPE ARCHITECTURE)

181. Graphics I (2)

Six hours of studio per week. Two 3-hour drafting room periods. Elements of perspective, isometric, oblique and orthographic projection. Practical applications of these principles in machine and architectural drawing, including piping, electrical and plant layouts. Spring.

182. Art Media I (1)

Three hours of studio per week. Studios, group instruction and demonstrations, individual critiques, sketching and drawing from model, from still life, and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Fall.

183. Art Media II (1)

Three hours of studio per week. Studio assignments, group instruction, and demonstrations, individual critiques, sketching and drawing from model, from still life, and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Spring.

280. Technical Drawing (1)

One 3-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in freehand and instrument drawing. Fall.

284. Art Media III (1)

Three hours of studio per week. Studios, field trips, group instruction, criticism and demonstration, painting in oil, water color and acrylics. A studio painting course in oil, watercolor or acrylics to familiarize and develop color media skills and painting expressiveness. Fall.

Prerequisite: GRA 182 or 183, or permission of instructor.

285. Art Media IV (1)
Three hours of studio per week. Laboratory-Studios, field trips, group instruction, criticism and demonstration; painting, sculpture and other three-dimensional media. A studio course in various three-dimensional art forms and painting. Emphasis on individual experimentation and self-expression. Spatial relationships will be studied through the use of the third dimension, both from standpoint of "enclosure" and "setting." Spring.

Prerequisite: GRA 182 or 183, or permission of instructor.

482. Advanced Media (1–3)
Three hours of studio per week. Discussions, demonstrations, critiques and individual study. Study oriented toward perception and self-expression, use and possibilities of various media, as selected by student and instructor. Fall and Spring.

Prerequisite: Prior art media training or experience, and permission of instructor.

LIB—LIBRARY (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSE)

100. (1)
Two hours of lecture or discussion, one hour lab per week in the library, during the first five weeks of the semester. Introduction for students at all levels to basic library materials and the research process leading to preparation of a bibliography. Fall and Spring. Staff.

LSA—LANDSCAPE ARCHITECTURE

310. Elements of Landscape Architecture and Environmental Design for Architecture Students (2)
Two hours of lectures, discussions and assigned readings per week. A successive presentation of a landscape architectural philosophy toward the physical environment and environmental design. Presentation of operational systems involved in the physical environment from technical, functional and sumbolic points of view. Fall.

Prerequisite: Enrollment in School of Architecture or permission of instructor.

311. Elements of Landscape Architectural Practice for Architecture Students (2)
Two hours of lectures, problems and assigned readings per week. An introduction to the design elements of Landscape Architecture in contemporary application and practice. Spring.

Prerequisites: LSA 310; enrollment in School of Architecture or permission of instructor.

320. Introduction to Landscape Architecture and Design Theory (2)
Two hours of lecture per week. Lecture and class discussion, notebooks, reports, assigned text reading and assigned reserve shelf reading, research reading, weekly quizzes and exams, slides, movies and field trips. Course describes the field of Landscape Architecture, its philosophy, design theory and interdisciplinary relationships. Fall.

Prerequisite: 3rd year status or permission of instructor.

326. Landscape Design Studio I (4)
Nine hours of laboratory and 1 hour of lecture per week. Lectures, studio problems, criticism, quizzes, exams, reports, composing and rendering two- and three-dimensional techniques used to simulate the physical environment. Course presents a theory of abstract design and offers studio time in which to apply theory to graphic problems. Topics presented are the mechanics and terminology of design and the simulation of natural and man-made environments. Fall.

327. Landscape Design Studio II (4)
One hour of lecture, 9 hours of studio per week. Studio assignments, drafting, readings, discussions and field trips. An introduction to the visual-mental concepts basic to landscape architectural design. Various abstract and realistic problems to graphically illustrate elements of the physical environment and their effect upon man. Special attention to the spatial context of these

elements and spatial sequences characteristic of the natural and man-made environments. Spring. (Student field trip expense $125–$150.)

Prerequisites: LSA 326, 320 or permission of instructor.

343. Structural Materials and Elements (3)

Three hours of lectures, problems and assigned reading per week. Study of the physical properties of materials and structural elements commonly used in landscape architecture. Topics include elementary statics and strength of materials, wood, metal, plastics, concrete, masonry, retaining walls, dams, foundations. Spring.

345. Elements of Site Engineering (3)

Two hours of lectures and 3 hours of studio per week. Lectures, problems, drafting, modeling and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles, layout plans, and earthwork quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring.

Prerequisites: FMG 201 and EIN 211.

420. Landscape Design Theory I (2)

Two hours of lectures, discussions, critiques and assigned readings per week. A successive presentation of data on the physical environment beginning with the macroscape of nature to the intensively humanized urban site. Principles of basic organization of land areas, composition of elements, analysis of sites and programs, the process, purpose and implication of the practice of design. Fall and Spring.

Prerequisite: 4th year status or permission of instructor.

Note: This course will be dropped, effective Spring, 1975.

422. Landscape Design Studio III (4)

Twelve hours of studio per week. Studio problems, research, drafting and field trips. The processes and methods of design considerations of variances upon the natural physical environment, ranging from broad regional areas to specific site concerns. Fall.

Prerequisites: LSA 320, 326 and 327 or permission of instructor.

423. Landscape Design Studio IV (4)

Twelve hours of studio per week. Studio problems, research and drafting. Interaction of cultural influences with the physical environment, with attention focusing on the resulting forms. Observations and illustrations of people and places as inputs into the design process. Spring.

Prerequisite: LSA 422 or permission of instructor.

425. Orientation for Experiential Studio (3)

Three hours lecture and recitation. Investigation and documentation of an area of specialized study to be engaged in an off-campus location. Lectures, discussion, readings and research. Fall and Spring.

Prerequisite: Permission of instructor.

432. Plant Materials Culture (1)

Three lectures per week for 5 weeks. Grasses, arboriculture, propagation, transplanting, planting plans and specifications. Fall.

Prerequisite: Permission of instructor.

440. Site Development Systems (3)

Three hours of lectures, problems and assigned reading per week. Study of various engineering systems as they relate to the design and development of land. Topics include pedestrian ways, utilities (water, solid waste, sewage, electric, gas), road location and design, shore protection, swimming pools. Fall.

Prerequisite: Surveying.

490. Social Behavior and the Designed Environment (3)

Three hours of class per week. Lectures, readings, discussion and project. An examination of the concepts of individual and social behavior in relation to the physical design of the environment focusing on perceptual and cognitive evaluations as determinant of spatial meaning. Fall and Spring.

495. Selected Readings in Environmental Studies (1–3)

Exploration of selected readings in

depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.

Prerequisite: Permission of instructor.

498. Introductory Research Problem (1–3)

Guided study of a selection of problems relating to landscape architecture and environmental design. Emphasis on study procedure and methods employed. Fall and Spring. Staff. Enrollment at periodic intervals throughout the semester.

Prerequisite: Permission of instructor.

522. Landscape Design Studio VI (4)

Twelve hours of studio per week. Studio problems, research, drafting and field trips. Concentration on complex urban problems. Concern for social and psychological considerations of the individual and large groups of people, their interaction and resultant forms of the environment. Spring.

Prerequisite: Permission of instructor.

524. Experiential Landscape Studio Design (16)

48 hours per week. The articulation of the study proposal established in LSA 425, as approved by faculty, through research, readings, field study with graphic and written documentation, and group discussion. Academic study in an off-campus location in an area of landscape architectural significance, as described and delineated in a student-prepared proposal approved by the faculty. Not available for Graduate Credit. Fall or Spring.

Prerequisites: LSA 425 or equivalent and LSA 423 or permission of instructor.

525. Landscape Design Studio VI (4)

Twelve hours of studio per week. Investigation of a problem in landscape architecture as proposed by the student and conducted in conjunction with faculty advisor. Spring.

Prerequisite: Permission of instructor.

527. Landscape Design Studio VI (4)

Twelve hours of studio per week. Studio problems, research, reports, and field trips. Concentration on regional landscape problems, the techniques of their analysis and derivation of their significance to the practice of landscape design. Spring.

Prerequisite: Permission of instructor.

529. The Major Elements of Environmental Design (3)

Lectures, readings, discussions and studios. The course presents an introductory survey of environmental design methods and associated skills and techniques. While studio work is engaged, no design background is required. Fall.

530. Herbaceous Plant Materials (2)

Two hours of lectures, study problems, assigned readings and field trips per week. Identification, understanding and design use of nonwoody plants. Fall.

Prerequisite: Permission of instructor.

532. Woody Plant Materials (3)

Three hours of lecture per week. Field study, lectures, slide presentations and readings. An elective course providing opportunity for extension of basic knowledge in the identification and design of woody plant materials in professional practice. Fall or Spring.

Prerequisites: LSA 533 and LSA 432 or permission of instructor.

533. Plant Materials (3)

Field trips and discussion. Ornamental woody plant identification. Observation and sketches of outstanding examples of planting design. Three weeks. Summer Session.

Prerequisite: Permission of instructor.

542. Highway Location and Design (3)

Two hours of lecture, 3 hours of studio per week. Lectures, assigned reading, studio projects, field trips. Environ-

mental, engineering and human factors which determine highway location and design, particularly as they relate to landscape architectural concerns. Location, alignment, geometric design, drainage, roadbed construction, pavements, roadside development. Fall or Spring.

Prerequisites: LSA 343 and 440 or permission of instructor.

545. Professional Practice Studio II (2)

Three hours of studio, 1 hour of recitation per week. Studio problems, research, discussion and recitation sessions on the processes and methods of office practice. Emphasis on all aspects of site-development. Spring.

Prerequisite: Permission of instructor.

547. Principles of Professional Practice (2)

Two hours of lecture per week. Lectures, assigned readings, reports, cost estimates, specifications, contracts, professional ethics, registration laws, professional practice. Spring.

Prerequisite: Upperclass standing.

562. Architecture (3)

Two hours of lecture, 3 hours studio. Discussion and investigation of the principles of architectural design and procedures of architectural practice. Functional building systems coupled with site and program considerations as to their relative impacts on architectural form. Spring.

Prerequisite: Permission of instructor.

595. Selected Readings in Landscape Architecture (1–3)

Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.

Prerequisite: 5th year status or permission of instructor.

597. Landscape Architecture Seminar (3)

Three hours of seminar per week. Discussion of current social, political, cultural and technological problems as to their relationship to the physical environment. Fall and Spring.

Prerequisite: Permission of instructor.

598. Research Problem (1–3)

Independent study of selected areas of environmental interest. Emphasis on a self-disciplined study, development of procedures and techniques to be employed in environmental design and planning. Engagement with specific sites and problems as proposed for study by individual communities. Fall and Spring. Enrollment at periodic intervals throughout the semester.

Prerequisite: Permission of instructor.

MAT—MATHEMATICS (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES)

115. Plane Trigonometry (3)

Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle, complex numbers, logarithms, and accuracy of computed results. Fall or Spring. Mr. Green.

116. College Algebra (3)

Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. Fall or Spring. Mr. Green.

PSE—PAPER SCIENCE AND ENGINEERING

300. Introduction to the Pulp and Paper Industry (3)
Discussion of the historical modern development and management of the paper industry. Fall.

301. Pulp and Paper Processes (3)
Three hours of lecture. Introduction to pulp and paper technology with emphasis on pulping and bleaching. A study of the processes of pulping and bleaching of fibers including underlying theory. An introduction to formation and reactions of a fibrous web. Spring. Mr. Bambacht.
Prerequisites: CHE 332, FCH 475 and 576.

302. Paper Processes Laboratory (1)
One 3-hour laboratory. Study and practice in the techniques of laboratory procedures normally encountered in the pulp and paper industry. Laboratory exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring. Mr. Bambacht.
Prerequisite: PSE 301 (or concurrent).

304. Mill Experience (5)
Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years. Ordinarily, the student receives wages or salary while getting the required experience. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Staff.

305. Mill Inspection Report (1)
One week inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are approximately $60 per student. Spring. Staff.

Prerequisites or concurrent: PSE 301, 302 and 370.

370. Principles of Mass and Energy Balance (3)
Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Spring. Mr. Gorbatsevich.
Prerequisites or concurrent: MAT 227, Physics, CHE 346, CHE 356 and CHE 333.

456. Economics of Pulp and Paper (2 or 3)
Two or 3 hours of lecture and seminar. Structure and development of the industry and the decisions of management are explained in the light of economic principles. Current industrial trends and problems are discussed. Each student prepares an analytical report on some aspect of industry structure. Spring. Mr. Armstrong.
Prerequisite: FEC 290 or equivalent.

461. Pulping Technology (4)
Two hours of lecture and 6 hours of laboratory. Discussion of pulping and bleaching processes: Effect of chemicals and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall. Mr. Gorbatsevich.
Prerequisites: PSE 370, CHE 346 and CHE 356.
Note: A student may not enroll in or receive credit for both PSE 461 and PSE 661.

465. Paper Properties (5)
Three hours of lecture, 6 hours of laboratory and discussion. Evaluation and study of the physical, optical and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results and the ultimate properties desired in the finished paper. Fall.
Prerequisites: PSE 301, PSE 302.
Note: A student may not enroll in or receive credit for both PSE 465 and PSE 665.

466. Paper Coating (3)
Two hours of lecture, 3 hours of laboratory. Evaluation and study of the

various coating processes and materials used by the paper industry to impart special properties to paper. Relationships of various components, flow properties of coating mixtures and evaluation of their effect on coated paper properties will be studied. Spring.

Prerequisite: PSE 465.

Note: A student may not enroll in or receive credit for both PSE 466 and PSE 666.

468. Papermaking Processes (3)

One hour of lecture, 6 hours of laboratory. Laboratory study of the papermaking process, with emphasis on operation of the semicommercial Fourdrinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished product and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring. Messrs. Gorbatsevich and Stenuf.

Prerequisites: PSE 461 and PSE 465.

472. Pulp and Paper Unit Operations Laboratory I (1)

Three hours of laboratory. Laboratory study of fluid dynamics, heat transfer and evaporation. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculations. Specially designed semicommercial equipment is used. Fall. Mr. Stenuf.

Concurrent: PSE 575 and 576.

474. Pulp and Paper Unit Operations Laboratory II (3)

Nine hours of laboratory. Laboratory study of humidity and air conditioning, drying, extraction, distillation, gas absorption, filtration, sedimentation, mixing and other unit operations. Emphasis is placed on the recognition of the important variables and on methods of evaluating them by experimentation and subsequent calculation. Specially designed semicommercial equipment is used. Spring. Mr. Stenuf.

Concurrent: PSE 578 and 579.

496. Special Topics (1–3)

Lectures, conferences and discussions. Specialized topics in chemistry, chemical engineering and physics as well as topics pertaining to management as related to the pulp, paper, paperboard and allied industries. Spring. Staff.

498. Research Problem (4)

Twelve hours laboratory. The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique rather than on discovery of results of commercial importance. The information obtained in the literature survey along with the data developed as a result of the investigation is assembled and evaluated and submitted in duplicate to his instructor. Spring. Staff.

Prerequisites: PSE 461 and PSE 465.

575. Unit Operations I: Fluid Mechanics and Heat Transfer (3)

Three hours of lecture and 4 hours of recitation per week for the first 9 weeks of the semester. The study of momentum and heat transfer. Pipeline and duct design, pump and blower selection, flow measurement, open channel flow, heat transfer by conduction, convection, radiation, including equipment design and selection. Fall. Mr. Stenuf.

Prerequisites: FCH 221 and 223, CHE 106, 116, 346, 356, PHY 103, 104, PSE 300, 301, 370 or equivalents.

576. Unit Operations II: Process Control and Mass Transfer (2)

Two hours of lecture and 4 hours of recitation per week for the last 6 weeks of the semester. The study and application of measuring means, remote signal transmission, and control elements. Response to signals, lag, dynamic error, cycling and other phenomena of process control are discussed in relation to the standard modes of control, including two-position, single-speed floating, proportional, proportional-speed floating, proportional-reset, proportional-reset-rate, cascade control, relation of the process variables to open and closed loop computer applications.

The fundamentals of mass transfer, humidification and air conditioning as applied to industry and as found in the environment—climate and weather conditions. Fall. Mr. Stenuf.

Prerequisite: PSE 575.

578. Unit Operations III: Mass Transfer (3)

Three hours of lecture and 4 hours of recitation per week for the first 9 weeks of the semester. The study of mass transfer and application to the design and operation of equipment for drying, gas absorption, distillation and extraction. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.

Prerequisite: PSE 576.

579. Unit Operations IV: Recovery Processes Operations (2)

Three hours of lecture and 4 hours of recitation per week for the last 6 weeks of the semester. The study of industrial recovery processes operations including evaporation, filtration, sedimentation, centrifugation, small particle technology and fluidization, and reverse osmosis. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.

Prerequisite: PSE 576.

SIL—SILVICULTURE

324. General Silviculture (3)

Three hours of lecture per week for first half of semester; 2 hours of lecture and 3 hours of laboratory or field work per week during second half of semester. Presentation of silvicultural concepts, principles and practices. Not designed for biology or resource management majors. Spring. Mr. Lea.

Prerequisite: Junior standing.

332. Soils (3)

Two hours of lecture and 3 hours of laboratory. Introduction to the fundamentals of soil science with particular reference to forestry, but including other land uses. Fall. Mr. Craul.

351. Meteorology and Fire Behavior (3)

Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall. Mr. Herrington.

Prerequisite: PHY 103 and 104 (Calculus helpful but not required).

420. Application of Ecology (3)

Two hours of lecture and discussion and 1 to 3 hours seminar, laboratory or field trip per week. Examination of ecological concepts relevant to practices modifying terrestrial ecosystems for human benefit. Discussion of selected ecological literature, seminars and field trips by specialists in various fields of applied ecology, and student presentations exploring ecological implications of specific problems or situations. Course designed for interdisciplinary participation. Spring or Fall. Mr. Richards.

Prerequisites: An ecology course or permission of instructor. Senior standing desirable.

421. Principles of Silviculture (3)

Three hours of lecture during the first half of the semester; 2 hours of lecture and 3 hours of laboratory during the second half of the semester. The forest as a community. Site factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owners. Spring. Mr. Berglund.

Prerequisites: Summer Session in Field Forestry, FBO 330 or FBO 530 concurrently, or permission of instructor.

424. Practices of Silviculture (3)

Two hours of lecture and one 3-hour laboratory or field trip. Theory and practices of silviculture manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, plantings and other silvicultural operations in their relationships to economic and ecological factors. Fall. Mr. Johnson.

Prerequisite: SIL 421 or permission of the instructor.

425. Advanced Practices of Silviculture (3)

Four hours of lecture and seminar during the first half of the semester; 6 hours of field exercises thereafter. Development of silvicultural decisions in management of woodlands. Trips to forest areas. A cultural plan prepared to attain assigned objectives. Spring. Mr. Lea.

Prerequisite: SIL 424.

426. Greenspace Silviculture (3)

Two hours of lecture and discussion, 1 to 3 hours seminar, workshop or field trip per week. Concepts and techniques applicable to the manipulation of vegetation systems primarily for their on-site values in park, recreation or multiple-use land, roadsides, utility rights-of-way, buffer and protection areas, etc. Spring. Mr. Richards.

Prerequisite: At least one general or plant ecology or silvics course. Senior standing desirable.

428. Regional Studies (2)

Two hours of lecture. Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography, geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. Spring. Mr. Johnson.

Prerequisite: SIL 424.

435. Forest Soils (3)

One hour of lecture, 1 hour of discussion, 4 hours of laboratory, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development—soil properties relationships. Methods of soil sampling and laboratory analysis. Fall. Mr. Leaf.

Prerequisite: SIL 332.

440. Forest Hydrology (3)

Two hours of lecture, 3 hours of laboratory. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion, and other variables. Fall and Spring. Mr. Eschner and Mr. Black.

441. Forest Influences (2)

Two full days/week for 4 weeks. Field observation of the effect of the presence of forest vegetation on easily quantified parameters of climate and the hydrologic cycle. Basic measurements of precipitation, radiation, temperature, interception, soil moisture, groundwater and streamflow. Summer Session II. Cranberry Lake Biological Station.

442. Practice of Watershed Management (3)

Two hours of lecture, 3 hours of laboratory. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring. Mr. Eschner.

Prerequisite: SIL 440.

452. General Meteorology (3)

Three hours of lecture. Examination of the physical processes of the atmosphere as they relate to the exchange of heat, moisture and momentum in the earth-atmosphere system. Emphasis on the meteorological and micrometeorological basis of climate and its interaction with the biological world. Spring. Mr. Herrington.

Prerequisite: Junior standing or permission of instructor.

453. Meteorology Laboratory (1)

Three hours laboratory. An extension of SIL 452 which provides analysis and discussion of the atmospheric processes important to weather and climate. Major topics include air mass analysis, surface weather map analysis, and climatological summarization procedures. Spring. Mr. Herrington.

Prerequisites: SIL 452 or concurrently and permission of instructor.

477. Forest Tree Improvement (3)

Two hours of lecture, 3 hours of laboratory or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal

and offspring testing and other problems. Spring. Mr. Westfall.

Prerequisites: FBL 370 and 371 strongly advised.

497. Silviculture Seminar (2 or 3)
Group study of selected silvicultural problems or situations of mutual interest. Emphasis is on critical evaluation and analysis and on organization and presentation of results from individual study for group consideration. Spring. Staff.

498. Special Studies in Silviculture (1–3)
Independent research in silviculture for selected undergraduate students. Selection of subject areas determined by the student in conference with appropriate faculty member. Final written report is required for departmental record. Fall or Spring. Staff.

Prerequisite: Consent of instructor and department chairman.

553. Energy Exchange at the Earth's Surface (3)
Two hours lecture and 3 hours of laboratory. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphere. Primary emphasis on the turbulent transfer of heat, momentum and water vapor and the expression of these fluxes in the microclimate. Spring. Mr. Herrington.

Prerequisite: SIL 452, physics and calculus.

WPE—WOOD PRODUCTS ENGINEERING

300. Properties of Wood for Designers (2)
Two hours of lecture. An introduction to the basic structure and properties of wood for the designer. Discussion of the effects of wood structure and properties on practical woodworking techniques. Fall. Staff.

302. Elementary Timber Mechanics (3)
Two hours of lecture, 3 hours of laboratory. Introduction to strength properties of wood, and wood products and other construction materials. Applications of these materials in typical construction problems. Fall. Mr. Kyanka.

Prerequisite: Senior standing or permission of instructor.

320. Polymeric Adhesives and Coatings (2)
Two hours of lecture a week. An introduction to organic adhesives and coatings for the purpose of being able to specify proper materials for particular applications. Knowledge acquired will allow the individual to understand product literature and specifications. Wood product systems are discussed in detail, but the principles involved are easily transferred to other substrate systems. A knowledge of chemistry is not required. Spring. Mr. L. Smith.

Prerequisite: Junior standing.

321. Adhesives and Coatings Laboratory (1)
Three hours of laboratory a week. Laboratory experiments to identify materials, methods of application and methods of evaluation of adhesives and coatings normally used in the wood industry. Spring. Mr. L. Smith.

Prerequisites: WPE 320 (may be concurrent) or permission of instructor.

322. Mechanical Processing (3)
Two hours of lecture, 3 hours of laboratory. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall. Mr. Moore.

326. Fluid Treatments (2)
Two hours of lecture. An introduction to wood-moisture relationships, wood permeability and pressure treatments, thermal conductivity, water-vapor movement and drying, and fire retardancy. The flow of fluids, heat and water vapor are treated as analogous phenomena and are related to the cellular structure of wood. Unsteady-state flow of gases, heat and water vapor are introduced. Spring. Mr. Siau.

Prerequisites: Junior status.

327. Fluid Treatments Laboratory (1)
Three hours of laboratory a week. Laboratory studies in relative humidity

measurement, wood-moisture relationships, the relationship between permeability and treatability, wood-preservative treatments, wood drying and flame testing. Spring. Mr. Siau.

Prerequisites: Junior status, concurrently with WPE 326.

360. Engineering Materials (3)

Two hours of lecture and one 3-hour laboratory a week. An introduction to the study of materials science emphasizing the structure and properties of materials used in the construction industry in general. Lab work includes fabrication, testing and evaluation of actual systems. Spring. Staff.

Prerequisites: Junior standing, physics, chemistry and engineering mechanics.

362. Timber Mechanics (4)

Three hours of lecture and 3 hours of laboratory second semester. Mechanical properties of wood and elements of structures. Lectures, problems, and use of timber-testing equipment. Spring. Mr. Kyanka.

Prerequisites: Calculus, physics.

386. Elementary Wood Technology (2)

One hour of lecture, 3 hours of laboratory. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U.S. timber by gross feature. Spring. Mr. DeZeeuw and Staff.

387. Wood Structure and Properties (4)

Two hours of lecture, 6 hours of laboratory. Identification variability and anatomical characteristics of wood and papermaking fibers. Uses, properties and sources of wood and fibers. Structure of wood in relation to defects, properties and uses. Fall. Mr. DeZeeuw and Staff.

Prerequisite: FBO 100 or consent of instructor.

390. Field Trip (2)

Two weeks supervised study and reporting of representative wood products industries. Spring. Staff. Required of all students in WPE. Estimated individual expenses are $100–150 while on the trip.

400. Introduction to Forest Products (2)

Two hours of lecture. Characteristics of the products of the forest tree

and manufacture of wood products. Fall. Mr. E. Anderson.

400. Design of Wood Structural Elements (3)

Lectures plus laboratory exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall. Mr. Kyanka.

Prerequisite: WPE 362.

422. Composite Materials (3)

Two hours of lecture, 3 hours of laboratory. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites, and extruded and molded products. Fall. Mr. Moore.

Prerequisites: WPE 320, and WPE 326. Concurrent or prior registration in WPE 362 or 302.

442. Light Construction (3)

Two hours of lecture, 3 hours of laboratory. Elements of light frame construction, blueprint reading, and estimating. Fall. Mr. G. Smith.

444. Materials Marketing (3)

Three hours of lecture and discussion. Marketing functions, agencies and management in the wood products and related industries. Principles of salesmanship and their application. Spring. Mr. G. Smith.

450. Construction Equipment (3)

Three hours lecture. Principles of selection, operation and maintenance of construction equipment. Primary types of site preparation, handling and assembly devices and their efficient utilization will be examined. Spring. Mr. Kyanka.

Prerequisite: Senior standing.

454. Construction Management (3)

Two hours lecture, 3 hours of laboratory. Conception, management and control of the construction process with emphasis on specifications, costs, legal boundaries, erection planning and control, inspection and supervision. Spring. Mr. Whitt.

Prerequisite: Senior standing.

470. Production Systems I: Analysis (3)

Two hours of lecture, 3 hours of laboratory. Elements of system engineering. Analysis of performance characteristics of integrated production systems. Analysis of long-range vs. short-range system planning. A comprehensive lab problem is commenced which deals with the analysis prerequisite to the establishment of a manufacturing plant in a wood-processing industry. Fall. Mr. Whitt.

Prerequisites: Senior status and INE 548, APM 491, and concurrent registration in INE 575 or equivalent.

472. Production Systems II: Synthesis (3)

Two hours of lecture and 3 hours of laboratory. Organization for production. Manufacturing engineering and production planning and control. Plant layout and materials handling. A comprehensive problem of production system synthesis is carried out in a succession of lab exercises oriented toward a wood-processing industry. Spring. Mr. Whitt.

Prerequisite: WPE 470 or equivalent.

497. Senior Seminar for Wood Products Engineering Majors (2)

Discussion and assigned reports in current problems and new developments in wood products engineering. Fall. Staff.

498. Research or Design Problem (1–3)

Conferences, library, laboratory, and/or field research on a specific problem in wood products engineering. Typewritten report (original and one copy) required. Fall and/or Spring. Staff.

Prerequisite: Consent of instructor.

596. Special Topics (1–3)

Lectures, conferences, discussions and laboratory. Special topics in Wood Products Engineering including techniques in scientific photography, microscopy, laboratory instrumentation, and computer applications as well as other topics of departmental interest. Fall and/or Spring. Staff.

Prerequisite: Consent of instructor.

Syracuse University Courses Required in College of Environmental Science and Forestry Curricula

ACC—ACCOUNTING

204. Financial Accounting Systems (3)
Fundamentals of financial accounting systems are described and applied to business organizations. Topics include: the recording process, income determination, asset valuation, financial statements, funds statements, ratio analysis and use of financial accounting information for decisionmaking.

205. Managerial Accounting and Financial Decisions (3)
Financial information for internal managerial decisions decisionmaking are discussed. Topics include: Introduction to capital budgeting, methods of increasing equities, management of working capital, operating budgets, cost analysis, product costing, variance analysis and financial control system.
Prerequisite: ACC 204 or equivalent.

ARC—ARCHITECTURE

294. Introduction to Architecture (3)
A continuation of ARC 293 which is a survey of the background and influences relating to architecture.

LPP—LAW AND PUBLIC POLICY

355. Introduction to the Legal System (3)
The law as an instrument of social control. An understanding of peoples' rights and duties is developed through a study of basic legal concepts, procedures and reasoning.
Prerequisite: Junior standing or permission of instructor.

557. The Law of Commercial Transactions (3)
The legal aspects of commercial transactions are studied, with special attention given to contracts, the sale of goods, the use of commercial paper, the treatment of security, and the protection of consumers.
Prerequisite: LPP 355 or permission of instructor.

CHE—CHEMISTRY

106, 116. General Chemistry Lecture (3)
Fundamental principles and laws underlying chemical action; states of matter, atomic and molecular structure, chemical bonding, stoichiometry, properties of solutions, chemical equilibrium and introduction to therodynamics. CHE 107 and 117 or 129 and 139 must be taken concurrently.

107, 117. General Chemistry Laboratory (1)
Open to students in CHE 109 and 119 or CHE 106 and 116. An experimental study of basic principles and techniques of chemistry. The states of matter, determination of formulas and molecular weights, simple volumetric and gravimetric analysis, heats of reaction. Studies of equilibrium, rates of reactions and qualitative analysis.

332. Quantitative Analysis, I and II (2)
The fundamentals of gravemetric and volumetric analysis. Two lectures per week. CHE 333 must be taken concurrently; it is recommended that CHE 326 also be taken concurrently.
Prerequisite: CHE 285.

333. Quantitative Analysis Laboratory, I and II (1–2)
Laboratory to accompany CHE 332. Must be taken for 2 credits by all chemistry majors.

346. Physical Chemistry, I and II (3)
The properties of gases, liquids and solids. Elementary thermodynamics and chemical equilibrium. Three lectures per week.
Prerequisites: One year of college physics and differential calculus.

356. Physical Chemistry, I and II (3)
Solutions, electrochemistry, kinetics and elementary statistical thermodynamics. Three lectures per week.
Prerequisite: CHE 346.

357. Physical Chemistry (1 or 2)
Experimental techniques of physical chemistry and error analysis. Measurement of molecular weights, reaction rates, heats of reaction, equilibrium constants, spectroscopy. One or two laboratory periods. CHE 346 and 356 are either prerequisites or corequisites.

434. Instrumental Methods, I and II (2)
The theory and application of instrumental techniques to the solution of chemical problems. Two lectures per week. CHE 435 must be taken concurrently.
Prerequisites: CHE 332, 333, and 356.

435. Instrumental Methods Laboratory, I and II (1–2)
Laboratory to accompany CHE 434. Must be taken for 2 credits by all chemistry majors.

CIE—CIVIL ENGINEERING

325. Mechanics of Deformable Bodies (3)
Theories of stress, deformation and stability of elastic and nonelastic bodies subjected to various force systems.
Prerequisites: MEE 225 and MAT 398 (the latter may be taken concurrently).

326. Engineering Materials (3)
Study of the atomic, molecular and crystalline structures of solid engineering materials. The explanation and interpretation of physical, mechanical and electrical properties of materials based on these structures. Two 1-hour lectures and one 2-hour laboratory per week.
Prerequisite: CIE 325 or permission of instructor.

327. Principles of Fluid Mechanics (4)
Dimensional analysis; hydrostatics; equations of motion; Bernoulli's equation; Euler's momentum theory; one-dimensional analysis; velocity potential; stream function; laminar viscous flow; Reynolds' stresses; isentropic flow.
Prerequisites: MAT 398, MEE 226.

437. Soil Mechanics and Foundations I (3)
Study of the formation and composition of soil. Concepts of soil mechanics, including hydraulic and mechanical properties. Two lectures and one laboratory per week.
Prerequisites: CIE 325, 327.

ELE—ELECTRICAL ENGINEERING

221. Electrical Science I (3)
Introduction to electric and magnetic field and circuit concepts; resist-

ance and diode circuits; network reduction using techniques like Thevenin's theorem; elements of transient and steady state circuit analysis.

Prerequisites: MAT 295, 296, PHY 103, 104.

222. Electrical Science II (3)

Mathematical description of electric and magnetic fields; elements of electromechanical conversion; analysis and design of simple electronic circuits, with emphasis on semiconductor diodes and transistors.

FIN—FINANCE

355. Money and Banking (3)

Introduction to general principles of money and banking, including organization and control of the banking system, commercial bank functions and operations, organization and operation of the Federal Reserve System, and monetary theory and policy.

Prerequisite: ECO 205.

GOL—GEOLOGY

101. General Geology (3)

Introduction to chemical, physical and biological processes and principles affecting the history and development of the earth. Lectures, laboratory and field trips.

105. Earth Science (3)

An introduction to earth science providing an integrated approach to the study of the solid earth, continental surfaces, atmosphere and oceans. Lectures, no laboratory, no prerequisite, not for geology majors.

INE—INDUSTRIAL ENGINEERING

548. Engineering Economic Analysis (3)

Deals with the economic factors of engineering decisions: the "will it pay?" aspect of engineering. Study of comparisons between old and alternative proposed economic plans from an engineering economy viewpoint involving consideration of management, materials, design, machine selection.

Prerequisite: Junior standing.

575. Industrial Methods and Systems Engineering (3)

Study of man-machine relationships, workplace design, process selection with emphasis on production subsystems, and automation. Special topics include measurement of human and machine activity, flow analysis, line balancing, feedback systems and control theory.

Prerequisites: INE 525 and 332, or equivalent.

MAR—MARKETING MANAGEMENT

355. Marketing and Society (3)

An analytical study of marketing as a major business function and a social process. Introduces analysis of market forces; marketing opportunities; determination of price, product, distribution, promotion and organization policies required to control and fulfill planned marketing programs.

MAT—MATHEMATICS

015. Plane Trigonometry (3)

Prerequisites: One year plane geometry and 1½ years algebra. No credit given if taken in high school. Will not satisfy Arts and Sciences group requirements.

016. College Algebra (3)

Prerequisite: One year of plane geometry and 1½ years algebra. Will not satisfy Arts and Sciences group requirements.

125. Elementary Analytic Geometry (3)

A study of geometry by algebraic means with emphasis on representation of lines, conics and other curves by equations; polar coordinates; parametric equations; solid analytic geometry.

Prerequisites: MAT 015 and 016 or equivalent.

226. Differential Calculus (3)

Limits; derivatives of algebraic and transcendental functions; applications to maxima and minima problems, curve tracing and rates of change; differentials.

Prerequisite: MAT 125.

227. Integral Calculus (3)
Law of the mean, definite and indefinite integrals, techniques of integration, geometric and physical applications.
Prerequisite: MAT 226.

328. Topics in Calculus (3)
Improper integrals, indeterminate forms, infinite series and expansion of functions, partial differentiation with applications, multiple integrals.
Prerequisite: MAT 227.

585. Higher Mathematics for Engineers I (3)
Solution of ordinary differential equations, including series solution; vector algebra and calculus, line and surface integrals, integral theorems; expansion in Fourier series.
Prerequisite: MAT 328 or 398.

MEE—MECHANICAL ENGINEERING

225. Engineering Mechanics (4)
Fundamental concepts; elements of vector algebra; forces, moments, equivalent systems; free-body diagrams. Statics and dynamics of particles, systems of particles and rigid bodies; translation, rotation, plane motion. Centroids, centers of mass, moments of inertia. Impulse-momentum, work-energy methods.

226. Engineering Mechanics (3)
Continuation of MEE 225. D'Alembert's principle. Kinematics of moving reference frames, Coriolis acceleration. Three-dimensional rigid-body dynamics; the gyroscope. Introductions to orbit theory and vibration analysis. Selected additional topics in dynamics.
Prerequisite: MEE 225 or permission of instructor.

351. Fundamentals of Thermodynamics I (3)
Basic concepts and methods in engineering thermodynamics. The laws of thermodynamics and their implications in mechanical, chemical, electrical and magnetic systems. Properties of solids, liquids and gases, including perfect gases and mixtures thereof.

PHY—PHYSICS

103 and 104. General Physics (4)
Basic course dealing with the fundamental principles of physics. Lectures with demonstrations, discussion, recitations and laboratory. The first semester covers the fields of mechanics, heat and sound; the second semester, electricity and light.
Prerequisite: Course in trigonometry, or trigonometry as a parallel course.

211/212. General Physics for Science Students, I, II (4)
An advanced level introductory course that makes use of calculus methods. First semester: mechanics, heat and sound. Second semester: electricity and magnetism, light and some atomic physics. Lectures, recitations, and laboratory.
Corequisite: MAT 295 or equivalent.

361. Introduction to Modern Physics (3)
Recent developments, including atomic theory, quantum theory, electronic structure of atoms and molecules, radioactivity and structure of the nucleus.
Prerequisites: PHY 103 and 104 or equivalent.

PAD—PUBLIC ADDRESS

215. Public Speaking (3)
Application of the principles of informing, interesting and motivating an audience; emphasis upon selection, organization and development of ideas. Students deliver, listen to and criticize expository and persuasive speeches. No prerequisite. Required of all students in the School of Speech and Dramatic Art. To complete a year in public address, students should elect PAD 235 or 535.

Summer Attendance

A wide array of courses at the undergraduate and graduate levels is available to College of Environmental Science and Forestry students in the Syracuse University summer sessions. Research problems, theses, and special courses regularly available at the College may also be taken during the summer sessions. Syracuse University courses taken must be an integral part of the student's planned program and *be approved by his faculty advisor.*

Transfer students are advised to review their special course needs with the Office of Admissions and to consider summer attendance where completions of background courses in mathematics, chemistry, economics, or general education subjects are necessary for fall semester entry in full standing. Information on courses available on the Syracuse campus, session dates, and registration procedures are available upon request from the Office of Student Affairs or the Office of Graduate and Instructional Affairs at the College. Summer session tuition charges at the College for New York State residents are $21.50 for undergraduate lower level students, $26.75 for undergraduate upper level students, and $40.00 for graduate level students per credit. Tuition charges for nonresidents of New York State are correspondingly $35.75, $43.50, and $50.00 per credit.

SUMMER FIELD PROGRAMS

Program in Field Forestry

Charles Lathrop Pack Demonstration Forest
Warrensburg Campus
Warrensburg, New York

A five-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted twice each summer at the Pack Demonstration Forest near Warrensburg, New York. These sessions are coordinated with the Syracuse University summer sessions, permitting students to attend an on-campus session and a field

session in the same summer. The courses presented in the field forestry program are listed in both the forest biology and resources management curricula sections. Room, board, and fee charges approximating $175 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the junior year. *Transfer students* planning to enroll in either the resources management or forest biology curriculum should write to the Director, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the field forestry program is required of students in resource management prior to the fall term of their junior year. Students in forest biology are also required to attend either this program or the program at Cranberry Lake Biological Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

Program in Environmental Biology

Cranberry Lake Biological Station
Charles Lathrop Pack Demonstration Forest
Cranberry Lake Campus
Cranberry Lake, New York

The Summer Program in Environmental Biology provides graduate students and undergraduate biology majors with the opportunity to continue their studies and research at a lake-and-forest field station in the summer. Qualified students from other institutions are welcome and are encouraged to attend.

Cranberry Lake and its environs are ideally suited for an advanced biology summer program. The surrounding topography is rolling hill and lake country dotted with numerous small ponds, closed bogs, and stream drainages. The lake itself is the third largest body of water in the Adirondacks. Because eighty percent of the shoreline is in State ownership, the lake remains relatively unspoiled by recreational developments and is free of pollution problems. Much of the original forest cover in the region was harvested years ago; today a rich variety of community types occupy those sites as the vegetation reverts again to the natural forest condition. The remaining virgin forests also provide the student with many examples of stable forests, each type reflecting the particular environmental conditions controlling forest development. A wealth of wildlife parallels the variety of cover types over the region. The area is centrally located providing easy access to a wide range of additional ecosystems ranging from bog to alpine types.

Facilities include four classroom-laboratories; dining facilities capable of serving 150; faculty quarters and cabins; an administration building; 12 cabins housing 6–8 students each; a recreation hall; and several smaller, supporting buildings.

The eight-week program extends from late June into mid-August and is divided into two four-week sessions. Courses are taught in blocks of two-day units, permitting concentrated study without hourly interruptions. These courses are designed to emphasize and effectively utilize the unique nature of this Adirondack setting and include the ecology of plants, invertebrate and vertebrate animals, in such diverse offerings as aquatic ecology, bryophyte ecology, insect ecology, vertebrate ecology, micro-community ecology, ornithology, forest communities, ecological measurements, forest pathology and limnology. The offerings vary from year to year, and interested students should contact the Office of Graduate and Instructional Affairs, State University of New York College of Environmental Science and Forestry, Syracuse, New York 13210 for additional information.

Forest Technician Program

THE PROGRAM

In 1912, some 1800 acres of land in the Adirondack Mountains were donated as a site for the development of a Ranger School by the College. Since that time, the forest technician program has trained more than 2,600 graduates, most of whom are now working in a variety of nationwide forest activities, and has earned the School a national reputation for excellence.

The 2-year curriculum trains students as forest technicians. The degree of Associate in Applied Science in Forest Technology (A.A.S.) is awarded upon the successful completion of the curriculum. The objectives of the curriculum are to provide students with a knowledge of the field practices of forestry as related to forestry managerial needs; the ability to work and communicate effectively with professional and paraprofessional forestry personnel; and an understanding of the sciences and practices of forestry with some emphasis on ecological applications.

Graduates are generally classified as forest technicians or forestry aides in initial employment positions. Forestry agencies and wood-using industries employ forest technicians as an important part of their forest management teams, usually as the "men on the ground" who plan and execute the field practice of forestry.

Since this curriculum is structured as a terminal, 2-year program at the paraprofessional level, students interested in a professional degree in forestry are advised to enroll initially in one of the College's 4-year undergraduate programs.

The freshman year of the forest technology curriculum consists primarily of general studies' courses which may be taken on the Syracuse Campus or at accredited community and junior colleges and agricultural and technical institutes.

The second year of the curriculum is taken at the College's Ranger School on the Wanakena Campus. Presented in a varied forest environment, the curriculum's emphasis is on practical field training and on the relationships between forest technology and managerial needs. Fifty

percent of the studies is devoted to field exercises, most of which are held in the School's forest. This rolling belt of managed forest, containing both hardwood and coniferous species, covers an area some 3½ miles long with widths varying from 6/10 to 2¼ miles. On two sides the forest is bounded by State Forest Preserve Lands. The forest is also adjacent to an area of several square miles of virgin timber within the Adirondack Forest Preserve. This excellent forest backdrop for the technology program provides a most diverse laboratory for instructional purposes.

Since the Ranger School is situated within a forest environment, some applicants to the forest technology program may mistakenly believe that the program is one of forest lore and wilderness survival. It is, therefore, strongly emphasized that the forest technology curriculum demands high quality academic achievement. Students cannot complete the program without concentrated and consistent study. Courses are offered in eight-week modules. Classes are scheduled from 8 a.m. to 5 p.m., Monday through Friday, with classroom and laboratory or field time equally divided. The intensity of the program normally requires a minimum of 70 hours a week of evening and weekend study, daily classes, and laboratory/field exercises. Several short trips, at no additional expense to the student, are made during the year in connection with courses in logging, forest recreation, forest mensuration and silviculture. A longer trip of five days' duration emphasizing regional forestry practice is sponsored during the spring semester of the second year. Students must bear their proportionate share of the cost of this field trip which consists primarily of lodging and meal expenses.

LIFE AT WANAKENA

The Wanakena Campus of the College of Environmental Science and Forestry is located on the banks of the Oswegatchie River near the picturesque hamlet of Wanakena. Approximately 65 miles northeast of Watertown, New York, and 35 miles west of Tupper Lake, New York, the School's buildings and its surrounding forest border on Cranberry Lake.

The main School building consists of a central service unit with dormitory wings on either side. The central unit contains classrooms, laboratories, library, a student lounge, faculty offices, the library, a kitchen, dining room and 44 student rooms, each housing two students.

Faculty living quarters are nearby on the campus. Other buildings include a maintenance shop, garages, a sugar house and storage buildings.

The close proximity of faculty offices and student quarters and the intensive field-work pattern enables students to consult easily and frequently with the faculty. The School considers this traditional close student-faculty association to be of major benefit in its training program.

A small library of approximately 1,500 volumes consists of highly specialized materials required for the teaching and study programs of the School.

Students taking the second year of the forest technology curriculum at the Wanakena Campus are required to live in the School's dormitories. An exception may be made for married students who may bring their families and rent their own private accommodations in the vicinity of the Wanakena Campus. Such accommodations are not plentiful. It is recommended that each married student arrange rental arrangements well in advance of the registration date.

The Wanakena Campus does not maintain an infirmary, nor does it have on its staff a physician or nurse. There are three physicians and a dentist available in the immediate area as well as an excellent Community Hospital in nearby Star Lake, New York. In emergency situations, the School transports the sick or injured student to the local physician of his choice or to the hospital. Furthermore, there is no student accident or sickness insurance plan available through the Wanakena Campus, so that it is strongly suggested that the student consider such coverage before reporting to the Campus.

Because of the comparatively isolated location of the Wanakena Campus, a stock of books and supplies used in connection with the second year of the program is maintained on campus for sale to students.

During the first year of the program, College-enrolled students will be guided by the rules and regulations that govern their attendance at the Syracuse Campus. During the second year of the program, students will be guided by the general rules and regulations for all College students and an additional set of Wanakena Campus "house rules" that supplement the College's general rules and regulations.

ADMISSION

Admission Requirements

Admission requirements for entrance into the forest technology curriculum are generally the same as for the other curricula of the College of Environmental Science and Forestry. Minimum requirements are 16 Carnegie high school units along this pattern: English, 4; history (social science), 2; science, 2 (one must be chemistry or physics); mathematics, 3 (including trigonometry or Math 11); and electives. Mechanical drawing and typing are strongly suggested electives.

An applicant must submit the test results of any one of the following: New York State Regents Scholarship Examination, College Entrance Examination Board (CEEB), Scholastic Aptitude Test (SAT), or American College Test (ACT).

The Director of Admissions may waive some of the above requirements under special circumstances.

In addition to the above-listed requirements, the following requirements must be met by all applicants:

1. The applicant must be strongly motivated toward a career as a forest technician.
2. The applicant must be aware of and willing to accept the work requirements of this field-forestry program and its strenuous physical demands.
3. The applicant's parents (if the applicant is under 21 years of age) must be fully aware of the field nature of the study program, its rigorous study-work regime and supporting academic facilities.
4. A full medical examination report must be submitted.

Admission Procedures

The decision to admit any student to the Forest Technician Program rests solely with the College of Environmental Science and Forestry. Most openings in the program are filled by students who received conditional acceptances while still seniors in high school, contingent on successful completion of the first year of college. Remaining openings are filled by transfer students who have already attended college. Therefore, it is suggested that the potential forest technician student apply while still a high school senior. Transfer admission at a later date is still possible for those not conditionally accepted in high school.

There are two procedures:

1. Seniors in high school who wish to spend the first year of the forest technician program on the Syracuse Campus should submit the regular freshman application (S-1) with supplemental forms to the College, using Curriculum Code 620 (Forest Technology).

2. Seniors in high school who wish to attend the first year of studies at another college (e.g., a community college), and the second year on the Wanakena Campus should: a.) Submit a regular freshman application (S-1) with supplemental forms to the College of Environmental Science and Forestry, using Curriculum Code 620 (Forest Technology). On one of the supplemental forms the student can indicate what school has been chosen for the first year. b.) Submit a regular application to the school selected for the first year of studies, using Curriculum Code 620.

Transfer Students

Students with previous college experience or who are currently enrolled at another college may apply for transfer. Courses transferred for credit must be appropriate to the freshman year course of studies and comparable in subject matter content and level. No transfer credit will be allowed for the second year courses taken at the Wanakena Campus.

Transfer applicants must submit a recent official copy of their college transcript and a list of courses they anticipate completing prior to enrollment.

Students spending the first year of studies at some other college must complete the following courses or their equivalents before they will be permitted to enroll in the Wanakena Campus portion of the program.

English	*6 semester hours*
Math (College Algebra and Trigonometry)	*3–6 semester hours*
General Biology (or Botany—course should be plant-oriented)	*6–8 semester hours*
Economics	*3 semester hours*
Graphics (Drafting—emphasizing lettering)	*1–2 semester hours*
Electives (Recommended: Public Speaking, Technical Report Writing)	*3–9 semester hours*
	30–32 semester hours

EXPENSES

Costs of the first year will vary with the specific institution attended.

Estimated costs of the second-year program on the Wanakena Campus are as follows:

	Tuition	*Board & Room*	*Books & Supplies*	*Fee*
New York Resident	$ 650	Approx. $1,000	Approx. $275	$15
Nonresident	$1,075	Approx. $1,000	Approx. $275	$15

An additional estimated expense of $150.00 will likely be incurred to cover the cost of laundry and clothing. The cost of the 5-day regional forestry practice trip during the spring semester is estimated at approximately $100.00. There is also a $10.00 graduation fee and a refundable property deposit of $15.00.

FINANCIAL ASSISTANCE

Financial aid is available upon acceptance to the College of Environmental Science and Forestry. There are three basic loans: scholarships or grants, part-time employment and long-term loans.

More detailed information on these financial aid opportunities can be found on pages 15–19 of this bulletin and in the *Undergraduate Financial Aid Bulletin*.

The student must file an application with the Office of Financial Aid at the Syracuse Campus and submit a *Parents' Confidential Statement* to the College Scholarship Service, Princeton, New Jersey 08540.

FOREST TECHNOLOGY CURRICULUM
(Associate in Applied Science Degree)

First Semester		*Credit Hours*	*Second Semester*		*Credit Hours*
		Freshman Year (Syracuse Campus or preferably taken at a two-year college)			
FBO 100	General Botany	4	FZO 100	General Zoology	4
[1]English		3	[1]English		3
[2]Math or Elective		3	[2]Math or Elective		3
GRA 280	Technical Drawing	1	FEC 290	Introduction to Economics for Forestry	3
[4]Electives		3	[4]Elective		3
PED or ROTC		0	PED or ROTC		0
[3]GFO 032	Orientation	0			
		14			16
		Senior Year (Wanakena Campus)			
FTC 200	Dendrology I	2	FTC 201	Dendrology II	½
FTC 202	Plane Surveying I	4	FTC 203	Plane Surveying II	3
FTC 204	Forest Mensuration and Statistics I	3	FTC 205	Forest Mensuration and Statistics II	2½
FTC 206	Forest Ecology	1½	FTC 207	Aerial Photogrammetry	2
FTC 208	Forest Installations	3	FTC 211	Silviculture II	2
FTC 209	Forest Roads	2	FTC 212	General Forestry	1½
FTC 210	Silviculture I	1½	FTC 214	Personnel Management	1½
FTC 213	Forest Protection I	2	FTC 215	Timber Harvesting	2
FTC 223	Graphics—This course will be offered to those unable to meet this requirement prior to entry at the Wanakena Campus—1 cr. hr.		FTC 216	Wood Technology	1½
			FTC 217	Forest Management	2½
			FTC 218	Forest Recreation	1½
			FTC 219	Elements of Wildlife Ecology	1½
			FTC 221	Allied Technologies	1
			FTC 225	Regional Forestry Practices	1
			FTC 227	Forestry Protection II	2
		19			26

[1]If competency in freshman English is shown, these 6 credit hours can be used for electives.

[2]Competency in plane trigonometry and college algebra is required. When this is demonstrated, these become elective credits.

[3]In addition to taking GFO 032, students in this program are expected to complete the one-day orientation session to be given at the Wanakena Campus in late May, prior to Fall Registration.

[4]In selecting electives, courses related to communication skills such as Technical Report Writing and Speech are strongly recommended. Additional work in the biological sciences and a basic course in geology should also be given serious consideration.

A total of 75 credit hours is required. Upon satisfactory completion, an associate science (A.A.S.) degree in forest technology will be awarded.

PLACEMENT

The School assists in placement of graduates. The reputation of the College's Ranger School usually results in graduates being able to find employment readily. Employment is common with local, state and federal forestry and land resource agencies, private forestry enterprises and surveying firms. Positions most frequently filled by recent graduates include: state forest ranger, state forest technician, forestry aide, industrial forest district supervisor, timber inventory specialist, timber sales supervisor, forest surveyor, forest engineering aide, forest protection technician, forest research technician and forest equipment salesman.

FOREST TECHNOLOGY

200. Dendrology I (2)

32 hours of lecture and 42 hours of field time. A study of the distinguishing characteristics, growth features, distribution, associates and importance of the major tree species of North America.

Seasonal field identification and on-the-spot discussion of habitats, associates, and the place in succession of the predominant forest trees and shrubs as found in the Adirondack area of the Northeast, plus a limited number of introduced species. Fall. Mr. Coufal.

201. Dendrology II (½)

10 hours of field time. A continuation of Dendrology I, with special emphasis on identification and use as site indicators, for example ground cover plants. Spring. Mr. Coufal.

Prerequisite: FTC 200.

202. Plane Surveying I (4)

FTC 202 and 203 together include 60 hours of lecture and 184 hours of field time. A comprehensive study of the theory and practice of plane surveying with particular stress on the development of proper field procedures and competency in the use of surveying instruments. Fall. Mr. Sterbenz.

203. Plane Surveying II (3)

FTC 202 and 203 together include 60 hours of lecture and 184 hours of field time. A comprehensive study of the theory and practice of plane surveying with particular stress on the development of proper field procedures and competency in the use of surveying instruments. Spring. Mr. Sterbenz.

Prerequisite: FTC 202.

204. Forest Mensuration and Statistics I (3)

32 hours of lecture and 52 hours of field time. A classroom and field study of the basic principles and skills required for timber measurements. Volume tables, their use and construction are studied. Cruise reports are required in which the student describes cruise procedures and results. Fall. Mr. Martin.

205. Forest Mensuration and Statistics II (2½)

22 hours of lecture and 44 hours of field time. A classroom field and laboratory study of the methods utilized for collecting, analyzing, and presenting data dealing with forest measurements. In addition, the student learns to scale and grade logs and other forest products. Spring. Mr. Martin.

206. Forest Ecology (1½)

28 hours of lecture and 20 hours of field time. Study of weather and weather data collection; students manning a forest weather station. Study of weather and soil factors as to how they affect trees and forests, plus the interactions within the forest community and with the environment. Attention given to the School forest soils survey with field trips to study soil and site relationships. Fall. Mr. Remele.

207. Aerial Photogrammetry (1½)

20 hours of lecture and 36 hours of laboratory. Development of the ability

to interpret important ground features by viewing aerial photos singly and in pairs, using stereoscopic techniques and equipment. Instruction in the use of other interpretation and photo measuring equipment for making useful overlays and maps. Spring. Mr. Remele.

208. Forest Installations (3)

42 hours of lecture and 60 hours of field time. This course provides the student with the technical competence necessary to use, plan, construct, and maintain such typical forest improvements as telephone lines, radio systems, trails, small streams, and light frame structures. Fall. Mr. Miller.

209. Forest Roads (2)

17 hours of lecture and 44 hours of field time. This course provides the student with the technical competence necessary to administer, locate, and design the construction and maintenance of a typical forest gravel road. Fall. Mr. Miller.

210. Silviculture I (1½)

FTC 210 and 211 together include 58 hours of lecture and 24 hours of field time. Orientation regarding the place, terminology, and methods of silviculture. Coverage of the most generally used techniques for establishing and manipulating the more important forest types in the Northeast for ecological and economical satisfaction. Field demonstrations and practice in planting, thinning, pruning, timber marking, and chemical silviculture. Fall. Mr. Remele.

Prerequisite: Forest ecology.

211. Silviculture II (2)

FTC 210 and 211 together include 58 hours of lecture and 24 hours of field time. Orientation regarding the place, terminology, and methods of silviculture. Coverage of the most generally used techniques for establishing and manipulating the more important forest types in the Northeast for ecological and economical satisfaction. Field demonstrations and practice in planting, thinning, pruning, timber marking, and chemical silviculture. Spring. Mr. Remele.

Prerequisites: Forest ecology, FTC 210.

212. General Forestry (1½)

27 hours of lecture. An introduction to the scope and objectives of forestry. Consideration is given to historical development, forest terminology, and forest policy. Forest agencies, both public and private, are examined. A survey of the various kinds of forestry occupations is made with emphasis on technician level opportunities. Current events in forestry are discussed. Forest programs, education, and trends for the future are analyzed. Spring. Staff.

213. Forest Protection I (2)

24 hours of lecture and 24 hours of lab/field time. A study of the insect and disease agents that damage trees and their role in the total forest community. The course covers identification of local forest insects and disease-causing organisms, study of the major pest groups of other forest regions, and control measures, including the effects of pesticides in the environment. Field trips cover local pests and the damage caused, while lab work covers major groups of pests likely to be encountered elsewhere. Fall.

214. Personnel Management (1½)

31 hours of lecture and 2 hours of field time. The role of personnel management within industrial companies and governmental agencies, with special consideration given the foreman level. A study of company and agency organizational groups including selection of and placement of personnel, training of personnel and personnel performance evaluations, planning for and administering crew responsibilities, human relations in the working situation, and special personnel problems of the forest technician and professional forester are covered.

Techniques of foremanship are applied in various field exercises in other courses, along with a study of safety hazards, accident prevention, accident classification, and accident reporting. Responsibility of management, particularly the foreman, in safe working procedures is incorporated. Twelve hours of first aid training are included. Spring. Staff.

215. Timber Harvesting (2)

21 hours of lecture and 35 hours of field time. This course acquaints the student with the basic harvesting methods and techniques, with emphasis on the

Northeast, along with the knowledge of how and where harvesting fits in with other forest uses. Students gain technical competence in timber sale contract administration and basic timber appraising. Spring. Mr. Miller.

216. Wood Technology (1½)

17 hours of lecture and 20 hours of laboratory. Study of the development of various cell and tissue structures within trees, the gross structural features of wood, and the part these features play in the physiological processes of living trees. Physical properties of wood are studied with special emphasis given to those gross features which identify species. Attention is given to wood quality, defects of wood, and those special features which make certain species desirable for specific uses.

In the laboratory a variety of samples from the more commercially important lumber trees of North America are identified by the use of a gross feature key and 10X magnification. Spring. Staff.

217. Forest Management (2½)

30 hours of lecture and 46 hours of field time. The relation of silviculture to management. Subdivisions and classification of forest properties. Determination of growing stock and growth. The forms of managed forests and methods by which forests are brought to a regulated condition. Field and lab work in preparation for a report giving recommendations for management of a portion of the School Forest. Spring. Mr. Remele.

218. Forest Recreation (1½)

28 hours of lecture and 30 hours of field/lab time. This course acquaints the student with the forest recreational resource—its present and future needs. Principles of recreational development and management are discussed with special emphasis placed on the technical aspects. Spring. Mr. Miller.

219. Elements of Wildlife Ecology (1½)

19 hours of lecture and 26 hours of field time. A study of the principles of wildlife ecology with fundamentals related to the actions of the preservationist, conservationist, and particularly those of the forest manager. Spring. Mr. Martin.

Prerequisite: A course in biology or its equivalent.

221. Allied Technologies (1)

18 hours of lecture and 8 hours of laboratory. A brief introduction to four areas of modern technology that relate directly to the forest management task: aviation; radio; remote sensing; computers. Interface type information is presented so that the student is made aware that these technologies exist. Spring. Mr. Sterbenz.

223. Graphics (1)

16 hours of lecture. This course provides the student with the opportunity to develop a minimum skill level in lettering and drafting as used by the forest technician in the keeping of surveying field notes and the preparation of maps for forest management purposes. Fall. Mr. Sterbenz.

225. Regional Forestry Practices (1)

40 hours of field time. An 8-day field trip to provide concentrated and varied field observation. It is conducted during the fourth semester to give the student first-hand observation of the current forestry practices in the northeastern part of the United States. Spring. Staff.

227. Forest Protection II (2)

27 hours of lecture and 27 hours of lab/field time. A continuance of the study of insects begun in FTC 213, Forest Protection I, with emphasis on insect identification and ecology as keys to control.

The basic principles of forest fire behavior, fire danger and fire danger rating, and the prevention and control of forest fires are covered. Fire simulation exercises and practice of fire suppression techniques are given. Spring. Mr. Coufal.

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UNDERGRADUATE STUDIES

STATE UNIVERSITY OF NEW YORK — COLLEGE OF

ENVIRONMENTAL SCIENCE AND FORESTRY

CORRESPONDENCE DIRECTORY

Detailed information about the College may be obtained by addressing inquiries to:

The State University of New York
College of Environmental Science and Forestry
Syracuse, New York 13210

Telephone (315) 473-8611

Admission
Director of Admissions
110 Bray Hall
473-8708

Financial Assistance
Coordinator of Financial Aid
109 Bray Hall
473-8884

Transcripts and Academic Records
Registrar
111 Bray Hall
473-8717

Housing
Coordinator of Undergraduate Housing
Office of Residential Life
Steele Hall
Syracuse University
Syracuse, New York 13210
423-2720

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State University of New York

COLLEGE OF

ENVIRONMENTAL SCIENCE AND FORESTRY

1975 - 76
Undergraduate Studies Bulletin

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Academic Calendars

SYRACUSE CAMPUS

FALL 1975

Residences Open	August 31	Sunday
Labor Day	September 1	Monday
Counseling Begins	September 2	Tuesday
Registration	September 3-5	Wednesday-Friday
Classes Begin	September 8	Monday
Yom Kippur	September 14-15	Sundown Sunday to sundown Monday
Fall Recess	November 26-30	Wednesday-Sunday
Last Day of Classes	December 10	Wednesday
Reading Day	December 11	Thursday
Exam Period	December 12-19	Friday-Friday

SPRING 1976

Residences Open	January 11-12	Sunday-Monday
Counseling Begins	January 13	Tuesday
Registration	January 14-16	Wednesday-Friday
Classes Begin	January 19	Monday
Mid-semester Recess	March 6-14	Saturday-Sunday
Last Day of Classes	April 23	Friday
Reading Days	April 26-27	Monday-Tuesday
Exam Period	April 28-May 5	Wednesday-Wednesday
Commencement	May 9	Sunday

FOREST TECHNICIAN PROGRAM—WANAKENA CAMPUS

FALL 1975

Students Arrive	August 21-22	Thursday-Friday
Classes Begin	August 25	Monday
Thanksgiving Recess	November 22-30	Saturday-Sunday
Semester Ends	December 19	Friday
Intercession	December 20-January 18	Saturday-Sunday

SPRING 1976

Classes Begin	January 19	Monday
Spring Recess	March 22-30	Monday-Tuesday
Semester Ends	May 28	Friday
Graduation	May 29	Saturday

Admission

ADMISSION CRITERIA

Admission to the College of Environmental Science and Forestry is based on academic qualifications after careful analysis of information provided by the applicant's high school or other scholastic records, standardized tests and recommendations. In many cases, an interview may be conducted to assess interests and abilities.

Minimum requirements are at least 16 units along this pattern: English, 4 units; history (social studies), 2 units; science, 2 units (with at least 1 in chemistry or physics); mathematics (through trigonometry), 3 units; and electives, 5 or more units. Recommended electives are mechanical drawing and a foreign language.

WHEN TO APPLY

A candidate for freshman admission usually begins the application process in the fall of the senior year of high school. Review of candidates begins in January and the date for final decision on most freshman applications is May 1. Freshman applicants begin to receive notification of admission after February 15. A copy of the decision letter is sent to the applicant's high school guidance counselor. Freshmen are not usually admitted to the College for the spring semester.

FRESHMAN APPLICATION PROCEDURE

1. To apply for admission, residents of New York State should request the proper forms from their local high school guidance office. Nonresidents should request the forms directly from ESF's Office of Admissions. Revised admission forms are available in September for entry the following year.

2. All freshman applicants must submit the results of at least one of the following tests: the New York State Regents Scholarship (administered only in early October in most high schools in New York); the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB); or the American College Test (ACT). The Director of Admissions has the authority to waive this requirement in certain cases.

3. While a personal interview is *not* required for admission, it may be helpful in college planning. An interview with an admissions officer can be arranged by contacting the Office of Admissions.
4. *Application deadline for freshman admission is March 1.*

CAMPUS VISITS

The College of Environmental Science and Forestry welcomes visits by students and their parents. The Office of Admissions is located in Room 110 Bray Hall. The office is open Monday through Friday from 8:30 a.m. until 5 p.m.

ENTRANCE WITH ADVANCED STANDING

Secondary school students may earn college credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry enriched course loads, and may be accomplished in two ways:

1. Courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After successful completion, an official transcript or other appropriate

document should be sent to the College by the institution along with a catalog description of the course or courses.

2. College-level courses are given by some high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English and foreign languages offer opportunity for degree credit at this College. The determination of credit is made by faculty members to whom the student's final examination papers are sent after they have been graded.

COLLEGE PROFICIENCY EXAMINATIONS

The New York State College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. The College also accepts the College Level Examination Program (CLEP) of the College Entrance Examination Board. These examinations are open to all who make application.

The College approves of the CPE and CLEP programs in general and will evaluate the performance of participants.

If all College policy requirements are met, grades A and B will receive credit; credit for a grade of C will be granted only upon recommendation of the department of the applicant's major; and no credit will be granted for a grade lower than C.

Application for credit should be made to the Office of Student Affairs. Application for deviation from the prescribed policy may be made to the Undergraduate Academic Affairs Committee.

TRANSFER STUDENTS

Students who are currently enrolled at another institution of higher education or who have previous college experience may apply for transfer. Any student who has been academically dismissed must wait at least one semester before applying to this College.

Application forms should be obtained directly from the College by writing to the Director of Admissions, Attn: Transfer. This material will arrive after 4—5 weeks. Revised application forms are available in September for admission the following year.

Students with two years of college can generally arrange their programs to allow transfer to the College of Environmental Science and Forestry with junior standing. Courses transferred for credit must be appropriate to the student's curriculum choice and successfully completed with a passing grade of D or better. (It should be noted, however, that students who transfer courses in which a grade of D has been earned must be aware of possible deficiencies when that material is used in more advanced courses.)

Furthermore, courses to be transferred as required courses in a curriculum must be comparable in content. Course credit hours are transferred, but grades and grade points are not.

In applying to the College for transfer, it is the students' responsibility to submit a recent official transcript from the college they are currently

attending and similar documents from all colleges previously attended. No official transfer credit will be awarded until all final transcripts are received. Catalogs from each college may also be required.

Application deadline for transfer students is May 15.

DUAL ENROLLMENT WITH COLUMBIA-GREENE

The College of Environmental Science and Forestry and Columbia-Greene Community College have arranged a dual enrollment program. Any applicant for the liberal arts, math and science program with a forest management concentration at the two-year college is evaluated by both institutions. Upon acceptance and successful completion of the associate in applied science degree program, the student is automatically accepted at the College of Environmental Science and Forestry.

INTERNATIONAL STUDENTS

The College accepts international students on the undergraduate level if they can satisfy all regular admissions requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country, if at all possible, and apply to the College as graduate students. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. If an international student wishes to apply as an undergraduate, he must:

1. meet the secondary school requirements for entrance;
2. show that he is proficient in the English language through acceptable results of the Test of English as a Foreign Language (TOEFL) and/or College Entrance Examination Board Achievement Test in English;
3. provide competitive scores on the CEEB's Scholastic Aptitude Test in the verbal and math areas; and,
4. produce evidence that he can meet all financial obligations.

Undergraduate foreign students must file official State University of New York admissions forms. These may be obtained by writing to the Director of Admissions at the College. No fee is required for processing the application. *If the foreign student is accepted, adequate health and accident insurance must be obtained before the student will be allowed to register at the College.*

International students who are currently enrolled at an American college may apply for transfer to the College. They must meet all entrance requirements plus those of a transfer student as listed above. Permission to transfer must be obtained from the U.S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

HEALTH EXAMINATION REPORT

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice.

Student Expenses

APPLICATION FEE

When a student applies for admission to any of the State University of New York units, he pays to the University a nonrefundable application fee of $10 for the first application and $5 for each of the next three applications. Students who apply for transfer from other units of the State University of New York pay no fee.

ADVANCED PAYMENT FEE

New and transfer students pay a fee of $50, which is credited to the student's first semester tuition. This payment should be sent to the Business Office, SUNY College of Environmental Science and Forestry, Syracuse, New York 13210, accompanied by the form provided by the Office of Admissions. The payment is required within 30 days after the date of acceptance and no later than May 1; it is refundable up to May 1.

TUITION AND FEES

The tuition and fee structure of the College of Environmental Science and Forestry includes library, health, infirmary, physical education, ROTC, special testing and other services, as well as an assessment for student activities and charges for expendable supplies and equipment.

Tuition is $650 per academic year for freshmen and sophomores who are residents of New York State. Tuition is $800 for juniors and seniors.

Tuition for nonresident freshmen and sophomores is $1,075 per academic year; nonresident juniors and seniors pay $1,300.

COLLEGE FEE

A State University-mandated fee of $25.00 ($12.50 payable each semester at registration) is required of all matriculated full-time students. Part-time students are required to pay a SUNY College fee of 85 cents for each semester in which they are enrolled.

STUDENT ACTIVITY FEES

In addition to tuition, the student body has voted to assess each student $18 per year to cover the cost of student activities. ESF students also pay yearly Syracuse University fees to cover the costs of the many student activities they participate in; these fees are $23.75 for full-time students and $13.50 for part-time students. An optional yearly fee of $3 supports Syracuse University's Public Interest Research Group (PIRG).

TERMS OF PAYMENT

A check or money order for tuition and fees should be made payable to *State University of New York College of Environmental Science and Forestry.* This payment is required by the last day of the registration period and can be paid at the College's Business Office either prior to registration or during registration. *A fee of $10 is charged for registering later than the established dates.*

HOUSING AND BOARD COSTS

Housing costs at Syracuse University, depending on the room, range from $770 to $990 for an academic year. Most rooms accommodate two students and are furnished with beds, mattresses, desks, chairs, study lamps and dressers. A commercial linen service is available for those who order it.

A variety of options on board offerings are available for all students. Costs range from $790 to $1,000 for an academic year.

Housing and board rates are subject to change, and inquiries about them should be addressed to Office of Residential Life, Syracuse University, Syracuse, New York 13210.

Payment for housing and board is made directly to Syracuse University.

COMMENCEMENT FEE

A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

OTHER COSTS

Students majoring in Resource Management attend a 5-week Summer Session in Field Forestry at the Warrensburg Campus between the sophomore and junior years. The cost is approximately $250.

Forest Biology majors attend either the Summer Session in Field Forestry or the Summer Session in Environmental Biology at the Cranberry Lake Biological Station. Cost for the 8-week session is approximately $400.

An extended field trip of up to 3 weeks costs approximately $200 for *Wood Products Engineering students.*

Field trips for *Landscape Architecture students* range between $125 and $150. In addition, students enrolled in the 5-year Landscape Architecture program are required to spend one semester off campus. This is a self-described and student-budgeted program. Costs are not required to exceed those of a semester on campus, but additional costs are often incurred depending upon the location chosen.

The cost of books and supplies is approximately $150 a year. Additional costs for personal expenses, recreation, clothes and travel depend on the individual, but they may range from $300 to $500 a year.

REFUNDS

The following policies apply to tuition liability and refunds for students canceling their registration.

A student who is given permission to cancel registration is liable for payment of tuition in accordance with the following schedule:

Liability During	*Semester*
1st week	0
2nd week	30%
3rd week	50%
4th week	70%
5th week	100%

No money will be refunded unless application for refund is made within one year after the end of term for which the tuition requested to be refunded was paid to State University. The first day of class session is considered the first day of the semester and Saturday of the week in which this first session occurs is considered the end of the first week for refund purposes. It is interpreted that a student who does not attend any class sessions after Saturday of the first week and who notifies the College of his intent to cancel registration on or before the second Saturday following the first day of classes will be considered to have canceled his registration during the first week.

There is no tuition or fee liability established for a student who withdraws to enter military service prior to the end of an academic term for those courses in which the student does not receive academic credit.

A student who is dismissed for academic or disciplinary reasons prior to the end of an academic term is liable for all tuition and fees due for that term.

A student who cancels registration at a unit of the State University, and within the same term registers at another unit of the State University, is entitled to full credit for tuition and fees paid for that term.

Notwithstanding any other provisions for refund, when a student has withdrawn through circumstances beyond the student's control, under conditions in which the denial of refund would cause undue hardship, the Chief Administrative Officer of the unit, may, at his discretion, determine that no liability for tuition has been incurred by the student, provided the student has not completed more than one half of the term and has not received or will not receive academic credit for the term. Such action, including the reason for withdrawal, must be in writing.

Financial Assistance

The College of Environmental Science and Forestry offers three basic forms of student financial assistance: scholarships or grants, part-time employment and long-term loans. These programs are coordinated to supplement parental support, summer work, savings and assistance from other sources. Since the source of funds for these programs, the guidelines for determining the recipients, the procedures for applying and the method of disbursement of funds vary greatly from one program to another, the individual is encouraged to contact the Office of Financial Aid to discuss specific questions.

Aware of the many problems of financing higher education and meeting day-to-day living expenses, financial aid adivsors are always available to discuss individual student problems.

HOW TO APPLY

Each year students interested in receiving financial assistance must apply, or reapply. Two forms are necessary for the application process.

1. The candidate must complete a College financial aid application form and return it to the College.
2. The candidate's parents or legal guardians must complete the Parents' Confidential Statement (which is available from high school guidance counselors or from the College) and forward it to the College Scholarship Service, Box 176, Princeton, New Jersey 08540, where it is analyzed and sent to the College.
3. Applicants who are financially independent of their parents should write directly to the Office of Financial Aid for the necessary forms.
4. Applications should be submitted as early as possible. Applicants need not wait for notification of acceptance to the College before applying for financial aid. Applications will be accepted after April 1; it should be noted, however, that available funds may already be committed to other students.
5. Students are invited to discuss with the College's Coordinator of Financial Aid any problems in financing their education.

SELECTION OF RECIPIENTS

Applications will be reviewed as soon as they are complete.

In making award decisions, consideration is given primarily to comparative financial need; however, scholastic standing, character and potential contribution to the College community are also factors in making certain awards.

SCHOLARSHIP AND GRANT PROGRAMS

Supplemental Educational Opportunity Grants (SEOG)

The College is the recipient of funds authorized under Title IV-A of the Higher Education Act of 1965 as amended. These funds enable the College to award grants to students who have high financial need. Grants range from $200 to $1,500 per year and must be matched by other awards.

Forestry Educational Opportunity Grant Program (FEOP)

Students accepted into the FEOP receive partial tuition waivers and grants to help meet the cost of their education. Students must come from a socio-economically disadvantaged background to be eligible for this program. Interested students should apply to the program and for the corresponding financial assistance when they apply for admission to the College.

Basic Educational Opportunity Grants (BEOG)

The BEOG Program was authorized in the Education Amendments of 1972. Grants are available to eligible full-time and half-time students who have not attended college prior to April 1, 1973. The amount of the award can vary from $50 to $1,400 depending on the following:

1. The amount of funds made available by the federal government.
2. The amount determined by an entitlement computation formula.
3. The cost of the student's education as allowed by the program.

Applications are available from high school guidance offices or any college office of financial aid.

Private Scholarships and Grants

The College administers a number of programs which have been established by private individuals, companies, organizations and foundations. These scholarship and grant programs have varying eligibility requirements and are awarded to students according to these guidelines. The following is a list of the programs: Alumni Memorial Awards, Alumni Educational Grants, Allied Paper Salesmen's Association, Inc., Harold L. Austin Memorial Scholarship, Boxboard Research and Development Association, Nelson Cortlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Award, Jack L. Krall Memorial Scholarship Fund, Federated Garden Clubs of New York State, Inc. and Heiberg Memorial Fund.

Other opportunities include: Joseph S. Illick Memorial Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, C. E. Libby Award, Milton Conservation Club Award, New York State College of Forestry Foundation, Inc., Portia Farrell Morgan Scholarship, Frank B. Myers Memorial Award, Charles Lathrop Pack Awards, Plastics Engineers' Awards, Phyllis Roskin Memorial Award, Student Association Grants, and State University at Syracuse Chapter of Civil Service Employees Association (CSEA) Scholarship.

Syracuse Pulp and Paper Foundation, Inc. Scholarships

Scholarships from this foundation are awarded to students majoring in Paper Science and Engineering. New York State residents receive $750, and students from out-of-state receive $1,050 annually. Incoming freshmen and transfer students entering the program should request a Pulp and Paper Scholarship application from the Office of Financial Aid. It is necessary to reapply each year for the scholarship.

State University Scholarships (SUS)

New York State residents who have a family net taxable income of $2,000 or less are eligible for assistance to pay the balance of the tuition charge after Scholar Incentive. Applications for this program are available at the time of registration.

Partial Tuition Waivers

In the Spring of 1972, the State University of New York Board of Trustees established a program of tuition waivers for New York State residents. The program reduces the cost of tuition for many students whose family taxable income is $12,000 or less. The amount of the waiver is based on the tuition charge and the amount of income reported on the Regents application. Students eligible for Regents awards will be asked to file the additional application after the Regents application has been processed. New York State residents who are not eligible for the benefits from Regents programs should write to the Office of Financial Aid for the appropriate application.

Tuition Waivers for International Students

Tuition waivers may be granted each year to qualified students from foreign countries. Interested students should contact the Vice President for Student Affairs or the Director of Admissions.

Regents Programs

Additional information and applications for the following Regents programs are available from:

Regents Examination and Scholarship Center
99 Washington Avenue
Albany, New York 12210

Regents College Scholarships (RC)

High school seniors who are New York State residents may qualify by taking the Regents Scholarship Examination.

Tuition Assistance Program (TAP)/Regents Scholar Incentive Award (SI)

These awards are available to New York State residents who are enrolled in full-time degree programs. Based on income, minimum awards begin at $100.

Regents War Service Scholarships (WS)

Veterans are eligible to take a competitive examination administered during the summer.

Regents Grants for Children of Deceased or Disabled Veterans

These grants are awarded to children of parents who served during specific periods of war or national emergency and who died as a result of such service, or suffered a disability of at least 50 percent. The award entitles a New York State resident to $450 per year.

Vocational Rehabilitation Grants

Financial assistance and program counseling are provided by New York State through the Office of Vocational Rehabilitation for students who qualify.

Veterans' Benefits

The Veterans' Readjustment Benefits Act of 1966 as amended enables veterans to obtain financial aid for their college education.

Additional information and counseling are available from the Office of Veterans' Affairs at the College. Local veterans' administration offices, or the State Regional Office, 111 West Huron Street, Buffalo, New York 14202 can provide information and application forms.

Social Security Benefits

The 1965 Amendments to the Social Security Act extended the age limit for a child's benefits from 18 to 22, providing the child is a full-time student. Local Social Security offices have additional information.

EMPLOYMENT OPPORTUNITIES

College Work-Study Program (CW-SP)

The College participates in the Federal College Work-Study Program. This program provides part-time jobs during the academic year and full-time positions during the summer to students who need financial assistance to attend college.

Other Employment

The College coordinates and maintains lists of part-time and summer employment opportunities which do not require financial need as a prerequisite for employment. Interested students should contact the Coordinator of Career Services for additional information.

LOANS

National Direct Student Loans (NDSL)

These loans are available to students with financial need who are enrolled at least half-time. An aggregate of $5,000 is the maximum an undergraduate can borrow, and $10,000 is the aggregate a graduate student can borrow. Repayment and 3 percent interest begin 9 months after leaving college. Deferment and cancellation benefits are available for certain situations.

Insured Student Loans

This program is administered by the New York Higher Education Assistance Corporation (NYHEAC) for New York State residents. These loans are available from a bank or other lending agent to students who are registered at least half-time. Undergraduates can borrow an aggregate of $7,500 for their undergraduate studies, and a graduate student can borrow an aggregate of $10,000. Repayment and 7 percent interest begin 9 months after leaving college (an additional ½ percent interest is paid at the time the loan is received. Applications are available at local banks or at the Office of Financial Aid.

Emergency Loans

The College is able to provide registered students interest-free, short-term loans. These loans are available because of the interest and support of the following donors: Alumni Association Short-term Loan Fund, Karl T. Frederick Memorial Fund, C. Ives Gehring Memorial Fund, Milton Hick Memorial Fund, James D. Judson Memorial Fund, David B. Schorer Memorial Fund and Edward Vail Emergency Fund.

Students should contact the Office of Financial Aid when need arises for a short-term loan.

Student Life

HOUSING

The College of Environmental Science and Forestry does not operate its own residence facilities or food service. Students enter into a Room and Board Agreement with Syracuse University, which is adjacent to the State-operated College.

Residence in a Syracuse University living center or in an approved fraternity or sorority house (upperclasses only) is required of all single freshman and sophomore students under 21 years of age.

Permission may be granted by the Syracuse University Office of Residential Life allowing the student to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative. Any exceptions to this requirement are listed in the room and board agreements.

Students have a choice of living centers at Syracuse University—large halls, apartment houses, cottages, fraternities and sorority houses or co-operative units. Graduate student resident advisors live on each floor or in each unit and are available for counseling, advisement and referral services.

Syracuse University also has housing units available for married students and their families. While veterans are given preference, non-veterans too can usually find housing.

EXTRACURRICULAR ACTIVITIES

Students at the College of Environmental Science and Forestry have many extracurricular activities to choose from, both on campus and in the community.

At the College

ESF students elect class officers annually and the *Student Council* is the official representative body governing extracurricular affairs.

Among the departmental organizations which offer to students an opportunity to broaden their knowledge and to meet other students with

similar interests are: *Archery Club*, for those interested in field archery; *Bob Marshall Club*, an organization of students concerned about the future of the Adirondack Mountains; the *Forestry Club*, the traditional sponsor of the Woodsmen's Team; *Botany Club*; *Mollet Club*, an organization of landscape architecture students; the *Papyrus Club*, organized by paper science and engineering students as a way to keep up with new developments in the industry; the *Wood Products Engineering Club*, a group that sponsors guest speakers and noted lecturers; and the *Zoology Club*, which sponsors lectures, films and field trips.

Other groups on campus include *Vox Silvae*, a debate team; *Saengerbund*, the College glee club; *Robin Hood*, the all-junior honor society; and *Alpha Xi Sigma*, senior honorary society. There are also student chapters of the *Wildlife Society* and the *Society of American Foresters*.

The two major student publications at ESF are *The Knothole*, a weekly newspaper and *The Empire Forester*, an annual pictorial review which has won many awards in past years.

ESF students support both a basketball club, and a basketball intramural league.

At Syracuse University

Students at the College of Environmental Science and Forestry have all the privileges of Syracuse University students; participation in student government, organizations, sports and other extracurricular activities is open to them.

Archbold Gymnasium on the Syracuse University campus is the center of athletics and physical education. It is equipped with regulation basketball courts, volleyball and badminton courts, and handball and squash courts. There are also a weight training room, pool, rowing tank and rifle range.

Manley Field House provides indoor practice facilities for many sports including football, track, lacrosse; it is the site of Syracuse University home basketball games.

Facilities at Skytop recreation area include ski tows and a ski jump, a lodge and 22 tennis courts.

The Women's Building offers instructional, social and recreational facilities that include swimming, basketball, bowling and tennis.

In the Syracuse Area

The City of Syracuse and its surrounding countryside offer many cultural, educational and recreational opportunities. The City has several fine museums including the Everson, with its outstanding collection of works by local, regional and international artists; live theater by touring groups and local repertory theater; and several points of historical interest.

Eight parks lie within the city limits; numerous county and state parks, including Beaver Lake Nature Center and Montezuma Wildlife Reservation, are within a short drive.

In the summer, golf enthusiasts have 23 public courses to choose from; water sports fans travel to nearby Lake Ontario, Oneida Lake and the Finger Lakes. Winter sports, especially skiing and skating, abound in Central New York. Special annual events include the New York State Fair, the Scottish Games and Regatta Weekend.

COLLEGE SERVICES

Academic and Personal Counseling

The Office of Student Affairs is available throughout the students' college career as a place where they may seek, at any time, the advice of experienced counselors. This office should be the first contact when questions or personal problems arise. General advisement for international students is provided by the Office of International Forestry. The Registrar in the Student Affairs Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition, the Coordinator of Financial Aid in the Student Affairs Office provides information on available scholarships, long-term State and Federal educational loans, work opportunities at the College and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration the student is assigned to a faculty advisor for assistance as needed in curriculum decision, program development, and elective decisions. In curriculum selection, special advisors are assigned to provide academic advice as needed. Faculty in the major departments are also available for academic guidance. In addition, many classes are small, permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later and professional life.

Career Counseling and Placement

Assistance is given to students in the development of plans for a career after graduation by the Coordinator of Career Services. Part-time jobs, lists of potential employers and opportunities which are currently available are a part of the offerings in this office. Liaison is maintained with the placement efforts of Schools on campus as well as the Office of Career Services on the Syracuse University campus, thus offering the graduating student the possibility to develop a broader perspective of available employment.

Veterans' Counseling

Veterans can receive personal counseling around social, financial or academic problems through the Office of Student Affairs. Information and application forms for V.A. Educational Benefits, Tutorial Assistance, Work-Study Allowance, and the ESF Veterans' Tuition Deferral Plan are available upon request. A Veterans' Administration representative is available periodically for information pertaining to veterans' welfare and benefits while on campus.

Other Counseling

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with several full-time and part-time denominational chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident advisors are located in all University dormitories, and are available for assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which the major work is taken. At the completion of the student's college career, placement counseling is available through the Office of Career Counseling and Placement.

Health and Medical Facilities

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service, and are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement per college year with ordinary medical care in the infirmary. Infirmary usage over 10 days will be at prevailing Infirmary rates. The usual laboratory examinations, if necessary for treatment or diagnosis of common illness, are usually provided without cost. Most common legal drugs are provided without extra charge.

A student accident or sickness insurance plan is available at Fall registration and not only supplements the usual infirmary privileges, but is also a health protection during the summer months when students are not under care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made available to University students. *All international students are required to carry health and accident insurance.*

Military Service

The Registrar's Office keeps on file up-to-date information on Selective Service. Students reaching 18 years of age after arriving in Syracuse may register with Selective Service in the Office of Student Affairs.

Air Force and Army Reserve Officer Training Corps programs are available; however, a minimum of two years is required.

Hearing and Speech Center

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech and voice disorders. This service is without expense to students.

Psychological Services and Research Center

Students desiring an analysis of their aptitudes, abilities and interests may secure special testing programs at the Testing and Evaluation Service Center on the Syracuse University campus.

Reading and Language Arts Center

The Syracuse University School of Education, in cooperation with the College of Liberal Arts and the Psychological Services and Research Center, maintains a reading and language arts center for research in the learning skills and for training teachers and specialists in reading and language arts. Representatives from the fields of medicine, speech and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

Alumni Association

The Alumni Office serves as the liaison between the College, the Alumni Association Board of Directors and more than 6,000 alumni. The Association supports educational programs through scholarships, publishes a quarterly newsletter and represents alumni concerns.

Undergraduate Rules and Regulations

The complete listing of guidelines for all undergraduate students attending ESF and residing on the Syracuse University campus is found in a separate publication, the *Student Handbook*, which is distributed at registration. Also distributed at registration are copies of "Rules and Regulations of Conduct and Behavior" which pertain to all members of the College community. It is the student's responsibility to be familiar with these regulations and abide by them.

Academic Life

STUDENTS AND FACULTY

Education in the classroom, laboratory and field is a cooperative endeavor between students and faculty, and is an enriching experience for both. This two-way communication is traditional at the College, so much so that deans and department chairmen, with considerable administrative duties, still meet classes and consider it a privilege to do so.

Men and women are enrolled as students at the College, and in the Fall, 1974, numbered 2,025. Of these, 1732 were undergraduates and 293 were graduate students. In addition, there were students engaged in postdoctoral work. A growing number of students at the College transfer from community colleges and other institutions, and international students are encouraged to apply for admission.

The teaching and research faculty number about 150. Selected professors are designated as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultation. Many of them serve as advisors to undergraduates, a practice which is particularly helpful to students seeking advanced degrees.

ORIENTATION

To ease the adjustment to college life, *all freshmen and new transfer students* are required to attend an orientation period during registration week of the Fall semester. This is an opportunity for new students to meet classmates and members of the faculty and administration. It is also a good way to become acquainted with the College, its functions, operations and services. A special orientation session for international students is provided through the Office of International Forestry.

A weekly one-hour orientation course, *General Forestry 032*, is required throughout the first semester for all freshmen and transfer students. The purpose of this course is to introduce the new undergraduate student to the College standards, counseling services and general College policy.

ACADEMIC ADVISEMENT

Upon arrival at the College, each student is assigned to a faculty advisor who can provide the student with information and advice on courses and programs both at the College and at Syracuse University. The success of this program rests largely upon the student to take the initiative in seeking assistance.

ATTENDANCE

In general, undergraduates are expected but not required to attend all of their scheduled classes. Faculty members may make regular class attendance a course requirement.

DROPPING OR ADDING COURSES

Changes in schedule may be made with the approval of the student's advisor and curriculum director. Such changes take place within the first three weeks of the semester.

CHANGE OF CURRICULUM

A student is allowed without petition one change of curriculum after beginning the major work.

WITHDRAWALS

A student who finds it necessary to withdraw from the College must notify the Office of Student Affairs. If the student withdraws before the official drop date for the semester, the student's permanent record card will be marked "no credit for the semester." After that date, entries will be based on the instructor's report as "withdrew passing" or "withdrew failing."

GRADES AND GRADE POINTS

College academic records list credit hours, grades and grade points. Grade points indicate the quality of work done according to the following scale:

Grade	*Quality*	*Grade Points Per Credit Hour*
A	Excellent	4
B	Good	3
C	Average	2
D	Minimum passing	1
F	Failure	0

CREDIT HOUR LOAD

A normal schedule for a full-time student at the College is defined as 12 or more credit hours per semester up to and including 20 hours.

GRADE POINT AVERAGE

The student's cumulative average is determined by dividing the number of credit hours into the total number of grade points earned for those hours. The student must obtain a C average (2.0) to be in academic good standing.

COLLEGE HONOR LIST

Students who have carried a minimum of 12 credit hours of course work and who have achieved a minimum semester average of 3.0 are placed on the College Honor List for that semester.

PROBATION

A student whose cumulative or semester grade point average falls below 2.0 will, after review by the Undergraduate Academic Affairs Committee, either be placed on probation or academically dismissed.

FAILURES AND INCOMPLETES

A student who fails a required course must repeat it.

A student is allowed one semester in which to make up an incomplete. Failure to do so results in an F.

GRADUATION REQUIREMENTS

To meet the academic requirements for graduation, a student must:

1. be in residence at the College during the final year;
2. complete the total course requirements of the approved degree program;
3. have a minimum cumulative grade-point average of 2.00.

COMMENCEMENT HONORS

Commencement honors are awarded to those students who have attained one of the following academic averages: *cum laude*, 3.0; *magna cum laude*, 3.34; *summa cum laude*, 3.83.

Areas of Study

THE SCHOOL OF BIOLOGY, CHEMISTRY AND ECOLOGY

The School of Biology, Chemistry and Ecology offers two curricula which support the science and ecological areas of environmental science and forestry.

Forest Biology

The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions to a wide range of environmental problems.

The School's biology curriculum is designed to educate biologists and to provide them with a firm grounding in forestry principles. The program is directed at both those students planning graduate study in the biological sciences, as well as those students who will seek forest biologist positions in such areas as forestry research, disease and insect control, recreation, fish and wildlife biology and conservation.

Requirements

The curriculum is built around a core of required courses which provide the student with a general education, an introduction to forestry principles and a sound background in biology and the physical sciences. It is designed to achieve breadth in biology as well as depth in a selected area of concentration.

The flexibility of the curriculum allows for the development of a variety of programs within or across the several participating departments, according to the academic and professional goals of the student. All students are considered to be majoring in biology, and each student is assigned an advisor to aid in program decisions.

Attendance at a 5-week Summer Session program in Field Forestry at the College's Warrensburg Campus is required. In special cases, attendance at the Cranberry Lake Biological Station or its equivalent may be substituted.

FOREST BIOLOGY CURRICULUM

Freshman Year

			Credit Hours
First Semester	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	FBO 100	General Botany	4
	English		3
	[1]Math		3
	[2]Elective		3
	GFO 032	Orientation	0
			17
Second Semester	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	FZO 100	General Zoology	4
	English		3
	[1]Math		3
	[2]Elective		3
			17

Sophomore Year

First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	PHY 103	General Physics	4
	FBL 320	General Ecology	3
	[2]Electives		6
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	PHY 104	General Physics	4
	ERM 205	Intro to Macro Economics	3
	[2]Electives		6
			17

Summer Session Alternate A[3]

SUMMER SESSION IN FIELD FORESTRY. 5 weeks, 6 credit hours. This program is conducted in two separate sessions during the summer period at the College's Pack Demonstration Forest near Warrensburg, New York.

[3]See Note 3 page 33

ERM 300	Summer Session in Field Forestry	6
		6

Junior Year

			Credit Hours
First Semester	FBO 315	Dendrology I	2
	FEN 350	Elements of Forest Entomology	3
	FBL 330	Principles of General Physiology	3
	[2]Electives		6
Second Semester	FBL 370	Principles of Genetics	3
	FBL 371	Principles of Genetics Lab	1
	APM 491	Introduction to Probability and Statistics (3)	
	GOL 105	Earth Science (3)	3
	or		
	ERM 345	Soils (3)	
	[2]Elective		3
			12

Summer Session Alternate B[3]

SUMMER SESSION IN ENVIRONMENTAL BIOLOGY. 8 weeks, 8 credits. Courses selected require approval of the student's advisor. Program conducted in June-August at the Cranberry Lake Biological Station, Pack Experimental Forest, Cranberry Lake.

Summer Session Alternate C[3]

Attendance at other approved biological field stations may be arranged. The courses selected must have the prior approval of the student's advisor.

Senior Year

First Semester	[2]Electives		15
			15
Second Semester	[2]Electives		15
			15

[1]Mathematics through integral calculus (MAT 227 or the equivalent) is required.

[2]In addition to the specified courses, students must meet the following requirements:

(a) 12 credit hours in a selected biology concentration (Zoology or Wildlife Biology, Botany, Forest Entomology, or Silvics.)
(b) 6 credit hours in a second biological area.
(c) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.
(d) 3 credit hours in the Resource Management area.
(e) 9 credit hours in Humanities and Social Sciences chosen with approval of Faculty Advisor.
(f) 27 credit hours in elective courses selected with approval of the Faculty Advisor.

[3]Students with a 2.5 academic average or better may substitute for this requirement 8 credit hours of courses at the Cranberry Lake Biological Station or minimum of 6 credit hours at other Biological Field Stations. The courses selected must have the approval of the student's advisor. It is preferable that the summer program be taken between the Junior and Senior Years.

NOTE: 5 credits of additional Forestry courses are recommended for those students not attending the summer session in Field Forestry.

A total of 131 credit hours is required.

In addition to the courses specified in the program, students must meet the following requirements:

1. 12 credits in a selected biology concentration (zoology or wildlife biology, botany, forest entomology, silvics).
2. 6 credits in a second biological area.
3. The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.
4. 3 credits in the resources management area.
5. 9 credits in the humanities and social sciences selected with the approval of the faculty advisor.
6. 27 credits in elective courses selected with the approval of the faculty advisor.

General requirements for federal and state biology positions are met by the curriculum. Position requirements in a broad range of special biological fields related to natural resources may also be achieved by selection of electives. Requirements for federal and state forestry positions may be satisfied by choosing specified forestry subjects as electives.

Electives

Students planning graduate study are urged to take two semesters of a language (as approved by their faculty advisor) as a part of their humanistic-social sciences elective requirement.

Students planning to meet special requirements for biology specialty positions in federal and state service should review the available Civil Service publications and become familiar with the specific course requirements to be met by elective choice.

Students planning to meet special requirements for Federal Civil Service positions in forestry at the GS-5 and GS-7 levels may do so by electing 10 credits in additional forestry courses and attending the Summer Session in Field Forestry at Warrensburg, New York. These special forestry requirements may be fulfilled by courses selected with the approval of the faculty advisor.

Transfer Students

The curriculum is arranged to facilitate transfer of students from the State University community colleges at the end of their freshman or sophomore years. Recommended core courses for students planning to transfer as entering juniors total 64 credits or an associate degree and include: biology (8 credits); general chemistry (8); organic chemistry (8); physics (8); mathematics through integral calculus (8); economics (3); English (6); and electives (14).

Chemistry

By selecting proper electives, students in either of the two following options may be certified on graduation as having completed an American Chemical Society-approved curriculum. Both options are excellent grounding for professional work at the B.S. level or for advanced graduate study.

Because of cooperative arrangements among local institutions, students may also emphasize various aspects of environmental chemistry.

Recommended core courses for students planning to transfer as entering juniors total 64 credits or an associate degree and include: biology 8 credits; general chemistry 8; organic chemistry 8; physics 8; mathematics through integral calculus 8; economics 3; English 6; electives 14.

Biochemistry and Natural Products Option

This option is designed for students who wish to approach problems in the life sciences with the tools and point of view of the chemist. In addition to a major concentration in the several branches of chemistry, the student obtains a solid grounding in the fundamentals of physics, mathematics, and biology. Professional electives can provide a minor concentration in botany, ecology, entomology, zoology, or physiology. Collaborative efforts of chemists and biologists are providing new solutions to problems of environment, natural resources and health.

CHEMISTRY CURRICULUM
BIOCHEMISTRY AND NATURAL PRODUCTS CHEMISTRY OPTION

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
			17
Sophomore Year			
First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	EGL 210	Advanced Composition and Literature	3
	[1]Math or Elective		3
	PHY 211	General Physics for Science Students I	4
	Elective		3
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	EGL 211	Technical Writing	3
	[1]Math or Elective		3
	PHY 212	General Physics for Science Students II	4
	ERM 204	Introduction to Economics for Forestry	3
			17

Junior Year

			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Math or Elective		3
	CHE 434	Instrumental Methods	2
	CHE 435	Instrumental Methods Lab	1
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		2-3
	Elective		3
			16-17

Senior Year

First Semester	FCH 495	Introduction to Professional Chemistry	2
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	FCH 530	Biochemistry I	3
	FCH 531	Biochemistry Lab	2
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 497	Undergraduate Seminar	1
	FCH 532	Biochemistry II	3
	FCH 477	Wood Chemistry III	2
	[5]EGL 215	Public Speaking	3
	Elective		3
			17

[1]One course of mathematics or Applied Mathematics beyond MAT 227 or MAT 397, or equivalent, is required.

[2]A sequence of professional electives should be chosen in the Junior year. In addition to the freshman biology courses, a student whose emphasis is in biochemistry must take three semester hours of genetics and at least another three semester hour biology course. A student whose emphasis is in natural products must take three semester hours of biology in addition to the freshman biology courses and an additional hour of organic chemistry laboratory (FCH 496) and a second hour of FCH 384.

[3]Introduction to Polymer Science, FCH 450 (3 credit hours) is suggested.

[4]Petition by student to Department for replacement of this requirement will be considered to allow time for special interest.

[5]ERM 464 may be substituted.

NOTE: A total of 133 credit hours is required.

Natural and Synthetic Polymer Chemistry Option

This option is designed for students interested in the structure and physical properties of man-made and natural materials, the giant molecules of wood, plastics, polysaccharides, proteins, rubbers, and fibers. The recently discovered chemistry of these materials constitutes one-half the concern of chemical industry and is the origin of a major revolution in our way of life and our understanding of nature. This special subject area is an advanced core of studies beyond the basic courses of the classical undergraduate chemistry curriculum.

CHEMISTRY CURRICULUM
NATURAL AND SYNTHETIC POLYMER CHEMISTRY OPTION

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
			17
Sophomore Year			
First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	EGL 210	Advanced Composition and Literature	3
	[1]Math or Elective		3
	PHY 211	General Physics for Science Students I	4
	Elective		3
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	EGL 211	Technical Writing	3
	[1]Math or Elective		3
	PHY 212	General Physics for Science Students II	4
	ERM 204	Introduction to Economics for Forestry	3
			17

Junior Year

			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Math or Elective		3
	CHE 434	Instrumental Methods	2
	CHE 435	Instrumental Methods Lab	1
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		2-3
	Elective		3
			16-17

Senior Year

First Semester	FCH 495	Introduction to Professional Chemistry	2
	FCH 450	Introduction to Polymer Science	3
	FCH 551	Polymer Techniques	2
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 552	Polymer Processing and Technology	3
	FCH 497	Undergraduate Seminar	1
	FCH 477	Wood Chemistry III	2
	[5]EGL 215	Public Speaking	3
	Elective		3
			17

[1]One course of Mathematics or Applied Mathematics beyond MAT 227 or MAT 397, or equivalent, is required.

[2]A sequence of two or more professional electives in related disciplines with a minimum of 5 credits should be chosen in the fall of the Junior Year from the College of ESF offerings. Wood Products Engineering and Paper Science and Engineering courses are recommended.

[3]Biochem I, FCH 530 (3 credit hours) is suggested.

[4]Petition by student to Department for replacement of this requirement will be considered to allow time for special interest.

[5]ERM 464 may be substituted.

NOTE: A total of 133 credit hours is required.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE ENGINEERING

The School of Environmental and Resource Engineering applies the principles and professional skills of engineering analysis and design to creative environmental stewardship, with emphasis on responsible use of renewable natural resources for the benefit of society. The curricula, programs and activities of the School are oriented toward multiple use of forest resources, wood products, paper and related fibrous materials. Environmental considerations, including pollution abatement, waste recovery and recycle, energy conservation, noise control and safety optimization, are basic to all courses and studies.

In each curriculum, fundamental professional requirements are met by a core of required courses, supplemented by optional choices and electives. Students may enter either as freshmen or as transfers from other colleges or universities. Applicants with associate degrees in engineering science or science and mathematics usually enter as juniors. Graduates of two-year technology programs may also earn junior standing if their previous studies include one year each of English, general chemistry and general physics, plus mathematics through integral calculus. Courses in general botany, engineering mechanics and economics are also desirable.

The School offers bachelor of science degrees in forest engineering, paper science and engineering and wood products engineering. Specific requirements in the programs leading to these degrees are described below.

Forest Engineering

The primary objective of this curriculum is to prepare qualified graduates who will operate with professional engineering competence within the context of forestry and natural resources development. It is an engineering curriculum, fundamentally interwoven with essential principles of forestry to develop environmental understanding and ecological awareness.

Students who successfully complete this four-year curriculum will be awarded a bachelor of science degree by the College. This degree is a starting point for a wide range of career opportunities, since minimum professional requirements, both in engineering and in forestry, are met by the core of required courses. This core may then be supplemented in areas suited to the students' goals through proper advisory use of the many electives within the curriculum. A Surveying Emphasis is offered for students aiming toward professional careers in surveying, photogrammetry, remote sensing, or combinations of these areas.

Qualified graduates in search of further formal education will find easy access to engineering graduate schools throughout the country as well as a number of graduate programs here at the College and Syracuse University. In addition, graduates of the general Forest Engineering curriculum may enter an established five-year program in either civil, industrial or mechanical engineering at Syracuse University. A bachelor

of science degree in engineering will be awarded by Syracuse University upon completion of requirements in the fifth year.

Graduates with associate degrees in engineering science or science and mathematics usually find transfer acceptance as entering juniors. Students looking forward to career opportunities in forest engineering are urged to obtain guidance on specific requirements from the Admissions Office of the College as early as possible in their preparatory programs.

FOREST ENGINEERING CURRICULUM

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math or Elective		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math or Elective		3
	Elective		3
	ERE 100	The Engineer and the Environment	1
			18

Sophomore Year

First Semester	[1]Math or Elective		3
	GRA 280	Technical Drawing	1
	ERM 206	Introduction to Micro-Economics	3
	PHY 103	General Physics	4
	MEE 225	Engineering Mechanics	4
	Elective		3
			18
Second Semester	[1]Math or Elective		3
	APM 360	Introduction to Computer Programming	3
	ERM 205	Introduction to Macro-Economics	3
	PHY 104	General Physics	4
	MEE 226	Engineering Mechanics	3
			16

Junior Year

First Semester	FEG 371	Plane and Geodetic Surveying	3
	FBO 315	Dendrology I	2
	APM 491	Introduction to Probability and Statistics	3
	MAT 585	Higher Mathematics for Engineers and Scientists I	3
	CIE 327	Principles of Fluid Mechanics	4
	[2]Engineering Science Elective		3
			18
Second Semester	FEG 302	Forest Engineering Problems	3
	FEG 340	Hydrology	3
	FEG 363	Photogrammetry	3
	ERM 333	General Silviculture	3
	or		
	FEG 352	Introduction to Remote Sensing	3
	CIE 325	Mechanics of Deformable Bodies	3
	Elective		3
			18

Senior Year

			Credit Hours
First Semester	FEG 410	Structures	4
	FEG 422	Principles of Production (Harvesting)	3
	ERM 477	Forest Management	4
	CIE 437	Soil Mechanics and Foundations I	3
	Elective		1-3
			15-17
Second Semester	FEG 437	Transportation Systems	3
	[4]FEG 447	Hydrologic Controls	3
	FEG 489	Forest Engineering Planning	4
	Electives		6
			16

Optional Senior Year—Survey Engineering

First Semester	FEG 460	Theory of Errors and Adjustments	3
	FEG 464	Photogrammetry II	3
	FEG 474	Geodesy	4
	FEG 486	Cartographic Surveying	2
	ERM 402	Legal Aspects of Surveying	3
	Electives		0-3
			15-18
Second Semester	FEG 437	Trans Systems	3
	FEG 477	Survey Systems Design	3
	FEG 489	Forest Engineering Planning	4
	Electives		6
			16

[1]12 credit hours must be elected in social sciences or humanities, at least 3 of which must be from the College. Mathematics through Differential Equations is required.

[2]Electrical Engineering, thermodynamics, or advanced engineering materials, each beyond freshman physics or the equivalent of CIE 325.

[3]ERM 333 required for forest engineering; FEG 352 required for optional senior year—Survey Engineering. Students may take both courses.

[4]An advisor-approved engineering design or synthesis course may be substituted. To be approved, the course must fit the objectives of professional forest engineering. Advanced courses in production or operational systems are suitable examples.

NOTE: A total of 136 credit hours is required for the B.S. degree from the College of ESF in this curriculum.

Paper Science and Engineering

The curriculum in Paper Science and Engineering is designed to provide a broad base of study and to prepare students for a variety of careers in the paper and related industries. Two options are offered: paper science and paper engineering.

The program provides basic training in the physical sciences, mathematics, and engineering, combined with a specific understanding of the chemistry and anatomy of wood, pulping of wood, chemistry and physics of paper and paper formation, and the chemical engineering of pulp and paper processing. Qualified graduates who wish to continue their formal education find excellent opportunities for graduate studies, either in specialized paper science curricula at the College or elsewhere, or in general science and engineering programs throughout the country.

Students having an associate degree in engineering science can complete their baccalaureate degree program in two years. Transfer students with either preparation may also enter with junior standing if they present 66 credits of acceptable courses including the following subjects:

English ..... 6 credits
General Chemistry ..... 8 credits
Organic Chemistry ..... 8 credits
General Physics ..... 8 credits
Mathematics ..... 9 credits
Economics ..... 6 credits

PAPER SCIENCE AND ENGINEERING CURRICULUM

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	ERM 205	Introduction to Macro-Economics	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	ERE 100	The Engineer and the Environment	1
			17

NOTE: A total of 134 credit hours is required.

Sophomore Year

			Credit Hours
First Semester	[1]Math or Elective		3
	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	PHY 103	General Physics	4
	Elective		3
	ERM 206	Introduction to Micro-Economics	3
			17
Second Semester	[1]Math or Elective		3
	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	PHY 104	General Physics	4
	EGL 211	Technical Writing	3
	Elective		3
			17

Junior Year

First Semester	FCH 475	Wood Chemistry I	2
	FCH 476	Wood Chemistry II	2
	CHE 346	Physical Chemistry	3
	PSE 300	Introduction to the Pulp and Paper Industry	3
	WPE 387	Wood Structure and Properties	4
	PSE 370	Principles of Mass and Energy Balance	3
			17
Second Semester	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	PSE 301	Pulp and Paper Processes	3
	PSE 302	Paper Processes Lab	1
	Elective		3
			14

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—2 credit hours. Twelve weeks' full-time pulp or paper mill employment approved by the Department between the Junior and Senior years.

Senior Year

First Semester	PSE 461	Pulping Technology	4
	PSE 465	Paper Properties	5
	PSE 491	Paper Science and Engineering Project I	1
	PSE 575	Unit Operations I: Fluid Mechanics and Heat Transfer	3
	PSE 576	Unit Operations II: Process Control and Mass Transfer	2
	GRA 280	Technical Drawing	1
			16
Second Semester	PSE 466	Paper Coating	3
	PSE 468	Papermaking Processes	3
	PSE 474	Pulp and Paper Unit Operations Lab II	3
	or		
	PSE 456	Economics of Pulp and Paper	3
	PSE 492	Paper Science and Engineering Project II	3
	PSE 578	Unit Operations III: Mass Transfer	3
	PSE 579	Unit Operations IV: Recovery Processes Operations	2
			17

WOOD PRODUCTS ENGINEERING CURRICULUM
WOOD SCIENCE OPTION

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
			16

Sophomore Year

First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	EGL 211	Technical Writing	3
	MAT 328	Topics in Calculus	3
	PHY 104	General Physics	4
	ERM 204	Introduction to Economics for Forestry	3
			17

Junior Year

First Semester	CHE 346	Physical Chemistry	3
	WPE 322	Mechanical Processing	3
	FBO 315	Dendrology I	2
	APM 491	Introduction to Probability and Statistics	3
	Wood Anatomy Sub-option:		
	FBL 330	Principles of General Physiology	3
	or		
	Wood Physics Sub-option:		
	APM 360	Introduction to Computer Programming	
	WPE 387	Wood Structures and Properties	4
			18
Second Semester	CHE 356	Physical Chemistry	3
	WPE 326	Fluid Treatments	3
	WPE 320	Polymeric Adhesives and Coatings	3
	[1]Electives		6
			15

Senior Year

		Credit Hours
First Semester	WPE 422 Composite Materials	3
	Wood Anatomy Sub-option:	
	Elective (3)	
	PHY 261 Introduction to Modern Physics (3)	6-7
	Wood Physics Sub-option:	
	MEE 225 Engineering Mechanics (4)	
	Elective (3)	
	Elective	3
	[1]Elective	2-3
		15
Second Semester	WPE 362 Timber Mechanics	4
	WPE 498 Research or Design Problem	3
	Wood Anatomy Sub-option:	
	WPE 688 Commercial Timbers of the World (3)	
	FBO 585 Plant Anatomy (3)	6
	Wood Physics Sub-option:	
	MEE 226 Engineering Mechanics (3)	
	FCH 520 Nuclear and Radiation Chemistry (2)	
	FCH 521 Nuclear Chemical Techniques (1)	
	[1]Elective	3
		16

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the Junior year.

[1]It is recommended that at least 9 credit hours of these electives be in the Social Sciences or Humanities.

NOTE: A total of 133 credit hours is required.

Wood Products Engineering

The Department of Wood Products Engineering prepares students for a wide variety of professional occupations concerned with the use of wood as a primary structural material. Four curriculum options are available: building construction, materials marketing, production systems engineering, and wood science.

As the only major construction material derived from a renewable natural resource, increasing attention is being focused on wood as a substitute for other materials which originate from and deplete nonrenewable resources. Thus a principal aim of the departmental program is to teach students the fundamentals of efficient wood processing and distribution or final use, whether as a piece of furniture or a complete house.

Students may enter either as freshmen or as transfers from other colleges or universities. Transfer students with A.A.S. or A.S. degrees will be accepted with full junior standing. To avoid preparation deficiencies which may delay graduation, students considering transfer into the wood products engineering curriculum are urged to consult with the College's admissions officers for detailed guidance concerning specific requirements in each option.

Wood Science Option

The basic aim of the wood science option is to give students a sufficiently basic and broad scientific background so that they will be prepared to enter graduate school for advanced degrees and ultimately go into positions in research and/or development work in industry, government laboratories, or universities.

The wood science option has two major subdivisions: 1) The biological aspects of wood science in which the relationships between the pure biological sciences and the anatomy-property relationships of wood are brought out, and 2) The physical science aspects of wood science in which the basic physical sciences are used to help characterize the structure-property relationships in wood. Students may further broaden their background in either of these programs through the wise use of electives.

WOOD PRODUCTS ENGINEERING CURRICULUM
BUILDING CONSTRUCTION OPTION

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	[1]Elective		3
	GFO 032	Orientation	0
			17
Second Semester	ERM 205	Introduction to Macro-Economics	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
	ERE 100	The Engineer and the Environment	1
			16

Sophomore Year

First Semester	WPE 322	Mechanical Processing	3
	ERM 206	Introduction to Micro-Economics	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			16
Second Semester	APM 360	Introduction to Computer Programming	3
	GOL 101	General Geology	3
	PHY 104	General Physics	4
	[1]Electives		6
			16

Junior Year

			Credit Hours
First Semester	MEE 225	Engineering Mechanics	4
	APM 491	Introduction to Probability and Statistics	3
	FEG 371	Plane and Geodetic Surveying	3
	ACC 204	Financial Accounting Systems	3
	[1]Elective		3
			16
Second Semester	WPE 362	Timber Mechanics	4
	FEG 342	Hydraulics in Construction	4
	WPE 360	Engineering Materials Testing and Properties	3
	ACC 252	Introduction to Managerial Accounting	3
	[1]Elective		3
			17

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the Junior year.

Senior Year

First Semester	WPE 422	Composite Materials	3
	FEG 410	Structures	4
	CIE 437	Soil Mechanics and Foundations I	3
	OPM 365	Management of Operations	3
	[1]Elective		3
			16
Second Semester	WPE 326	Fluid Treatments	3
	WPE 320	Polymeric Adhesives and Coatings	3
	WPE 450	Construction Equipment	3
	WPE 454	Construction Management	3
	[1]Elective		3
			15

[1]It is recommended that 12 credit hours of electives be taken in the Social Science-Humanities areas. The remaining electives shall be selected from the following areas:
a. From another engineering discipline at the College of ESF or S.U.
b. General technical or management areas.

NOTE: A total of 131 credit hours is required.

Building Construction Option

The current pressures for new housing and urban reconstruction have led to an option that develops a deep awareness of the effects of construction on the environment, as well as the efficient use of materials, particularly wood. There is an increasing demand for technically trained specialists in the construction industry and supporting fields who have the skills to use efficiently the wide variety of wood-based building materials, with consideration to their place in respect to other materials and to the purpose of the end product.

The specialty electives are designed to allow the opportunity for concentration areas related to the individual's career objectives. It is felt that the wide range of construction activities found in practice cannot be adequately serviced by a rigid program of study.

Suggested areas and available courses have been grouped below. Many courses are not mentioned, but most relevant material should be under the following areas:

Engineering	*Management*	*Environment*
Structural Analysis	Marketing	Urban Planning
Building Systems	Business Law	Solid Waste Disposal
Adv. Soil Mechanics	Accounting	Waste Water Treatment
Photogrammetry	Finance	Environmental Sanitation
Thermodynamics	Industrial Management	Land Use
Transportation	Operations Research	Landscape Architecture
Systems Analysis	Real Estate	

With careful planning and use of electives, students can obtain a B.S. degree in civil or mechanical engineering at Syracuse University with an additional year's work. Similar adjustments can be made to facilitate continuation in an MBA program.

WOOD PRODUCTS ENGINEERING CURRICULUM
PRODUCTION SYSTEMS ENGINEERING OPTION

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	[1]Elective		3
	GFO 032	Orientation	0
			17
Second Semester	ERM 205	Introduction to Macro-Economics	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
			15

Sophomore Year

First Semester	ERM 206	Introduction to Micro-Economics	3
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			16
Second Semester	APM 360	Introduction to Computer Programming	3
	EGL 211	Technical Writing	3
	MAT 328	Topics in Calculus	3
	PHY 104	General Physics	4
	[1]Elective		3
			16

Junior Year

			Credit Hours
First Semester	WPE 322	Mechanical Processing	3
	WPE 387	Wood Structure and Properties	4
	IOR 548	Engineering Economic Analysis	3
	APM 491	Introduction to Probability and Statistics	3
	MEE 225	Engineering Mechanics	4
			17
Second Semester	WPE 320	Polymeric Adhesives and Coatings	3
	WPE 326	Fluid Treatments	3
	WPE 362	Timber Mechanics	3
	ERM 461	Operation Cost Control	3
	MEE 351	Fundamentals of Thermodynamics	3
			16

WPE: 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the Junior year.

SUMMER EXPERIENCE: 2 months' experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required. Usually fulfilled between the Junior and Senior years.

Senior Year

First Semester	WPE 422	Composite Materials	3
	WPE 470	Production Systems I: Analysis	3
	WPE 497	Senior Seminar for Wood Products Engineering Majors	2
	ELE 221	Electrical Science I	3
	IOR 575	Industrial Methods and Systems Engineering	3
	Technical Elective		3
			17
Second Semester	WPE 472	Production Systems II: Synthesis	3
	WPE 498	Research or Design Problem	3
	ELE 222	Electrical Science II	3
	[1]Electives		6
			15

[1]It is recommended that students elect at least 9 credit hours from the Social Sciences or the Humanities.

NOTE: A total of 131 credit hours is required.

Production Systems Engineering Option

The goal of this option is to provide an engineering background in the fields of process development, plant design, and production management of modern industries utilizing wood and related materials. Modern production plants are complex systems of machines, men, money and management integrated for production in highly competitive markets. Because the design and operation of such systems are essentially an engineering problem, this option provides a solid foundation in fundamental sciences and applied mathematics which are the basic tools

needed. Beyond the basics, students take courses in engineering and management sciences essential to the planning and development of production processes and to the design and operation of modern manufacturing facilities.

Production systems engineering students may arrange with their advisors to prepare for special program options leading to admission into a bachelor of science degree program at Syracuse University in either industrial or mechanical engineering. Seniors presenting acceptable Graduate Record Examination scores may be admitted to an M.S. program in industrial engineering at Syracuse University. With adequate planning such degrees can usually be obtained after one year's additional work.

Materials Marketing Option

This option is designed to prepare students for professional careers in the field of technical sales and management of distributive enterprise in the wood products and allied industries. The marketing of wood products with their related materials and services brings together the essential elements of production distribution and consumption of our renewable natural resource. Preparation for successful marketing involves development of basic knowledge of the materials and their properties, their efficient processing and fabrication, and the effective use of finished products. Because marketing channels vary widely in nature, size and complexity to meet the equally varied needs of commercial, industrial and consumer markets, preparation must also include the sound general business orientation required of any segment of the economy.

With careful planning, students electing the materials marketing option may obtain the degree of Master of Business Administration from Syracuse University with one year's additional work beyond the bachelor's degree.

WOOD PRODUCTS ENGINEERING CURRICULUM
MATERIALS MARKETING OPTION

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	EGL 215	Public Speaking	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	ERE 100	The Engineer and the Environment	1
	Elective		2
			16

Sophomore Year

			Credit Hours
First Semester	ACC 204	Financial Accounting Systems	3
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	GRA 280	Technical Drawing	1
	Elective		3
			17
Second Semester	ACC 252	Introduction to Managerial Accounting	3
	EGL 211	Technical Writing	3
	APM 491	Introduction to Probability and Statistics	3
	PHY 104	General Physics	4
	Elective		3
			16

Junior Year

First Semester	WPE 322	Mechanical Processing	3
	APM 360	Introduction to Computer Programming	3
	MAR 355	Marketing and Society	3
	WPE 387	Wood Structure and Properties	4
	Elective		3
			16
Second Semester	WPE 320	Polymeric Adhesives and Coatings	3
	WPE 326	Fluid Treatments	3
	WPE 362	Timber Mechanics	4
	ERM 204	Introduction to Economics for Forestry	3
	Elective		3
			16

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the Junior year.

Senior Year

First Semester	WPE 422	Composite Materials	3
	WPE 442	Light Construction	3
	WPE 497	Senior Seminar for Wood Products Engineering Majors	2
	LPP 355	Introduction to the Legal System	3
	Electives		6
			17
Second Semester	WPE 444	Materials Marketing	3
	ERM 404	Economics of Wood-Using Industries	3
	LPP 557	The Law of Commercial Transactions	3
	FIN 355	Money and Banking	3
	Elective		3
			15

NOTE: A total of 132 credit hours is required.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE MANAGEMENT

The School of Environmental and Resource Management prepares students for the critical role of managing forest and related resources and their associated environments for human benefit. Management in this sense embraces the integration of basic ecological and social principles into comprehensive programs of planning, manipulation and use of forest and open lands for the sustained production of timber, forage, water, wildlife and recreational values consistent with national needs and the protection and enhancement of environmental quality. It includes further the effective implementation of these programs via the administrative process in accordance with established policies and goals and in cooperation with individuals and organizations, both public and private.

Students completing the resource management curriculum are qualified for professional practice as foresters and environmental managers with public and private organizations or as private consultants serving a wide array of clients. The significance of such service to human welfare and the potential it offers for a meaningful career can be more fully appreciated when it is recognized that forest lands alone comprise nearly 60 percent of the land area of New York State and roughly a third of that, respectively, of the United States and the world. The goods and services that flow from this vast resource base are of critical and growing importance to the needs of modern society and influence in a major way the quality of the environment.

The program also offers opportunity for students to pursue special interests, to prepare for advanced study or to develop their capabilities for service in a variety of fields pertinent to renewable natural resources and the environment, but not specifically forest oriented.

The New Management Curriculum

Though it represents the oldest area of professional instruction in the College, this is a newly-revised curriculum which was implemented with the entering Freshman class in 1973. A core of required courses, totaling 99 semester hours, presents the basic principles and practices that underly the purposeful management of forest and related resources for optimum production and use of any one or more of their potential products and services.

Extensive elective opportunities, totaling over one-fourth of the program, are available to help broaden the student's general education, to strengthen perceptions and integration of knowledge and to enable the student to enhance depth of understanding in areas of environmental and resource management of special interest or as a base for subsequent study at the graduate level. Areas of concentration provide meaningful sequences in terms of subject matter coverage. Such areas currently include *forest resource science, management science, environmental education and communications, urban forestry, world forestry,* and *applied resource management* within which emphasis may be focused on multiple-use forest

management, or on single-use values such as timber, forage, watershed, wildlife, recreation and aesthetics.

Additional areas of concentration are under consideration for development in cooperation with other disciplinary units of the College, especially in relation to regional planning, resource engineering, and environmental studies. Students need not select a given area of concentration, but may choose elective courses in accordance with their respective interests and needs, the only restriction being that such selections have the approval of the student's faculty advisor.

A significant feature of the elective component of the curriculum is that the spring semester of the senior year consists wholly of electives and thus is available for a variety of independent or group study activities. These may be conducted in whole or in part on any one of the College's several campuses, or off campus at another institution, in cooperation with some resource management agency or firm or in conjunction with an overseas academic program operated by the College. Proposals for off-campus study are subject to faculty review and are carried out with varying degrees of faculty guidance to ensure adherence to academic standards.

Considerable emphasis in the curriculum is placed on field instruction to provide students with intimate knowledge of how the forest ecosystem functions and how it is manipulated and used. Attendance at a 5-week, 6-credit hour Summer Session in Field Forestry is required following completion of the sophomore year. This session serves as the major avenue of entrance into the curriculum for transfer students.

Transfer Students

The curriculum is designed to facilitate to the fullest extent possible the transfer of qualified students from liberal arts and science programs in community colleges and other institutions of higher learning. For students contemplating such *transfer as entering juniors,* it is recommended that they have at least 64 semester hours of credit or an associate degree with from 37 to 54 of their credits distributed among specific course areas as presented below. Transfer students having the minimum level of credits shown will be able to complete the requirements of the curriculum beyond the Summer Session in Field Forestry with four additional semesters of course work. With anything less than the

minimum credits shown, it will be necessary for a student to extend the period of study to include courses during the summer or an additional semester.

	Minimum Credit Hours	Desired Credit Hours
Botany	4	4
Zoology		4
Chemistry	8	8
Physics (mechanics, heat and sound)	4	8
Mathematics	3	6
Social Sciences:		
Introductory Sociology 3	12	18
Introductory Psychology 3		
Introductory Economics 6		
Introductory Political Science 6		
English	6	6
	37	54
Electives	27	10
	64	64

[1]This requirement may be met by English 211 or 215 or by comparable courses designed to develop both the written and oral skills of students.

[2]Mathematics through Integral Calculus is required.

[3]Elective hour requirements are free to the extent that (a) they are in courses selected with the approval of a faculty advisor and (b) at least *nine* such elective hours are centered in forest biology and environmental and resource engineering, but with no less than one elective course in each of these broad fields.

NOTE: A total of 137 credit hours is required.

RESOURCE MANAGEMENT CURRICULUM (NEW CURRICULUM)

(Note: Available to Freshmen, Sophomores, and Juniors only)

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	Communication Skills I		3
	[2]Math		3
	ERM 100	Introduction to Forestry and Environmental Management	3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	ERM 201	Social Sciences I—Sociocultural Processes	6
	[2]Math		3
			17

Sophomore Year

			Credit Hours
First Semester	ERM 202	Social Sciences II: Economic Processes	6
	Communication Skills II		3
	PHY 103	General Physics	4
	[3]Elective		3
			16
Second Semester	ERM 203	Social Sciences III: Political Processes	6
	PHY 104	General Physics	4
	[3]Electives		6
			16

SUMMER SESSION IN FIELD FORESTRY—5 weeks, 6 credit hours: Required of all students following the sophomore year and prior to registration for the Junior year (including Junior year transfer students who elect this curriculum).

ERM 300	Summer Session in Field Forestry	6

Junior Year

First Semester	ERM 331	Introduction to the Physical Environment	6
	ERM 332	Silvics—Silviculture	8
	ERM 360	Principles of Management	3
			17
Second Semester	ERM 361	Management Models	3
	ERM 362	Forest Information Systems	4
	APM 491	Introduction to Probability and Statistics	3
	[3]Electives		6
			16

Senior Year

First Semester	APM 492	Forest Biometrics	3
	ERM 400	The Social Environment of Resource Management	3
	ERM 470	Management of the Forest Enterprise	3
	[3]Electives		6
			15
Second Semester	[2]Electives		17
			17

RESOURCE MANAGEMENT CURRICULUM (OLD CURRICULUM)

(Note: Available to Seniors only)

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	PED or ROTC		0
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	PED or ROTC		0
			17

Sophomore Year

First Semester	FBO 315	Dendrology I	2
	GRA 280	Technical Drawing	1
	FMG 201	Plane Surveying	3
	PHY 103	General Physics	4
	Electives		6
			16
Second Semester	FEC 300	Introduction to Macro-Economics	3
	GOL 101	General Geology	3
	PHY 104	General Physics	4
	Electives		6
			16

SUMMER SESSION IN FIELD FORESTRY—5 weeks, 6 credit hours: Required of all students following the sophomore year and prior to registration for the Junior year (including Junior year transfer students who elect this curriculum).

FBL 301	Field Biology	1
FMG 303	Introduction to Forest Measurements	1
SIL 302	Silvics	1
ERM 304	Silviculture-Resource Management	3
		6

[1]*Six credit hours of mathematics are required.* Two semesters of calculus are highly recommended to be taken prior to the Junior year, particularly for students interested in graduate work.

[2]At least one of the following two courses must be chosen from these electives: ERM 351 (SIL 351)—Meteorology and Fire Behavior, FZO 352—Wildlife Ecology.

NOTE: Three elective courses (totalling 9 credits) must be selected *from the Humanities and Social Science areas* with at least one course from each area. *Additional electives* should be chosen *from these areas or from natural and physical sciences not directly related to the student's course of study. A total of 136 credit hours is required.*

Junior Year

			Credit Hours
First Semester	APM 471 or APM 491	Introduction to Statistical Analysis / Introduction to Probability and Statistics	3
	FBO 330	Plant Physiology	2
	FEC 301	Introduction to Micro-Economics	3
	SIL 332	Soils	3
	Electives		6
			17
Second Semester	FMG 322	Mensuration	3
	FEN 300	Principles of Forest Entomology	2
	FMG 340	Harvesting	2
	SIL 421	Principles of Silviculture	3
	WPE 386	Elementary Wood Technology	2
	Elective		3
			15

Senior Year

First Semester	ERM 463	Principles of Forestry Economics	3
	ERM 460	Forest Administration and Policy	3
	ERM 432	Practices of Silviculture	3
	WPE 400	Introduction to Forest Products	2
	[2]Electives		6
			17
Second Semester	ERM 472 or ERM440	Fundamentals of Outdoor Recreation / Forest Hydrology	3
	ERM 476	Management Planning and Operation	3
	ERM 471	Resources Management (or other Forestry Elective)	3
	[2]Electives		6
			15

THE SCHOOL OF LANDSCAPE ARCHITECTURE

The School of Landscape Architecture offers two undergraduate curricula in environmental design—a four-year program in Environmental Studies and a five-year professional program in Landscape Architecture.

Landscape Architecture

Education in the design professions today is witness to a great deal of concern for school objectives, programs, and organization. The central issue relates to the force and pace of change that characterizes the work of the environmental designer and brings him into ever challenging situations. The present condition of cities, depletion of natural resources and pollution of air and water all pose severe and complex threats to society. Concurrently, a greater awareness and desire for environmental quality tax the resources and ingenuity of those in the design profession.

Several trends have emerged in recent years that suggest conditions for present and future educational programs. It is clear that an interdisciplinary approach to environmental problems is indicated and includes landscape architecture, architecture, engineering, and planning, with specific attention to the biological and behavioral sciences. It is also clear that the educational purpose must relate more directly to the health and well-being of man and be designed for versatility rather than the narrow concerns of career orientation. Finally, that contemporary education should orient the student to systems thinking in his approach to knowledge, society and the individual.

In an effort to recognize and respond to the demands and responsibilities of the times, the following curriculum is offered in environmental studies and landscape architecture. The major characteristics of the programs are: an expansive frame of reference for landscape architects as major contributors to the solution of environmental problems, with a concurrent broad educational base for their professional training; provision for flexibility to accommodate shifts in educational goals, particularly within the design professions; articulation with the programs of the two-year colleges to permit ready transfer to professional programs; and professional training to adequately meet the educational standards of accrediting bodies, the American Society of Landscape Architects and the Division of Professional Education of the New York State Education Department.

The curriculum is based on three consecutive educational sequences: The *first two years* may be taken at this college or at any other school or college. Students may transfer into the freshman, sophomore, or junior programs, depending upon acceptable transfer credit. Requirements for students planning to *transfer* as entering juniors are as follows: (a) Associate degree or acceptable transfer credit totaling a minimum of 62 semester credit hours or their equivalent; (b) Botany, 3 credits; and (c) the equivalent of college algebra and trigonometry plus high school chemistry or physics. A recommended course series prior to transfer would include English (composition) (4 credits); English (literature) (6); speech (3); biological sciences (6); social sciences (9); art media (2); geology

(3); geography (3); and humanities (6). This series is strongly recommended but not required, except as noted above. Deficiencies in these areas will be accommodated as possible during subsequent semesters and summer school sessions.

The *third and fourth years* are devoted to a broad spectrum of courses dealing with a variety of aspects of environment and man's relationship to it, synthesized through development of ability in both the functional and creative design processes. The successful completion of this 127-hour program qualifies the student to receive a bachelor of science degree with a major in environmental studies. The education is broad but with sufficient training to focus the student's concerns for the physical environment and its significance. At this point, students may pursue graduate study, or may apply to continue study toward the first professional landscape architectural degree.

The *fifth year* is comprised of three major components beginning with a short summer session course in plant materials. The fall semester is devoted to a unique program of off-campus study coupled with a concentration of professional course work in the final semester. The off-campus experiential studio is described and conducted by small groups of students with study topics correlated with locational opportunities throughout the world. Successful completion of this 33-hour program of 500 level course work leads to the degree of Bachelor of Landscape Architecture, the first professional degree. Study beyond this point is accommodated by the MLA programs.

Concentration in Environmental Studies

The College of Environmental Science and Forestry has historically provided educational programs focusing on the scientific, managerial, engineering, and design skills basic to the solution of environmental problems. The concentration in environmental studies is designed (1) to provide the specialist trained in these areas with an introduction to and appreciation of the nature of man and of his institutions and their profound effect on any solution proposed for an environmental problem, and (2) to allow students in diverse areas of specialization to work together on real environmental problems in such a manner that they learn to appreciate the multifaceted nature of these problems and to work comfortably and knowledgeably with persons of diverse subject matter background.

Students electing this concentration will take a two-course sequence designed to establish an environmental awareness early in their undergraduate careers. The first of these courses—Environmental Studies 100: Introduction to Environmental Studies—will explore the cultural, socio-economic, and political factors that condition mankind's view of the environment. The second course—Environmental Studies 101: Human Ecology—will build upon the student's awareness of human values and their importance in environmental study. Students will analyze the components, first of simple and then of progressively more complex ecosystems; study the interaction of these components via the flow of energy and natural nutrient cycles, goods, and services in

LANDSCAPE ARCHITECTURE CURRICULUM

			Credit Hours
First Year			
First Semester	English		3
	FBO 100	General Botany	4
	Philosophy	Elective	3
	GRA 182	Art Media I	1
	EST 100	Introduction to Environmental Studies	3
	GFO 032	Orientation	0
			14
Second Semester	English		3
	FZO 100	General Zoology	4
	Economics	Elective	3
	GRA 183	Art Media II	1
	Anthropology	Elective	3
	Elective		3
			17
Second Year			
First Semester	English		3
	GRA 284	Art Media III	1
	Psychology	Elective	3
	Electives		8
			15
Second Semester	English		3
	Philosophy	Elective	3
	Sociology	Elective	3
	GRA 285	Art Media IV	1
	Electives		6
			16
Third Year			
First Semester	LSA 320	Introduction to Landscape Architecture and Design Theory	2
	LSA 326	Landscape Design Studio I	4
	FBL 320	General Ecology	3
	FEG 271	Plane Surveying	3
	FBO 315	Dendrology I	2
	Elective		3
			17
Second Semester	LSA 327	Landscape Design Studio II	4
	LSA 343	Structural Materials and Elements	3
	LSA 345	Elements of Site Engineering	3
	APM 360	Introduction to Computer Programming	3
	EIN 211	General Geography	3
			16
Fourth Year			
First Semester	FEN 432	Insects and Site Planning	1
	FBO 432	Diseases of Woody Ornamentals	1
	LSA 432	Plant Materials Culture	1
	LSA 422	Landscape Design Studio III	4
	LSA 440	Site Development Systems	3
	EIN 470	Art History	3
	EIN 411	Principles of Land Use	3
			16

qualitative and simple quantitative terms; and finally, impose and evaluate the influence of man's attitudes and value systems on these ecosystems. Subsequently, as the student's disciplinary competence develops, he will elect at least two seminars (Environmental Studies 497), and two hours of problems' courses (Environmental Studies 498). These are designed to provide students of diverse backgrounds to bring their special skills to focus and to work together on problems of environmental importance.

In addition to the courses listed above, and the course requirements of the diverse curricula of the College, there is a wide diversity of additional courses available for election of students interested in environmental studies, provided elective hours are available. Members of the Undergraduate Environmental Studies Advisory Group are available to discuss these with the students.

This program will educate a person to both a disciplinary specialization and a keen appreciation of how this specialization can be applied in the environmental decade of the "70's."

			Credit Hours
Second Semester	[1]LSA 425	Orientation for Experiential Studio	3
	LSA 423	Landscape Design Studio IV	4
	EIN 471	History of Landscape Architecture	3
	ARC 294	Introduction to Architecture	3
	EIN 451	Fundamentals of City and Regional Planning	3
			16

Summer Session

LSA 533: Plant Materials. Three-week course in Plant Materials. 3 credit hours.

Fifth Year

First Semester	OFF-CAMPUS PROGRAM		
	LSA 524	Experiential Landscape Design Studio V	16
			16
Second Semester	LSA 522	Landscape Design Studio VI	
	or		
	LSA 525	Landscape Design Studio VI	4
	or		
	LSA 527	Landscape Design Studio VI	
	LSA 545	Professional Practice Studio II	2
	LSA 547	Principles of Professional Practice	2
	LSA 562	Architecture	3
	Elective		3
			14

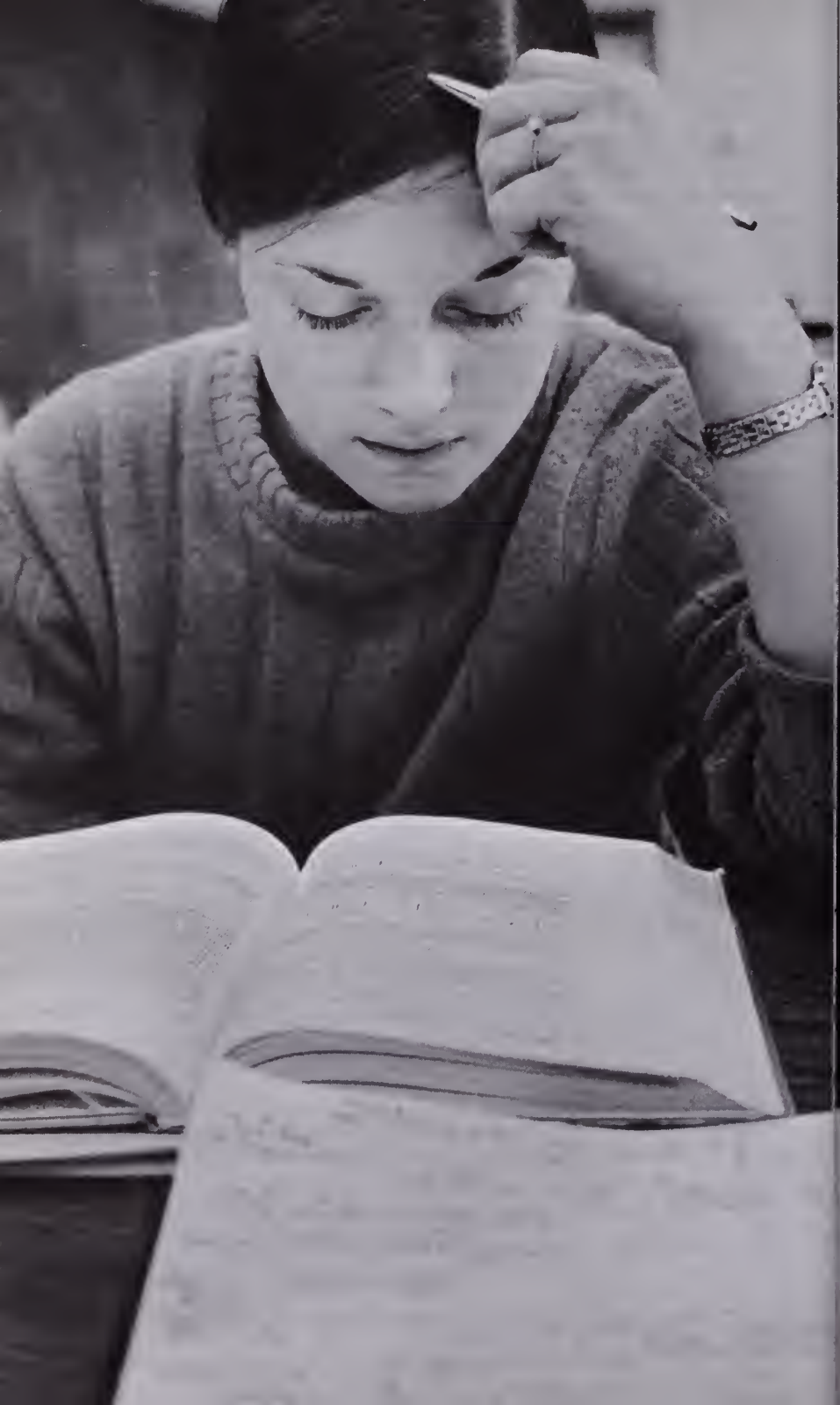
[1]All students must have completed the equivalent of college algebra and trigonometry plus H.S. chemistry or physics and botany and 62 credit hours before entering third year.

NOTE: At the beginning of the 4th year students will state their degree intentions at Registration; applications for the BLA program will be accepted during Spring Registration. Approval of the SLA Faculty is necessary for admission to the BLA program. Students in the Terminal B.S. program may elect to take LSA 524 (16 hrs.) in place of the courses listed for the 8th semester. These students will substitute LSA 425 for LSA 440 or EIN 470 or (LSA 432, FBO 432, FEN 432.

Students in the terminal B.S. program on campus will substitute an elective for LSA 425.

The B.S. degree requires a total of 127 credit hours.

The BLA degree requires 33 hours of 500-level course work. A total of 160 credit hours is required.



Course Offerings

Undergraduate students at the College of Environmental Science and Forestry not only have the academic resources of their own institution, but also the resources of nearby Syracuse University and State University Upstate Medical Center.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, English, business law, personnel relations and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics and the arts. Descriptions of required Syracuse University Courses are included following College of Environmental Science and Forestry courses.

DESCRIPTION OF COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

Course Numbering System (Effective June, 1973)

Code Levels:

000—099	Noncredit courses
100—199	Freshman courses
200—299	Sophomore courses
300—499	Junior and Senior courses designed primarily to serve as an undergraduate elective and/or as a requirement in an undergraduate curriculum with the number appropriate to the level where the course appears as a requirement or is normally scheduled as an elective in the major program.

500—599 Graduate courses designed expressly for graduate students in areas supporting their specialization or interdisciplinary program, or for fifth year professional students with a baccalaureate degree (e.g. BLA students with B.S. in Environmental Studies), and available for undergraduate credit by selected upper division undergraduate students with superior academic records.

600—699 Graduate courses designed for beginning graduate students. Undergraduates are permitted admission only by petition with a well-documented justification approved by the undergraduate advisor and curriculum director and the instructor of the course. (See the *Graduate Studies Bulletin* for these courses.)

ESF COURSES—SYRACUSE CAMPUS

APM—APPLIED MATHEMATICS

360. Introduction to Computer Programming (3)
The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages or problem solving. The course will cover instruction in Fortran IV, and an Assembly language plus some discussion of PL/1, Algol, APL, and use of software operating systems. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring. Mr. C. N. Lee and Staff.

460. Information Processing Fundamentals (3)
Three hours of lecture per week. The course presents problem solving and analytical structures, and practice in their application by use of a digital computer. Selected portions from the two general processing categories of numerical analysis and information systems are presented for discussion and study. The purpose is to develop an awareness with some understanding and proficiency in automated problem-solving systems. Fall. Mr. C. N. Lee and Staff.
Prerequisites: Integral calculus and proficiency in computer programming.

491. Introduction to Probability and Statistics (3)
Two hours lecture, 3 hours laboratory. Elementary probability, theoretical and sampling distributions, hypothesis testing, statistical estimation, analysis of variance, regression and correlation, nonparametrics and sampling concepts. Fall and Spring. Staff.
Prerequisite: Two semesters of calculus.

492. Forest Biometrics (3)
Two hours lecture, 3 hours laboratory. Analysis of variance including nested and cross-classification. Matrix approach to multiple linear regression and weighted least squares. Nonlinear regression. Sampling methods and design. Applications to forestry problems. Fall.
Prerequisite: APM 491 or equivalent.

500. Introduction to Computer Programming for Graduate Students (3)
The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages for problem solving. The course includes a rather detailed study of Fortran IV, plus some discussion of an Assembly language and moderate study of Cobol and APL. To provide completeness, some attention is also afforded to techniques of representing information, managing files, error control, and to operating systems and job control. This course or a

demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring.

593. Introduction to Analysis of Variance (3)
Two hours of lecture, 3 hours lab. One and two-way analysis of variance, multiple comparisons, subsamples, unequal sample size, tests of hypotheses, statistical estimation, determination of sample size. Fall.
Prerequisite: APM 491 or equivalent.
Note: This course will be dropped from the College offerings, effective Fall, 1976.

EGL—ENGLISH (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES)

210. Advanced Composition and Literature (3)
Further development of reading and writing skills acquired in freshman English. Understanding of imaginative literature promoted through the study of selected works in American literature in their historical context. Practice in the principles and techniques of critical writing coordinated with reading assignments. Fall. Mrs. Sutton and Mr. Lalor.

211. Technical Writing (3)
Instruction in the principles and techniques of technical writing in general; in the letter, memorandum and report, and in the special techniques of technical writing in particular. Course work includes lectures and discussions, reading assignments in the required text and supplementary materials, and numerous written assignments including a formal report presenting the results of an investigation. Spring. Mrs. Sutton and Mr. Lalor.

215. Fundamentals of Public Speaking (3)
Study of and practice in the application of the principles of good oral communication in extemporaneous person-to-group format. Students participate in information and problem-solving group discussions and prepare, deliver, listen to and criticize information and persuasive talks. Fall. Mr. Lalor.

400. American Writers and the Natural Environment (3)
The tracing of the changing concepts of the natural environment in American writings from the Puritans to the present. Fall. Mrs. Sutton.

EIN—ENVIRONMENTAL INFLUENCES (LANDSCAPE ARCHITECTURE)
(See also courses listed under GRA and LSA.)

211. General Geography (3)
Three hours of lectures, assigned readings, written reports per week. Discussion of basic geographic concepts and methods, explanation of the significance of man-land relationships as exemplified through the regional distribution and spatial patterns of natural and cultural features, description of geologic processes and other physical features such as soils, climates and natural vegetation. Not open to geography or geology majors. Spring.

411. Principles of Land Use and Planning (3)
Three hours lecture, reports, assigned readings. Explanation of factors which influence the use, development and control of land. Discussion of government's role in land development and control. Consideration of unique values of land competition for the use of space, planning for better land use, introduction to planning concepts and techniques and other topics. Fall.

451. Fundamentals of City and Regional Planning (3)
Three hours of lectures, assigned readings, written reports per week. Discussion of the meaning and purposes of city and regional planning. Examination of the historical development of urban places. Explanation of the principal elements of the comprehensive planning process, including goal formulation and decisionmaking, social and advocacy

planning, planning for community facilities and planning administration. Discussion of the methods and objectives of city and regional planning. Spring.
Prerequisite: Permission of instructor.

470. Art History (3)
Three hours of lecture per week. Informal lectures and class discussion will emphasize and review assigned text and other readings and handout notes. Slides will be shown regularly; notebooks, reports, quizzes and examinations. Evolutionary nature of the main cultural periods of Western man and fine arts as man's selected environment will be the course emphasis. Fall.

471. History of Landscape Architecture (3)
Three hours of lecture per week. Informal lectures, and class discussion, notebooks, reports, assigned text, and assigned reserve shelf reading, optional text, and handout notes, weekly quizzes and exams. Slides. Historical study and style analysis of Western man's efforts to design his environment and his changing attitudes and relationships to environment. Also, non-Western coverage where significant or influential on Western Man. Study of historical personalities as well as periods that are of environmental concern up into the modern period. Spring.
Prerequisites: EIN 470 or equivalent history of arts course.

ERE—ENGINEERING (ENVIRONMENTAL AND RESOURCE ENGINEERING)

100. The Engineer and the Environment (1)
One hour of lecture per week. Introduction to engineering practice in relation to environmental considerations and the needs and resources of society. Historical development of engineering and technology. Mission and content of engineering curricula. Representative case studies and project assignments. Open to all students. Spring. Mr. Jelinek and staff.

496. Special Topics (1-3)
Lectures, readings, problems, and discussions. Topics as announced in the areas of environmental or resource engineering. Fall and/or Spring. Staff.

ERM—RESOURCES MANAGEMENT (ENVIRONMENTAL & RESOURCE MANAGEMENT)

100. Introduction to Forestry and Environmental Management (3)
Two 1½ hour meetings per week. An introduction to environmental and resources management. Emphasis is placed on the breadth of the field and on the important interrelations among the social, physical and managerial aspects within which the environmental manager operates. Specific topics include: resources, institutions, values, the physical environment, the organism, the biological system, goals, management problems, information and analysis and dealing with people. Fall.

201. Social Sciences I—Socio-Cultural Processes (6)
Six hours lecture and discussion. Introduction to the concepts, theories and terminology of psychology, anthropology and sociology, which are relevant to the understanding of the interrelationships of human social groups with their environments and resources. Human social and cultural behavior as possible reflections of adaptations to past environments; human cultural and social organization as adaptations to resources of present-day environments; human ecology as it relates to human economic and political systems. Spring.

202. Social Sciences II: Economic Processes (6)
Five 1-hour lectures and one 1-hour discussion per week. The course has two major subdivisions: macroeconomic processes are concerned with the composition, measurement

and determination of national income, with the financial institutions of the United States and with fiscal and monetary policies; microeconomic processes are concerned with pricing of output and resource allocation, the theory of consumer demand, the theory of the firm and industrial organization, the role of labor unions in the United States and microeconomic policies of the Federal Government. Fall.

203. Social Sciences III—Political Processes (6)
Introduction to the concepts, theories and terminology which will provide students with a general understanding of the American political system, with emphasis upon how this system carries out and affects environmental and resource administration. The need and potential for, and direction of, change within and through the political system, and the roles of experts in defining and effecting change receive special consideration. Spring. Mr. Muniak.

204. Introduction to Economics for Forestry (3)
Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. Spring. Mr. Petriceks.

205. Introduction to Macroeconomics (3)
Three hours of lecture and discussion. Composition, measurement and determination of national income. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. Spring. Mr. Bennett and Staff.

206. Introduction to Microeconomics (3)
Three hours of lecture and discussion. Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in antitrust policy. The Theory of International Trade. Fall. Mr. Bennett and Staff.

300. Summer Session in Field Forestry (6)
Fundamental training in forestry disciplines demonstrating elements of resource inventory, ecology and utilization within the context of total resource management. Course consists of five 6-day weeks of field exercises, reports and projects in areas of surveying and cartography, forest and tree measurements, dendrology, ecology and utilization of forest goods and services. Daily exercises develop understanding through active physical participation by students. Two repeating sessions per summer held at Warrensburg Campus. A service charge is required covering individual expenses while in residence at Pack Demonstration Forest, Warrensburg, New York. Staff.

331. Introduction to the Physical Environment (6)
Lectures, discussions, field and laboratory work blocked in time and subject matter with ERM 332, Silvics-Silviculture. Study of the environmental media: air, soil and water, through examination of the flow of energy and matter within and between these components of the environment. Drawing together information from geology, physical geology, soil science, water science and meteorology, this course provides understanding of these areas, their interactions, and the interface with the biological system. Fall.
Prerequisite: Junior year standing in ERM curriculum or equivalent. Course should be taken concurrently with ERM 332, Silvics-Silviculture because of the blocking of these two courses.
Note: This course will be offered for the first time in the Fall, 1975.

332. Silvics-Silviculture (8)
Three 1-hour lectures and five 3-hour labs or field trips per week. Fundamentals of silvics and practices of silviculture enabling manipulation of forests to attain objectives of the forest owner. Emphasis is placed on the biological interrelationships within the forest

community, including site factors and forest stand dynamics, and the consideration of these in silvicultural operations. Fall.

Prerequisites: Summer Session in Field Forestry, Physical Environment (taken concurrently) or permission of instructor.

Note: This course will be offered for the first time in the Fall, 1975.

333. General Silviculture **(3)**

Three hours of lecture per week for first half of semester; 2 hours of lecture and 3 hours of laboratory or field work per week during second half of semester. Presentation of silvicultural concepts, principles and practices. Not designed for biology or resource management majors. Spring. Mr. Lea.

Prerequisite: Junior standing.

345. Soils **(3)**

Two hours of lecture and 3 hours of laboratory. Introduction to the fundamentals of soil science with particular references to forestry, but including other land uses. Spring. Mr. Craul.

Note: Not available to Environmental and Resource Management students.

351. Meteorology and Fire Behavior **(3)**

Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall. Mr. Herrington.

Prerequisite: PHY 103 and 104 (Calculus helpful but not required).

360. Principles of Management **(3)**

Three hours of lecture and recitation. Basic principles and concepts of management which are universally applicable to any organization, business enterprise or public agency. The various approaches to management including the classical, behavioral and quantitative concepts with emphasis upon the integrative approach, now required to meet modern society's changing life styles and values and the new awareness of the public regarding environmental matters and natural resources management. Fall.

Note: This course will be offered for the first time in the Fall, 1975.

361. Management Models **(3)**

Two hours of lectures, 3 hours of laboratory. Introduction to the various models used in managerial decisionmaking. Emphasis is on the characteristics of the various models: their formulation, assumptions, uses and limitations. The major topics covered will include: the role of models in management; simple optimization; constrained optimization; multivalued choices; time adjustment of value; simulation; and models in nondeliberated decisions. Integration of the deliberative and intuitive models is stressed. Spring. Staff.

Note: This course will be offered for the first time in the Spring, 1976.

362. Forest Information Systems **(4)**

Data needs, as specified by management goals and resource constraints, and the manner in which these needs influence acquisition, storage, retrieval and prediction. Spring.

Note: This course will be offered for the first time in the Spring, 1976.

364. Soil and Water Conservation **(3)**

Three lectures per week. An integrated historical survey of water and related land resource conservation in the United States. Interrelationships of planning, administration, and evaluation of policies, programs and projects by all levels of government and private units. Spring. Mr. Black.

371. Range Management **(2)**

Two hours of lecture. Range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring.

372. Roads (3)
Two hours of lecture, 3 hours of field and laboratory practice. Engineering principles in the planning, location, design, construction and maintenance of forest roads. Contract specifications, costs, drainage, typical sections, grades, curves, surfacing materials, use of heavy equipment and explosives. Principles in the location, installation and maintenance of communications. Spring. Mr. Koten.
Prerequisite: FEG 271 or FEB 371.

373. Harvesting (2)
Two hours of lecture. Principles of harvesting primary forest products. Equipment, methods and economics of the logging industry. Spring. Mr. Koten.

400. The Social Environment of Resource Management (3)
Three hours of lecture and discussion. This course describes the institutional framework within which the resource manager practices his profession. It intends to show how economics, law, public policy, pressure groups and financial considerations constrain the professional judgment of the resource manager and the goals and objectives of the institution employing him.
Prerequisites: Silvics-Silviculture, Principles of Management, Management Models, Information Systems, Senior standing.
Note: This course will be offered for the first time in the Fall, 1976.

401. Sociology and Psychology of Leisure Behavior (3)
3 hours lecture and discussion. Introduction to theory and research findings dealing with the sociological and psychological aspects of leisure behavior; field work and lectures demonstrate applications, particularly with regard to leisure behavior. Spring. Mr. Morrison.
Prerequisites: ERM 472, Fundamentals of Outdoor Recreation, and an introductory course in sociology or psychology, or instructor's permission.

402. Legal Aspects of Surveying (3)
Three credit hours of lecture and discussion. Fundamental principles of real property law with special reference to boundary survey, conveyances, rules of evidence, title insurance, rights, duties, and liability of professional land surveyors. Case material and appropriate New York State statutes will be discussed. Fall. Mr. Horn.

404. Economics of Wood-Using Industries (3)
Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decisionmaking by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring. Mr. Armstrong.
Prerequisite: ERM 204 or equivalent.

405. World Forestry Resources: Problems and Prospects (3)
Three hours of lecture and discussion plus guided readings, pertaining to world forest resources and the problems and opportunities associated with their use and development. Major topics include: world forest resources; production and trade; principal wood-producing countries; forestry and the problems of underdevelopment; and special areas and topics of interest to world forestry. Spring. Staff.
Prerequisite: Upper division status. Senior status preferred.

429a. Environmental Impact: Principles and Strategy (1)
One hour of lecture. Principles and theory of environmental impact and statements of impact as required by Federal law. Administrative procedures for review and evaluation. Procedural strategy and effective constitution before various governmental levels. Means of obtaining and sources of authoritative information. Spring. Messrs. Black, Herrington and Staff.
Prerequisite: Senior standing.

429b. Environmental Impact: Principles and Strategy (2)
Two hours of discussion. Principles and theory of environmental impact and statement of impact as required by Federal law. Administrative procedures for review and evaluation. Procedural strategy and effective constitution before various governmental levels. Means of obtaining and sources of authoritative information. Spring. Messrs. Black, Herrington and Staff.
Prerequisite: 429a.

430. Application of Ecology (3)
Two hours of lecture and discussion and 1 to 3 hours seminar, laboratory or field trip per week. Examination of ecological concepts relevant to practices modifying terrestrial ecosystems for human benefit. Discussion of selected ecological literature, seminars and field trips by specialists in various fields of applied ecology, and student presentations exploring ecological implications of specific problems or situations. Course designed for interdisciplinary participation. Fall or Spring. Mr. Richards.
Prerequisites: An ecology course or permission of instructor. Senior standing desirable.

431. Principles of Silviculture (3)
Three hours of lecture during the first half of the semester; 2 hours of lecture and 3 hours of laboratory during the second half of the semester. The forest as a community. Site factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owners. Spring. Mr. Berglund.
Prerequisites: Summer Session in Field Forestry, FBO 330 or FBO 530 concurrently, or permission of instructor.
Note: Not available to Environmental and Resource Management students.

432. Practices of Silviculture (3)
Two hours of lecture and one 3-hour laboratory or field trip. Theory and practices of silviculture manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, plantings and other silvicultural operations in their relationships to economic and ecological factors. Fall. Mr. Johnson.
Prerequisite: ERM 431 or permission of the instructor.
Note: Not available to Environmental and Resource Management students.

434. Greenspace Silviculture (3)
Two hours of lecture and discussion, 1 to 3 hours seminar, workshop or field trip per week. Concepts and techniques applicable to the manipulation of vegetation systems primarily for their on-site values in park, recreation or multiple-use land, roadsides, utility rights-of-way, buffer and protection areas, etc. Spring. Mr. Richards.
Prerequisite: At least one general or plant ecology or silvics course. Senior standing desirable.

435. Regional Studies (2)
Two hours of lecture. Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography, geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. Spring. Mr. Johnson.
Prerequisite: ERM 432.

436. Mensuration (3)
Two hours lecture and discussion, one 3-hour laboratory. Principles and methods of estimating and projecting net volumes of trees and products; tree form; timber volume determination of logs, trees and stands; growth determination analyses by graphical and mathematical methods; stand structure adjustments; numerous problems. Spring.
Prerequisites: APM 491; or FEG 271 or FEG 371.

440. Forest Hydrology (3)
Two hours of lecture, 3 hours of laboratory. The relation of forest and range vegetation

to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion, and other variables. Fall and Spring. Mr. Eschner and Mr. Black.

441. Forest Influences (2)
Two full days/week for 4 weeks. Field observation of the effect of the presence of forest vegetation on easily quantified parameters of climate and the hydrologic cycle. Basic measurements of precipitation, radiation, temperature, interception, soil moisture, groundwater and streamflow. Summer Session II. Cranberry Lake Biological Station.

442. Practice of Watershed Management (3)
Two hours of lecture, 3 hours of laboratory. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring. Mr. Eschner
Prerequisite: ERM 440.

446. Forest Soils (3)
One hour of lecture, 1 hour of discussion, 4 hours of laboratory, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development—soil properties relationships. Methods of soil sampling and laboratory analysis. Fall. Mr. Leaf.
Prerequisite: ERM 345.

452. General Meteorology (3)
Three hours of lecture. Examination of the physical processes of the atmosphere as they relate to the exchange of heat, moisture and momentum in the earth-atmosphere system. Emphasis on the meteorological and micrometeorological basis of climate and its interaction with the biological world. Spring. Mr. Herrington.
Prerequisite: Junior standing or permission of instructor.

453. Meteorology Laboratory (1)
The hours laboratory. An extension of SIL 452 which provides analysis and discussion of the atmospheric processes important to weather and climate. Major topics include air mass analysis, surface weather map analysis, and climatological summarization procedures. Spring. Mr. Herrington.
Prerequisites: ERM 452 or concurrently and permission of instructor.

455. Forest Tree Improvement (3)
Two hours of lecture, 3 hours of laboratory or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. Spring. Mr. Westfall.
Prerequisites: FBL 370 and 371 strongly advised.

456. Management of the Forest Business (3)
Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to RMP 611. Fall or Spring. Staff.

460. Forest Administration and Policy (3)
Three hours of lecture and recitation. Administrative and executive aspects of forestry. Public and private forest policy formulation; basic principles of organization, planning, public relations, personnel management, budget and administrative practice. Work and organization of the major agencies engaged in forestry. Fall.

461. Operation Cost Control (3)
Three hours lecture. Management uses of accounting data. Essentials of cost accounting and the uses and misuses of historical cost data in management decisionmaking. Concepts

of financial analysis of past and projected cash flows, and various methods of comparing alternatives. Fall and Spring. Staff.
Prerequisite: Permission of instructor.

462. The Structure of Management Decisions (3)
Three hours of lecture. Introductory course in managerial decisionmaking. Covers theory, concepts and methodology of management practices and relates these to the realities of decisionmaking. Uses the problem solving approach in preparing the prospective resource manager or administrator for an understanding of the application of decisionmaking models. Spring. Staff.
Prerequisites: ERM 460, APM 491 or equivalent and permission of instructor.

463. Principles of Forestry Economics (3)
Two hours of lecture, 3 hours of laboratory. Economics of the production of forest goods and services. Land, labor and capital and their combination in forest production. Supply and demand of various forest products and their changes over time. Economics of taxation and public policy formation. Emphasis is placed upon principles and methods of analysis useful in understanding and in making resource management decisions. Fall. Mr. Christiansen.
Prerequisite: ERM 206 or equivalent.

464. Applied Communications (3)
Two hours of lecture. Three hours of laboratory during first part of course. Major media production project required. Course objective is to acquaint students with the basic principles of instructional communications in the teaching-learning process. Various media including television, motion pictures, exhibits, illustrated lectures, slide talks, newspapers, etc. are examined with emphasis on their utilization in environmental education. Also, consideration is given to instructional design for meeting predetermined learning objectives in various publics—lay and professional adult audiences, school children, etc. Spring. Mr. Hanselman and Staff.

470. Management of the Forest Enterprise (3)
Two hours of lectures and one discussion/laboratory. This course is concerned with the management alternatives, both of a technical and social nature, that are available in the planning for and the production of timber, recreation, wildlife, forage and water from the forest and with the criteria for choice to meet management objectives. Fall.
Note: This course will be offered for the first time in the Fall, 1976.

471. Resources Management (3)
The interrelationships between man and forest resources and the multiple services which those resources provide; the extent and nature of responsibilities of the forester to the community and to society in his stewardship of natural resources. Spring. Staff.

472. Fundamentals of Outdoor Recreation (3)
Three hours of lecture per week. Introduction to the programs and practices of Federal, state and local agencies and private organizations involved in planning, administration and management of outdoor recreation areas. Emphasis is on major recreational issues and conflicts faced by area managers, and how they integrate solutions into their plans. Spring. Mr. Gratzer.

EST—ENVIRONMENTAL STUDIES

100. Introduction to Environmental Studies (3)
Lecture and discussion on the nature of man, his social, cultural, economic and political institutions and how these condition his views of the environment. Fall. Staff.

101. Human Ecology (3)
Study of the principles of ecosystem structure and function developed in the context of human values and societal structures. Spring. Staff.
Prerequisite: EST 100.

497. Undergraduate Seminar (1)
Seminars on problems of environmental concern. The subject of the seminar will be announced prior to registration. Fall and/or Spring. Staff.

498. Undergraduate Problem (1-3)
Interdisciplinary research designed to solve environmental problems. Selection of subject matter to be determined by students in conference with the Undergraduate Environmental Studies Advisory Group. Problem analysis and programs for solution in the form of a final report required. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

FBL—BIOLOGY (FOREST BIOLOGY)

320. General Ecology (3)
Two hours lecture, 3 hours of field trips during the first half of the semester. Three hours lecture during the second half of the semester. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography, and representative ecosystems. The ecological impact of man is reviewed. Fall. Mr. Alexander.
Prerequisite: A year course in biology or equivalent.

473. Planning and Development of Forest Recreation Areas (3)
Three hours of lectures or equivalent laboratory and assignments per week. Planning and designing forest recreation areas, structures and facilities. Development of construction plans for camp and picnic sites, for waterfront areas and for trails. Emphasis is on the functional relationship between planning and design, management and maintenance. Field trips required. Fall. Mr. Gratzer.
Prerequisite: ERM 472 and permission of instructor.

474. Advanced Practices of Silviculture (3)
Four hours of lecture and seminar during the first half of the semester; 6 hours of field exercises thereafter. Development of silvicultural decisions in management of woodlands. Trips to forest areas. A cultural plan prepared to attain assigned objectives. Spring. Mr. Lea.
Prerequisite: ERM 432.

476. Management Planning and Operations (3)
Three hours of lecture and recitation. The overall management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration and human relations in the context of a practical operating land ownership. Spring. Mr. Horn.

477. Forest Management (4)
Three hours of lecture supplemented by 1 hour of discussion and/or lecture. Public and private forest policy formation; principles of modern management; overall management and operation of a productive forest property. Primarily for forest engineers. Not available to Resource Management undergraduates. Fall or Spring. Mr. Koten.
Prerequisite: Mensuration and silviculture or by permission of the instructor.

496. Special Topics in Environmental and Resource Management (1-3)
Guided readings, lectures and tutorial conferences for the undergraduate student from any school of the College, designed to help him apply economic analysis to questions within his area of interest. Illustrative topics include the economics of land use and planning; of forest culture; of outdoor recreation; of water or timber management, or related resource production; of wood-using industry; and of the distribution or consumption of forest resources. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

497. Resources Management Seminar **(3)**
Three hours of group discussion and analysis. Current literature, plans and principles, and new developments in forest management. Fall or Spring. Staff.

498. Special Studies in Environmental and Resource Management **(1-3)**
Independent research in environmental and resource management for selected undergraduate students. Selection of subject areas determined by the student in conference with appropriate faculty member. Final written report is required for departmental record. Fall or Spring. Staff.
Prerequisite: Consent of instructor and department chairman.

330. Principles of General Physiology **(3)**
Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Fall. Mr. Brezner.
Prerequisite: One semester of organic chemistry.

370. Principles of Genetics **(3)**
Three hours of lecture and discussion. A general course covering concepts of genetics and evolution basic to upper division biology and biochemistry courses. Includes the inheritance and analysis of Mendelian and quantitative traits, the chemical nature of the gene and its action, the genetic structure of populations and their evolution. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.
Prerequisites: Forest Botany 100 and Forest Zoology 100 or a 1-year college introductory biology course.

371. Principles of Genetic Laboratory **(1)**
Three hours of autotutorial laboratory. Experiments with plants and animals and computer simulation exercises demonstrate the basic principles of inheritance of Mendelian and quantitative traits and changes in populations caused by major forces in evolution or by breeding procedures. Numerical methods for characterizing quantitative traits and for testing hypotheses are introduced. Spring.
Corequisite: FBL 370 or equivalent.

372. Introduction to Quantitative and Population Genetics **(1)**
Ten lecture-discussions and four autotutorial laboratories the second half of the semester (incl. Lecture-Lab Modules 5 and 6 of FBL 370 and 371). Basic genetic concepts of quantitative inheritance, the structure of populations and evolution. Laboratory experiments and computer simulations are used to demonstrate these concepts. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.
Prerequisite: An introductory genetics lecture-laboratory course deficient in these areas of genetics and permission of instructor. (Not open to students taking FBL 370 and 371.)

405. History of Natural Science **(1)**
One hour of lecture. A review of the history of western science from pre-Ionian times to Darwin, with evaluation of the impact of culture and religion on scientific progress. Spring. Mr. Brezner.

421. Ecology of Freshwaters **(2)**
Note: SUNY, Albany No. BIO 421.
Two full days a week for 4 weeks. Experimental and observational studies of environmental and biotic interactions, influencing productivity of freshwaters. Basic concepts at the organismic, population and community level. Summer Session I, Cranberry Lake Biological Station. Staff, SUNYA.
Prerequisite: A course in ecology.

496. Topics in Biology **(1-3)**
Experimental, interdisciplinary, or special coursework in biology for undergraduate students. Subject matter and method of presentation varies from semester to semester. May be repeated for additional credit. Fall or Spring. Staff.

497. Undergraduate Seminar **(1)**
Literature surveys and seminars on topics of biological interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring. Staff.

498. Research Problem in Biology **(1-3)**
Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

540. Chemical Ecology **(3)**
Two hours of lecture and 1 hour of discussion. A treatment of biological phenomena incorporating elements of ecology, physiology and chemistry as a basis for development and behavior and survival. Emphasis is on intra- and interspecific relationships involving chemical messengers at the organismal population and community levels. Spring. Mr. Simeone.
Prerequisites: Organic chemistry, general ecology, general physiology.

FBO—BOTANY (FOREST BOTANY AND PATHOLOGY)

100. General Botany **(4)**
Prerequisite to all other courses in Botany. Two hours of lecture and 4 hours of lecture-laboratory in the Autotutorial Learning Center. An introduction to plant biology with special emphasis on the structure and function of the green plant. Fall. Mr. Geis.

310. Classification of the Plant Kingdom **(3)**
Two hours of lecture and 3 hours of lab. Introductory study of the plant kingdom with emphasis on the angiosperms. Spring. Mrs. Wang and Staff.

315. Dendrology I **(2)**
One hour lecture and one 3-hour laboratory/field trip each week. Field study, identification, taxonomy and elementary silvics of important forest trees of North America. Fall. Mr. Ketchledge.

330. Plant Physiology **(2)**
Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Will not satisfy the plant physiology requirement of botany majors. Fall. Mr. Schaedle.
Prerequisite: FBO 100 or equivalent.

360. Forest and Shade Tree Pathology **(3)**
Two hours of lecture and 3 hours of autotutorial laboratory. Major diseases of forest, shade and ornamental trees and deterioration of forest products will be discussed with emphasis on disease identification, principles of disease development, effects of disease on the host and practical control measure. Spring. Mr. Manion.

415. Dendrology II **(1)**
One 3-hour field trip/laboratory each week. A continuation of DENDROLOGY I emphasizing trees and shrubs ecologically important in the central New York region and economically important in North America. Fall. Mr. Ketchledge.

422. Ecology of Forest Communities **(2)**
Note: SUNY Albany No. BIO 422.
Cranberry Biological Station. Session II. Two full days per week for 4 weeks. Study of the structural and functional characteristics of selected Adirondack forest ecosystems;

techniques of vegetational and environmental analysis. Special requirement: students must be prepared to go on two overnight camping trips to an isolated study area. Mr. Ketchledge.

Prerequisites: At least 1 semester of general ecology plus 15 hours of other biological sciences.

425. Plant Ecology (3)

Two hours of lecture and discussion and one laboratory session per week. A first course in plant community ecology dealing with the dynamics of community development and change and the process of community analysis and description. Spring.

Prerequisites: FBL 320, ERM 432 or equivalent.

440. Environmental Microbiology (3)

Three hours of lecture and discussion. Topics to be discussed include: kinds of microbes and their morphology, how viruses and bacteria grow and reproduce, physiology of microorganisms, microbial transformation of the natural and polluted environment, symbiotic relationships of microbes with plants and animals, and microbes as model systems for higher organisms. Spring. Mr. Flashner and Mr. Griffin.

Prerequisites: Junior or Senior standing or permission of instructor.

460. Field Problems in Forest Pathology (2)

Two full days per week for 4 weeks. Field study of important tree diseases in the Adirondacks, including heartrots, root-rots, cankers, rusts, foliage diseases, mistletoe, and physiological diseases. Also field study of mycorrhizae and other tree-root mutualisms. Summer Session I, Cranberry Lake Biological Station.

490. Plant Propagation (2)

One combined lecture-demonstration-laboratory/week plus supervised greenhouse assignments.

Instruction in principles and practices of plant propagation and in related greenhouse operations. Spring. Mr. Ketchledge, Mr. Wilcox and Staff.

Prerequisite: 20 hours of biology, including dendrology and general physiology.

510. Mycology (3)

Two hours of lecture, 3 hours of laboratory. Fundamentals of the morphology, taxonomy, cytology, life histories and ecology of fungi. Laboratory experience in culturing and identification of fungi. Fall. Mr. Griffin.

515. Systematic Botany (3)

Two hours of lecture, 3 hours of laboratory. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. Fall.

Prerequisite: FBO 310 or permission of the instructor.

530. Plant Physiology (2)

Two hours of lecture. Internal processes and conditions in higher plants with emphasis on physiological and biochemical concepts. For students majoring in the biological sciences. Spring. Mr. Wilcox.

Note: Botany majors electing this course for their concentration must also take FBO 531.

531. Plant Physiology Laboratory (2)

Two lab sessions. Introduction to current methods and procedures of physiological research including nutrition, tissue culture, photosynthesis, respiration and hormonal regulation of growth. Spring. Mr. Schaedle.

Prerequisites: FBL 330, corequisite FBO 530, or permission of the instructor.

561. Principles of Forest Pathology (3)

Three hours of lecture and discussion. Concepts and principles of tree diseases in relation to forest practice. Fall. Mr. Manion.

Prerequisite: FBO 360 or consent of instructor.

585. Plant Anatomy (3)
Two hours of lecture, 3 hours of laboratory. An introductory course in plant anatomy designed to familiarize the student with the organization and development of the primary and secondary plant body of higher plants. Spring. Mr. Tepper.
Prerequisite: FBO 100.

FCH—CHEMISTRY

221. Organic Chemistry I (3)
Two hours of lecture, 1 hour of recitation. A survey of representative classes of carbon compounds with an emphasis on structure, nomenclature and fundamental reactivity and other important properties, uses and characteristics. Fall. Mr. Silverstein and Staff.
Prerequisite: One year of freshman chemistry.

222. Organic Chemistry Laboratory I (1)
One 3-hour laboratory period. Laboratory techniques in organic chemistry. Melting points, distillation, recrystallization, extraction, column and thin layer chromatography. Qualitative functional group analysis. Fall. Staff and laboratory assistants.
Prerequisite: One year of freshman chemistry.
Corequisite: FCH 221 or equivalent.

223. Organic Chemistry II (3)
Two hours of lecture, 1 hour of recitation. A study in depth of the reactivity characteristics of the various classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three-dimensional characteristics of carbon compounds. Spring. Mr. LaLonde and Staff.
Prerequisites: One year of freshman chemistry and 1 semester of organic chemistry.

224. Organic Chemistry Laboratory II (1)
One 3-hour laboratory period. Continuation of FCH 222. Simple physical, quantitative and instrumental techniques applied to organic chemistry. Gas chromatography, polarimetry, kinetics. Introduction to synthesis. Spring. Staff and laboratory assistants.
Prerequisite: FCH 222 or equivalent.
Corequisite: FCH 223 or equivalent.

325. Chemistry III (4)
Two hours of lecture, one 6-hour laboratory period. Classical and recent literature synthesis of organic compounds, employing advanced techniques. Fall. Mr. LaLonde.
Prerequisite: Two semesters of elementary organic chemistry.

384. Spectrometric Identification of Organic Compounds (1-2)
Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the second half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultraviolet spectometry will be applied to identification of organic natural products. Spring. Mr. Silverstein.
Prerequisites: Organic chemistry; 1 semester of advanced organic chemistry for second credit.

450. Introduction to Polymer Science (3)
Three hours of lecture. Introduction to the chemistry, physics and properties of synthetic polymers. Description and classification of polymers. Polymer synthesis. Polymer solutions. Polymer solid states, including discussion of rubber elasticity, glass transition, crystallization, viscoelasticity. Structure and properties of fibers, films, elastomers, foams. Fall. Mr. Sarko and Mr. Smid.
Prerequisites: One year of organic chemistry and 1 year of physical chemistry.

475. Wood Chemistry I (2)
Four hours of lecture first half of semester. Introduction to carbohydrate chemistry.

Chemistry of cellulose, hemicelluloses, and lignin. Cellulose derivatives. Wood extractives. Bark chemistry. Distribution of the cell wall constituents in wood. Fall. Mr. Timell.
Prerequisites: FCH 221—224 or equivalent.

476. Wood Chemistry II **(2)**
Four hours of lecture second half of semester. Interaction of cellulose with water and alkali. Effect of acids on cellulose, hemicelluloses and lignin. Sulfonation and oxidation of lignin. Action of alkali on cellulose, hemicelluloses and lignin. Topochemistry of the major wood delignification reactions. Wood defects. Chemical by-products from wood. Manufacture of cellulose acetate and rayon. Fall. Mr. Timell.
Prerequisite: FCH 475.

477. Wood Chemistry III **(2)**
Chemistry of pectin and starch. Photosynthesis, with emphasis on the chemical, dark phase. Biosynthesis of sucrose, starch, and plant cell wall polysaccharides. Biosynthesis of aromatics, with emphasis on lignin. Effects of growth hormones on structure and chemistry of plant cell walls. Spring. Mr. Timell.

478. Wood Chemistry Laboratory **(1)**
Gravimetric and spectrophotometric determination of lignin in wood. Determination of number—and weight—average molecular weights of ethylcellulose. Separation of larch arabinogalactans A and B and estimation of their molecular weight and molecular-weight distribution by gel permeation chromatography. Fall. Mr. Timell.

495. Introduction to Professional Chemistry **(2)**
Professional ethics and responsibilities of the practicing chemist. Employer-employee relations, legal and legislative relations. Alternate employment opportunities. Professional organizations. Safety in the laboratory. Organization and use of chemical literature. Selection of research topic and literature survey. Fall. Mr. Schuerch and Staff.
Prerequisite: Upper division status. Senior status preferred.

496. Special Problems in Chemistry **(1-3)**
An opportunity for a special problem, technique development, independent or unstructured study in an area related to the chemical profession. The work may be technical, professional or interdisciplinary. Advisors outside this department may be solicited. A brief proposal must be presented for approval with specific arrangements outlined including faculty advisor and objectives of the study. Evidence of competence and appropriate effort is required for credit. A written report will be expected. Fall and Spring. Staff.
Prerequisite: Upper division status.

497. Undergraduate Seminar **(1)**
One hour per week. Literature surveys and seminars on topics of current research interest and recent advances in chemistry. Spring. Staff.

498. Introduction to Research **(5)**
Eighteen hours of laboratory per week, library search and report writing. Solution of a selected research problem using special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring. Staff.

520. Nuclear and Radiation Chemistry **(2)**
The two 1-hour lectures will cover the information required for the basic understanding of nuclear reactions, the types of radiation emitted, the instrumentation necessary to detect and measure this radiation, the principles of radioisotope tracer techniques, and radiation chemistry which is the effect of radiation on organic systems. Visits to the Cornell Reactor and the Nuclear Medicine Department of the Upstate Medical Center will be arranged. Spring. Mr. Meyer.
Prerequisites: Physical, organic and inorganic chemistry or by permission of the instructor.
Note: This course can be taken independently of FCH 521.

521. Nuclear Chemical Techniques (1)

The laboratory will consist of one 4-hour laboratory class every 2 weeks, with 1 hour to be made up at the student's discretion to accommodate counting periods which extend over several weeks. A short movie by the AEC each week will be required for the sixth hour. The laboratory will give each student the opportunity to use the individual counting instruments, gain experience in the handling and preparation of radioactive samples and the use of the 1000 Curie cobalt source in radiation chemistry. Spring. Mr. Meyer.

Prerequisite: Physical, organic and inorganic chemistry or permission of the instructor. Advance tentative registration is required.

Corequisite: FCH 520.

530. Biochemistry I (3)

Three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers, and biological oxidations will also be covered. Fall. Mr. Walton.

Prerequisite: One year of organic chemistry.

Pre- or corequisite: One year of physical chemistry.

531. Biochemistry Laboratory (2)

Six hours of laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry and methods involved in the isolation, purification, and assay of enzymes. Fall. Mr. Walton.

Prerequisites: One semester of quantitative analysis with laboratory.

532. Biochemistry II (3)

Three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and biochemical properties of lipids, theories on the origin of life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins and other aspects of nitrogen metabolism. Spring.

Prerequisites: FCH 530 and its pre- and corequisites.

539. Principles of Biological Chemistry (3)

Three hours of lecture. Principles of biochemistry with emphasis on their relationship to biology. Topics include basic metabolic pathways, structure and function of proteins, enzymes, and nucleic acids, energy relationships, and biochemical control mechanisms. Fall. Mr. Walton.

Prerequisite: A 2-semester course in organic chemistry is desirable, but a 1-semester course is acceptable. This course is not open to chemistry majors.

540. Chemical Ecology

This course is the same as FBL 540. Refer to description on page 77.

551. Polymer Techniques (2)

One hour of lecture and discussion and 3 hours of laboratory; lab reports. Techniques of polymer preparation: free radical solution and emulsion polymerization, copolymerization. Molecular weight determination by light scattering, osmometry, viscosity, ultracentrifugation. Structure characterization by X-ray diffraction, electron microscopy, nuclear magnetic resonance, optical rotatory dispersion, polarized microscopy, stress-strain and swelling equilibrium. Fall. Mr. Sarko.

Prerequisites: One year of organic and 1 year of physical chemistry.

552. Polymer Processing and Technology (3)

Industrial methods of production and processing of polymeric materials such as fibers, films, plastics, elastomers, foams, composites, adhesives and coatings, including discussions on the correlation between polymer structure and polymer properties. Spring. Mr. Smid and Staff.

Prerequisites: Introduction to Polymer Science, FCH 450.

FEG—ENGINEERING (FOREST ENGINEERING)

271. Plane Surveying (3)
Two hours of lecture and recitation, 3 hours of field or office practice. A comprehensive development of the principles of plane surveying. Use of modern instruments and methods, computations related to topographic mapping and site development. Fall. Mr. Bender.
Prerequisite: Plane trigonometry, or permission of instructor.

300. Forest Engineering Problems (1)
One hour of lecture and discussion. An introduction to methodologies for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall and Spring. Staff.
Prerequisite: Junior standing in Forest Engineering.

302. Forest Engineering Problems (3)
Three hours of lecture and discussion. An introduction to methodologies of forest measurements for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Spring. Staff.

340. Hydrology (3)
Two hours of lecture and 3 hours of laboratory and discussion per week. Analysis of the waters of the earth; their occurrence, circulation and distribution; chemical and physical properties; and interaction with their environment, including their relation to living things. A system's perspective is developed towards the solution of typical hydrologic problems. Spring. Mr. Tully.
Prerequisite: 327, Principles of Fluid Mechanics; APM 491, Introduction to Probability and Statistics; and APM 360, Introduction to Computer Programming or equivalent.

342. Hydraulics in Construction (4)
Three hours of lecture, 3 hours of laboratory. The physical, mechanical, thermal and hydraulic properties of fluids relevant to the construction industry. A study of solutions to hydraulic problems in contemporary construction activities. Not open for credit to forest engineering students. Spring. Staff.
Prerequisites: Physics and differential calculus.

352. Introduction To Remove Sensing (3)
Two hours of lecture and 3 hours of laboratory per week. Qualitative and quantitative introduction to the fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys, site development studies and land use analyses. Oriented for multidisciplinary participation. Spring. Mr. Lillesand.
Prerequisite: Junior standing, physics and calculus or consent of instructor.

363. Photogrammetry (3)
Two hours of lecture and discussion, 3 hours of laboratory. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation and unique requirements are considered. Fall and Spring. Mr. Brock.
Prerequisite: FEG 271 (or FEG 371 concurrent).

371. Surveying for Engineers (3)
Two hours lecture and recitation, 3 hours of laboratory. The principles of plane surveying for engineers. Subject areas to be treated include linear and angular measurements in both the horizontal and vertical planes; error analysis; horizontal and vertical control and associated computations; areal and volumetric computations; circular and parabolic curves; state plane coordinates; astronomical observations for direction of lines; and consideration of potential computer relationships. The laboratory is essentially

the same as FEG 271, but with additional work. Field work and computations culminate in a topographic map. Fall.

Prerequisite: Differential and integral calculus.

410. Structures (4)

Three hours of lecture, 3 hours of laboratory. Engineering principles in the analysis, planning, design, construction and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems and other facilities. Properties of timber, concrete, steel and other structural materials. Fall. Mr. Tully.

Prerequisite: CIE 325 or concurrent registration.

422. Production Systems Engineering (3)

Three hours of lecture per week. Concepts of production systems and principles of their design and management, with special treatment of wood products harvesting. Applications of engineering economic analysis and mathematical programming to problems of resource allocation and system's control. Fall. Mr. Palmer.

Prerequisite: ERM 206, FEG 302, APM 491.

430. Soil Mechanics (2)

Two hours of lecture, 3 hours of laboratory (9 weeks only). The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. A 9-week course, concluding with specifications of engineering soils. Credit towards forest engineering degree may be granted only by the completion of additional assigned work. Fall. Mr. Tully.

Prerequisite: Senior class standing or permission of instructor.

Note: A student may not enroll in and receive credit for both FEG 430 and FEG 432.

432. Soil Mechanics for Engineers (3)

Two hours of lecture, 3 hours of laboratory. The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. Application of these and other engineering principles to the design of earthen structures common to the forest environment. Fall. Mr. Tully.

Prerequisites: FEG 340; also, CIE 325 concurrently.

Note: A student may not enroll in and receive credit for both FEG 430 and 432.

437. Transportation Systems (3)

Two hours of lecture and 3 hours of laboratory. Interrelationships among natural features, transportation types, design and management objectives to provide the most effective system within the given framework. Basic engineering principles in the planning location, design, construction and maintenance of suitable transportation systems to serve various aspects of forest resource management. Spring. Staff.

Prerequisites: FEG 371 and FEG 432 or equivalents.

442. Hydraulic Operations (2)

Three hours of lecture, 3 hours of laboratory. A 7-week course beginning at mid-semester, which studies solutions to hydraulic problems in contemporary construction operational activities. Not open to students having previous credit for FEG 342. Spring. Mr. Tully.

Prerequisites: Senior class standing in engineering or permission of instructor based on a background in hydraulics.

447. Hydrologic Controls (3)

Three hours of lecture and discussion. A continuation of FEG 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring. Mr. Tully.

Prerequisites: FEG 340, FEG 430 or FEG 432, CIE 327 or equivalents as evaluated by the instructor.

460. Measurement Errors and Adjustment Computations (3)
Two hours lecture, one 3-hour lab each week. The study of measurement errors and the adjustment of observations oriented toward geodesy and photogrammetry. Topics include error definitions, weighted observations, method of least squares, matrix algebra in adjustments, variance-covariance matrix, the error ellipse, the general case of adjustment, and the design of survey networks. Fall or Spring. Mr. Brock.
Prerequisite: Calculus, APM 491 or equivalent

464. Photogrammetry II (3)
Two hours of lecture, 3 hours laboratory each week. General analytic photogrammetry including interior and exterior orientation systems, intersection, space resection and orientation. Correction of photo coordinates for film deformations, lens distortions, atmospheric refraction and earth curvature. Introduction to photogrammetric plotters including hands-on experience for interior, relative and absolute orientation as well as calibration considerations. Planning photogrammetric projects, establishing product specifications, cost models, optimal components of photogrammetric systems, design of optimum procedures for the photogrammetric project. Fall. Mr. Brock.
Prerequisite: FEG 363 or equivalent.

474. Geodesy (4)
Three hours of lecture, 3 hours of laboratory. An introduction to Geodesy, including ellipsoidal geodesy, the direct and inverse problems, spherical triangles, conformal maps, astronomic methods of position determination, time, gravity field of earth. Fall. Mr. Bender.
Prerequisite: Calculus through MAT 328 and FEG 371 or equivalent.

477. Survey Systems Design (3)
Three hours of lecture and discussion. A study of the development and present status of Land Surveys, including the U.S. Public Land System, plane coordinate system, land use and resource systems such as New York's LUNR system. The impact of survey upon land use. The design of future systems. Spring. Mr. Bender.

486. Cartographic Surveying (2)
Six hours of field or laboratory exercise each week. A complete topographic mapping project will be planned and conducted utilizing photogrammetric techniques. An introduction to the elements of cartography related to large scale mapping will be incorporated during the performance of the project. Fall. Staff.
Prerequisite: FEG 371 and FEG 363 or equivalent.

489. Forest Engineering Planning (4)
Three hours of lecture and 3 hours of laboratory. A synthesis of the fundamental areas of forest engineering in the planning of the physical development of the forest resources. Specific design studies will be made emphasizing the interrelationship of man, forest resources and their multiple services. These studies will lead to the development and application of planning to simulated realistic conditions. Spring. Staff.

497. Undergraduate Seminar (1)
Literature surveys and seminars on topics of Forest Engineering interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring. Staff.

498. Research Problem in Forest Engineering (1-3)
Independent research in topics in Forest Engineering for the highly motivated undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

563. Photogrammetry I (3)
Two hours of lecture and discussion, 3 hours of laboratory and discussion. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. Fall and Spring. Mr. Brock.
Prerequisite: FEG 271 (or FEG 301 concurrent) or equivalent.

FEN—ENTOMOLOGY (FOREST ENTOMOLOGY)

300. Principles of Forest Entomology (2)
Elements of insect classification, living requirements, and control manipulations that are prerequisite, with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, 3 hours of laboratory field work. Spring. Mr. Allen.

350. Elements of Forest Entomology (3)
Two hours of lecture, 3 hours of laboratory/field work. General classification of insects, morphology, physiology, ecology behavior, and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall. Mr. Simeone.
Prerequisites: FBO 100 and FZO 100.

402. Forest and Shade Tree Entomology (3)
Two hours of lecture, 3 hours of laboratory/field trip. Important forest and shade tree insects; detection, evaluation, prevention and control of their damage; their relation to silviculture and management of forests and shade trees. Spring. Mr. Lanier.
Prerequisite: FEN 350 or FEN 300.

404. Wood Deterioration by Insects (3)
Three hours of lecture, discussion and demonstration. Biology, identification, ecology of insect and wood interrelations; prevention of injury, and control of insects injurious to forest products and wood in use. Spring. Mr. Simeone.
Prerequisite: FEN 350, FEN 300 or consent of the instructor.

432. Insects and Site Planning (1)
Three hours of lecture per week for 4 weeks. An introduction to insect pests of shade trees, other woody ornamentals, wood structures and man; cultural methods for dealing with insect problems. Fall. Mr. Allen and Staff.

450. Forest and Aquatic Insects (2)
The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer (4-week period). Cranberry Lake Field Biology Station. Mr. Lanier.
Prerequisites: Background in botany, zoology, systematics and ecology.

490. Medical Entomology (3)
Two hours of lecture, 3 hours of lab. Study of arthropods affecting man, domestic animals and wildlife with emphasis on their biology, control, and relationship to vertebrate disease. Spring. Mr. Morris.
Prerequisite: A beginning course in biology, entomology, zoology or consent of instructor.

560. Environmental Toxicology of Insecticides (2)
Two hours of lecture. Basis of action of insecticides in living systems, behavior of insecticides and microtoxicants in environment, interaction of insecticides and biological systems. Fall. Mr. Nakatsugawa.
Prerequisite: FBL 330 or equivalent course in physiology or biochemistry.

580. Insect Morphology (3)
Two hours of lecture, 3 hours of laboratory. A comparative study of the external morphology of insects emphasizing evolutionary trends, especially modifications of

homologous structures. Topics of special importance include intersegmental relationships, feeding, sensory mechanisms, locomotion and reproduction. Spring. Mr. Kurczewski.
Prerequisite: FEN 350.

FZO—ZOOLOGY (FOREST ZOOLOGY)

100. General Zoology **(4)**
Prerequisite to all other courses in Forest Zoology. An autotutorial course with 2 hours of lecture and recitation, 4 hours in the learning center. A brief survey of major phyla with emphasis on morphology, taxonomy, evolution and ecology followed by an introduction to the processes of maintenance, perpetuation and adaptation by animal species. The importance of other animals to man and the ecosystem is emphasized. Spring. Mr. Van Druff.

200. Wildlife Conservation **(3)**
Two hours of lecture, 1 hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not designed for students concentrating in the area of Forest Wildlife Management. Fall. Mr. Payne.
Prerequisite: One semester of biological science.

313. Biology of Birds and Mammals **(3)**
A course surveying the taxonomy, anatomical-behavioral-physiological adaptations and natural history of birds and mammals. Techniques for the field study of a vertebrate species will be discussed. fall. Mr. Van Druff.

352. Wildlife Ecology **(3)**
Two hours of lecture, 3 hours of laboratory. A study of the principles governing forest and range wildlife and of the biological mechanisms involved. Spring.
Prerequisite: FBL 320 or permission of instructor.

381. Vertebrate Anatomy Histology Physiology I **(4)**
Three hours lecture, 3 hours laboratory. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on the skeletal, muscle, nerve and endocrine systems. Fall. Mr. Hartenstein.
Prerequisite: General zoology or general biology.

382. Vertebrate Anatomy Histology Physiology II **(3)**
Three hours lecture. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on digestion, metabolism, nutrition, circulation, respiration, excretion and body defense and destructive systems. Spring. Mr. Hartenstein.
Prerequisite: FZO 381 or some other course in anatomy.

383. Vertebrate Anatomy Histology Physiology III. **(1)**
Three hours laboratory. Macroanatomy, microanatomy and physiology of the digestive, metabolic, respiratory, circulatory, urogenital and immunological systems of vertebrates. Spring. Mr. Hartenstein.
Prerequisite: FZO 381, Vertebrate Anatomy Histology Physiology I or FZO 382, Vertebrate Anatomy Histology Physiology II.

411. Invertebrate Zoology **(3)**
Two hours of lecture, 3 hours of laboratory. Structure, classification and evolution of invertebrates. Emphasis on role of specific invertebrates in their natural habitat. Spring. Mr. Mitchell.

416. Ichthyology **(3)**
Two hours of lecture, 3 hours of laboratory. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring. Mr. Werner.

423. Microcommunity Ecology (2)
Note: SUNY Albany, No. BIO 423.
Two full days a week for 4 weeks. Study of terrestrial invertebrate microcommunities; descriptive and comparative assay of microhabitats incorporating experimental and field techniques. Summer Session I, Cranberry Lake Biological Station. Mr. Dindal, College of Environmental Science and Forestry.
Prerequisites: General biology, general ecology; invertebrate zoology is recommended.

424. Vertebrate Ecology (2)
Note: SUNY Albany No. BIO 425.
Two full days a week for 4 weeks. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics, and ecological role of vertebrates; standard field and laboratory techniques. Summer Session II, Cranberry Lake Biological Station. Staff, SUNYA.
Prerequisite: 12 hours of biology.

440. Fishery Biology (3)
Two hours of lecture, 3 hours of laboratory. Principles and techniques of handling fisheries resources in freshwater environments. Fall. Alternate even years. Mr. Ringler.
Prerequisites: FZO 525 and FZO 416 or permission of instructor.

456. Wildlife Ecology and Management I (3)
Two hours of lecture, 3 hours of lab. A study of the ecological principles governing wild animal populations and the relationship of these to manipulation of said populations. Spring. Mr. Chambers.
Pre- or corequisites: FBL 320 and LIB 100.

457. Wildlife Ecology and Management II (3)
Two hours of lecture, 3 hours of lab occasional day-long field trips. A study of wildlife management techniques, management schemes and programs. Fall. Mr. Chambers.
Prerequisites: FZO 456.

470. Principles of Animal Behavior (3)
Three hours of lecture per week. A study of the basic principles of animal behavior, stressing exogenous and endogenous mechanisms of control. Fall. Mr. Price.
Prerequisite: General zoology.

475. Behavioral Ecology (2)
Cranberry Lake Biological Station. Session I. Half time for 4 weeks. Study of the behavioral adaptations of animals to their environment. Emphasis will be placed on animal orientation and social behavior. Habitat selection and interspecific interactions will also be considered. Mr. Price, College of ESF.
Prerequisites: General biology and general ecology.
Note: Credit may not be received for both FZO 475 and FZO 470.

520. Terrestrial Community Ecology (3)
Two hours of lecture, 3 hours of laboratory. Relations of terrestrial animals to their physical, chemical and biological environment. Emphasis on community principles, succession and terrestrial adaptations. Fall. Mr. Dindal.
Prerequisite: A course in basic ecology.

525a. Physical and Chemical Limnology (1)
Modular format, 2 hours of lecture/week for first 7 weeks of fall semester. An introduction to the physics and chemistry of inland waters with particular emphasis on lakes.
Prerequisites: Junior standing, an introductory physics course and an introductory chemistry course. Fall. Mr. Werner.

525b. Introduction to Biological Limnology (1)
Modular format. Two hours of lecture/week for last 7 weeks of fall semester. An introduction to the biology of inland waters. Particular emphasis is placed on the aquatic environment as a habitat and the effect of changes in this environment on the structure and function of the biological communities contained therein.
Prerequisites: FZO 525a. Fall. Mr. Werner.

525c. Limnology Laboratory (1)
One laboratory or field trip/week. An introduction to Limnology techniques and the taxonomy of aquatic organisms. Field trips to local aquatic habitats. FZO 525a and FZO 525b must be taken concurrently or previously. Fall. Mr. Werner.

GFO—GENERAL FORESTRY

032. Orientation (0)
One hour of lecture and discussion per week designed to introduce the freshman student to the College and its academic and social environs. Fall. Mr. Payne and Staff.

GRA—GRAPHICS (LANDSCAPE ARCHITECTURE)

(See also courses listed under EIN and LSA.)

181. Graphics I (2)
Six hours of studio per week. Two 3-hour drafting room periods. Elements of perspective, isometric, oblique and orthographic projection. Practical applications of these principles in machine and architectural drawing, including piping, electrical and plant layouts. Spring.

182. Art Media I (1)
Three hours of studio per week. Studios, group instruction and demonstrations, individual critiques, sketching and drawing from model, from still life and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Fall.

183. Art Media II (1)
Three hours of studio per week. Studio assignments, group instruction, and demonstrations, individual critiques, sketching and drawing from model, from still life and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Spring.

280. Technical Drawing (1)
One 3-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in freehand and instrument drawing. Fall.

284. Art Media III (1)
Three hours of studio per week. Studios, field trips, group instruction, criticism and demonstration, painting in oil, water color and acrylics. A studio painting course in oil, watercolor or acrylics to familiarize and develop color media skills and painting expressiveness. Fall.
Prerequisite: GRA 182 or 183 or permission of instructor.

285. Art Media IV (1)
Three hours of studio per week. Laboratory-Studios, field trips, group instruction, criticism and demonstration; painting, sculpture and other three-dimensional media. A studio course in various three-dimensional art forms and painting. Emphasis on individual experimentation and self-expression. Spatial relationships will be studied through the use of the third dimension, both from standpoint of "enclosure" and "setting." Spring.
Prerequisite: GRA 182 or 183 or permission of instructor.

482. Advanced Media (1-3)
Three hours of studio per week. Discussions, demonstrations, critiques and individual study. Study oriented toward perception and self-expression, use and possibilities of various media, as selected by student and instructor. Fall and Spring.
Prerequisite: Prior art media training or experience and permission of instructor.

LIB—LIBRARY (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSE)

300. Library Research (1)
Two hours of lecture or discussion, 1 hour lab per week in the library, during the first 5 weeks of the semester. Introduction for students at all levels to basic library materials and the research process leading to preparation of a bibliography. Fall and Spring. Staff.

LSA—LANDSCAPE ARCHITECTURE
(See also courses listed under EIN and GRA.)

310. Elements of Landscape Architecture and Environmental Design for Architecture Students (2)
Two hours of lectures, discussions and assigned readings per week. A successive presentation of a landscape architectural philosophy toward the physical environment and environmental design. Presentation of operational systems involved in the physical environment from technical, functional and symbolic points of view. Fall.
Prerequisite: Enrollment in School of Architecture or permission of instructor.

311. Elements of Landscape Architectural Practice for Architecture Students (2)
Two hours of lectures, problems and assigned readings per week. An introduction to the design elements of Landscape Architecture in contemporary application and practice. Spring.
Prerequisites: LSA 310; enrollment in School of Architecture or permission of instructor.

320. Introduction to Landscape Architecture and Design Theory (2)
Two hours of lecture per week. Lecture and class discussion, notebooks, reports, assigned text reading and assigned reserve shelf reading, research reading, weekly quizzes and exams, slides, movies and field trips. Course describes the field of Landscape Architecture, its philosophy, design theory and interdisciplinary relationships. Fall.
Prerequisite: 3rd year status or permission of instructor.

326. Landscape Design Studio I (4)
Nine hours of laboratory and 1 hour of lecture per week. Lectures, studio problems, criticism, quizzes, exams, reports, composing and rendering two- and three-dimensional techniques used to simulate the physical environment. Course presents a theory of abstract design and offers studio time in which to apply theory to graphic problems. Topics presented are the mechanics and terminology of design and the simulation of natural and man-made environments. Fall.

327. Landscape Design Studio II (4)
One hour of lecture, 9 hours of studio per week. Studio assignments, drafting, readings, discussions and field trips. An introduction to the visual-mental concepts basic to landscape architectural design. Various abstract and realistic problems to graphically illustrate elements of the physical environment and their effect upon man. Special attention to the spatial context of these elements and spatial sequences characteristic of the natural and man-made environments. Spring. (Student field trip expense $125—$150.)
Prerequisites: LSA 326, 320 or permission of instructor.

343. Structural Materials and Elements (3)
Three hours of lectures, problems and assigned reading per week. Study of the physical properties of materials and structural elements commonly used in landscape architecture. Topics include elementary statics and strength of materials, wood, metal, plastics, concrete, masonry, retaining walls, dams, foundations. Spring.

345. Elements of Site Engineering (3)
Two hours of lectures and 3 hours of studio per week. Lectures, problems, drafting, modeling and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles, layout plans, and earthwork quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring.
Prerequisites: FEG 271 and EIN 211.

422. Landscape Design Studio III (4)
Twelve hours of studio per week. Studio problems, research, drafting and field trips. The processes and methods of design considerations of variances upon the natural physical environment, ranging from broad regional areas to specific site concerns. Fall.
Prerequisites: LSA 320, 326 and 327 or permission of instructor.

423. Landscape Design Studio IV (4)
Twelve hours of studio per week. Studio problems, research and drafting. Interaction of cultural influences with the physical environment, with attention focusing on the resulting forms. Observations and illustrations of people and places as inputs into the design process. Spring.
Prerequisite: LSA 422 or permission of instructor.

425. Orientation for Experiential Studio (3)
Three hours lecture and recitation. Investigation and documentation of an area of specialres, discussion, readings and research. Fall and Spring.
Prerequisite: Permission of instructor.

432. Plant Materials Culture (1)
Three lectures per week for 5 weeks. Grasses, arboriculture, propagation, transplanting, planting plans and specifications. Fall.
Prerequisite: Permission of instructor.

440. Site Development Systems (3)
Three hours of lectures, problems and assigned reading per week. Study of various engineering systems as they relate to the design and development of land. Topics include pedestrian ways, utilities (water, solid waste, sewage, electric, gas), road location and design, shore protection, swimming pools. Fall.
Prerequisite: Surveying.

490. Social Behavior and the Designed Environment. (3)
Three hours of class per week. Lectures, readings, discussion and project. An examination of the concepts of individual and social behavior in relation to the physical design of the environment focusing on perceptual and cognitive evaluations as determinant of spatial meaning. Fall and Spring.

495. Selected Readings in Environmental Studies (1-3)
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.
Prerequisite: Permission of instructor.

498. Introductory Research Problem (1-3)
Guided study of a selection of problems relating to landscape architecture and environmental design. Emphasis on study procedure and methods employed. Fall and Spring. Staff. Enrollment at periodic intervals throughout the semester.
Prerequisite: Permission of instructor.

522. Landscape Design Studio VI (4)
Twelve hours of studio per week. Studio problems, research, drafting and field trips. Concentration on complex urban problems. Concern for social and psychological considerations of the individual and large groups of people, their interaction and resultant forms of the environment. Spring.
Prerequisite: Permission of instructor.

524. Experiential Landscape Studio Design (16)
48 hours per week. The articulation of the study proposal established in LSA 425, as approved by faculty, through research, readings, field study with graphic and written documentation, and group discussion. Academic study in an off-campus location in an area of landscape architectural significance, as described and delineated in a student-prepared proposal approved by the faculty. Not available for Graduate Credit. Fall or Spring.
Prerequisites: LSA 425 or equivalent and LSA 423 or permission of instructor.

525. Landscape Design Studio VI (4)
Twelve hours of studio per week. Investigation of a problem in landscape architecture as proposed by the student and conducted in conjunction with faculty advisor. Spring.
Prerequisite: Permission of instructor.

527. Landscape Design Studio VI (4)
Twelve hours of studio per week. Studio problems, research, reports, and field trips. Concentration on regional landscape problems, the techniques of their analysis and derivation of their significance to the practice of landscape design. Spring.
Prerequisite: Permission of instructor.

529. The Major Elements of Environmental Design (3)
Lectures, readings, discussions and studios. The course presents an introductory survey of environmental design methods and associated skills and techniques. While studio work is part of the course, no design background is required. Fall.

530. Herbaceous Plant Materials (2)
Two hours of lectures, study problems, assigned readings and field trips per week. Identification, understanding and design use of nonwoody plants. Fall.
Prerequisite: Permission of instructor.

532. Woody Plant Materials (3)
Three hours of lecture per week. Field study, lectures, slide presentations and readings. An elective course providing opportunity for extension of basic knowledge in the identification and design of woody plant materials in professional practice. Fall or Spring.
Prerequisites: LSA 533 and LSA 432 or permission of instructor.

533. Plant Materials (3)
Field trips and discussion. Ornamental woody plant identification. Observation and sketches of outstanding examples of planting design. Three weeks. Summer Session.
Prerequisite: Permission of instructor.

542. Highway Location and Design (3)
Two hours of lecture, 3 hours of studio per week. Lectures, assigned reading, studio projects, field trips. Environmental, engineering and human factors which determine highway location and design, particularly as they relate to landscape architectural concerns. Location, alignment, geometric design, drainage, roadbed construction, pavements, roadside development. Fall or Spring.
Prerequisites: LSA 343 and 440 or permission of instructor.

545. Professional Practice Studio II (2)
Three hours of studio, 1 hour of recitation per week. Studio problems, research, discussion and recitation sessions on the processes and methods of office practice. Emphasis on all aspects of site-development. Spring.
Prerequisite: Permission of instructor.

547. Principles of Professional Practice **(2)**
Two hours of lecture per week. Lectures, assigned readings, reports, cost estimates, specifications, contracts, professional ethics, registration laws, professional practice. Spring.
Prerequisite: Upperclass standing.

562. Architecture **(3)**
Two hours of lecture, 3 hours studio. Discussion and investigation of the principles of architectural design and procedures of architectural practice. Functional building systems coupled with site and program considerations as to their relative impacts on architectural form. Spring.
Prerequisite: Permission of instructor.

595. Selected Reading in Landscape Architecture **(1-3)**
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.
Prerequisite: 5th year status or permission of instructor.

597. Landscape Architecture Seminar **(3)**
Three hours of seminar per week. Discussion of current social, political, cultural and technological problems as to their relationship to the physical environment. Fall and Spring.
Prerequisite: Permission of instructor.

598. Research Problem **(1-3)**
Independent study of selected areas of environmental interest. Emphasis on a self-disciplined study, development of procedures and techniques to be employed in environmental design and planning. Engagement with specific sites and problems as proposed for study by individual communities. Fall and Spring. Enrollment at periodic intervals throughout the semester.
Prerequisite: Permission of instructor.

MAT—MATHEMATICS (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES)

115. Plane Trigonometry **(3)**
Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle complex numbers, logarithms, and accuracy of computed results. Fall or Spring. Mr. Green.

116. College Algebra **(3)**
Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. Fall or Spring. Mr. Green.

PSE—PAPER SCIENCE AND ENGINEERING

300. Introduction to the Pulp and Paper Industry **(3)**
Discussion of the historical modern development and management of the paper industry. Fall.

301. Pulp and Paper Processes **(3)**
Three hours of lecture. Introduction to pulp and paper technology with emphasis on pulping and bleaching. A study of the processes of pulping and bleaching of fibers including

underlying theory. An introduction to formation and reactions of a fibrous web. Spring. Mr. Bambacht.

Prerequisites: CHE 332, FCH 475 and 576.

302. Paper Processes Laboratory (1)

One 3-hour laboratory. Study and practice in the techniques of laboratory procedures normally encountered in the pulp and paper industry. Laboratory exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring. Mr. Bambacht.

Prerequisite: PSE 301 (or concurrent).

304. Mill Experience (2)

Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Staff.

305. Mill Inspection Report (1)

One week inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are approximately $60 per student. Spring. Staff.

Prerequisites or concurrent: PSE 301, 302 and 370.

370. Principles of Mass and Energy Balance (3)

Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Spring. Mr. Gorbatsevich.

Prerequisites or concurrent: MAT 227, Physics, CHE 346, CHE 356 and CHE 333.

456. Economics of Pulp and Paper (2 or 3)

Two or 3 hours of lecture and seminar. Structure and development of the industry and the decisions of management are explained in the light of economic principles. Current industrial trends and problems are discussed. Each student prepares an analytical report on some aspect of industry structure. Spring. Mr. Armstrong.

Prerequisite: ERM 204 or equivalent.

461. Pulping Technology (4)

Two hours of lecture and 6 hours of laboratory. Discussion of pulping and bleaching processes: Effect of chemicals and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall. Mr. Gorbatsevich.

Prerequisites: PSE 370, CHE 346 and CHE 356.

Note: A student may not enroll in or receive credit for both PSE 461 and PSE 661.

465. Paper Properties (5)

Three hours of lecture, 6 hours of laboratory and discussion. Evaluation and study of the physical, opticaliand chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results and the ultimate properties desired in the finished paper. Fall.

Prerequisites: PSE 301, PSE 302.

Note: A student may not enroll in or receive credit for both PSE 465 and PSE 665.

466. Paper Coating (3)

Two hours of lecture, 3 hours of laboratory. Evaluation and study of the various coating processes and materials used by the paper industry to impart special properties to paper. Relationships of various components, flow properties of coating mixtures and evaluation of their effect on coated paper properties will be studied. Spring.

Prerequisite: PSE 465.

Note: A student may not enroll in or receive credit for both PSE 466 and PSE 666.

468. Papermaking Processes (3)
One hour of lecture, 6 hours of laboratory. Laboratory study of the papermaking process, with emphasis on operation of the semicommercial Four-drinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished product and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring. Messrs. Gorbatsevich and Stenuf.
Prerequisites: PSE 461 and PSE 465.

PSE 491. Paper Science and Engineering Project I (1)
Student makes a systematic survey of all available literature on the problem assigned him and incorporates it in a formal, typewritten report. An essential part of this report is a detailed outline of a research project (PSE 492) which the student proposes to undertake during the next semester.
Prerequisites: PSE 300 and 301.

PSE 492. Paper Science and Engineering Project II (3)
The analysis of a problem, the synthesis of a solution, and the basic design of the facilities needed to solve the problem. Laboratory research, field work, and consulting as needed in addition to the literature survey completed in PSE 491. Progress reports and a final report and seminar-style presentation.
Prerequisite: Senior standing in PS and E.

496. Special Topics (1-3)
Lectures, conferences and discussions. Specialized topics in chemistry, chemical engineering and physics as well as topics pertaining to management as related to the pulp, paper, paperboard and allied industries. Spring. Staff.

498. Research Problem (4)
Twelve hours laboratory. The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique rather than on discovery of results of commercial importance. The information obtained in the literature survey along with the data developed as a result of the investigation is assembled and evaluated and submitted in duplicate to his instructor. Spring. Staff.
Prerequisites: PSE 461 and PSE 465.

575. Unit Operations I: Fluid Mechanics and Heat Transfer (3)
Three hours of lecture and 4 hours of recitation per week for the first 9 weeks of the semester. The study of momentum and heat transfer. Pipeline and duct design, pump and blower selection, flow measurement, open channel flow, heat transfer by conduction, convection, radiation, including equipment design and selection. Fall. Mr. Stenuf.
Prerequisites: FCH 221 and 223, CHE 106, 116, 346, 356, PHY 103, 104, PSE 300, 301, 370 or equivalents.

576. Unit Operations II: Process Control and Mass Transfer (2)
Two hours of lecture and 4 hours of recitation per week for the last 6 weeks of the semester. The study and application of measuring means, remote signal transmission, and control elements. Response to signals, lag, dynamic error, cycling and other phenomena of process control are discussed in relation to the standard modes of control, including two-position, single-speed floating, proportional, proportional-speed floating, proportional-reset, proportional-reset-rate, cascade control, relation of the process variables to open and closed loop computer applications.
The fundamentals of mass transfer, humidification and air conditioning as applied to industry and as found in the environment—climate and weather conditions. Fall. Mr. Stenuf.
Prerequisite: PSE 575.

578. Unit Operations III: Mass Transfer (3)
Three hours of lecture and 4 hours of recitation per week for the first 9 weeks of the semester. The study of mass transfer and application to the design and operation of equipment for drying, gas absorption, distillation and extraction. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.
Prerequisite: PSE 576.

579. Unit Operations IV: Recovery Processes Operations (2)
Three hours of lecture and 4 hours of recitation per week for the last 6 weeks of the semester. The study of industrial recovery processes operations including evaporation, filtration, sedimentation, centrifugation, small particle technology and fluidization, and reverse osmosis. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.
Prerequisite: PSE 576.

RMP—RESOURCE MANAGEMENT AND POLICY

588. The Law of Natural Resource Administration (3)
Three hours of lecture and discussion. An introduction to the law concerning the procedures, powers and judicial review of public agencies responsible for the management of natural resources. Topics will include the extent of an agency's rulemaking power and the rights of aggrieved parties to appeal from agency decisions. Spring. Mr. Horn.
Prerequisite: ERM 460 or equivalent course in public administration.

SIL—SILVICULTURE

553. Energy Exchange at the Earth's Surface (3)
Two hours lecture and 3 hours of laboratory. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphers. Primary emphasis on the turbulent transfer of heat, momentum and water vapor and the expression of these fluxes in the microclimate. Spring. Mr. Herrington.
Prerequisite: ERM 452, physics and calculus.

WPE—WOOD PRODUCTS ENGINEERING

300. Properties of Wood for Designers (2)
Two hours of lecture. An introduction to the basic structure and properties of wood for the designer. Discussion of the effects of wood structure and properties on practical woodworking techniques. Fall and Spring. Staff.

302. Elementary Timber Mechanics (3)
Two hours of lecture, 3 hours of laboratory. Introduction to strength properties of wood, and wood products and other construction materials. Applications of these materials in typical construction problems. Fall. Mr. Kyanka.
Prerequisite: Senior standing or permission of instructor.

320. Polymeric Adhesives and Coatings (2)
Two hours of lecture a week. An introduction to organic adhesives and coatings for the purpose of being able to specify proper materials for particular applications. Knowledge acquired will allow the individual to understand product literature and specifications. Wood product systems are discussed in detail, but the principles involved are easily transferred to other substrate systems. A knowledge of chemistry is not required. Spring. Mr. L. Smith.
Prerequisites: Junior standing.

321. Adhesives and Coatings Laboratory (1)
Three hours of laboratory a week. Laboratory experiments to identify materials, methods of application and methods of evaluation of adhesives and coatings normally used in the wood industry. Spring. Mr. L. Smith.
Prerequisites: WPE 320 (may be concurrent) or permission of instructor.

322. Mechanical Processing (3)
Two hours of lecture, 3 hours of laboratory. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall. Mr. Moore.

326. Fluid Treatments (2)
Two hours of lecture. An introduction to wood-moisture relationships, wood permeability and pressure treatments, thermal conductivity, water-vapor movement and drying, and fire retardancy. The flow of fluids, heat and water vapor are treated as analogous phenomena and are related to the cellular structure of wood. Unsteady-state flow of gases, heat and water vapor are introduced. Spring. Mr. Siau.
Prerequisites: Junior status.

327. Fluid Treatments Laboratory (1)
Three hours of laboratory a week. Laboratory studies in relative humidity measurement, wood-moisture relationships, the relationship between permeability and treatability, wood-preservative treatments, wood drying and flame testing. Spring. Mr. Siau.
Prerequisites: Junior status, concurrently with WPE 326.

360. Engineering Materials (3)
Two hours of lecture and one 3-hour laboratory a week. An introduction to the study of materials science emphasizing the structure and properties of materials used in the construction industry in general. Lab work includes fabrication, testing and evaluation of actual systems. Spring. Staff.
Prerequisites: Junior standing, physics, chemistry and engineering mechanics.

362. Timber Mechanics (4)
Three hours of lecture and 3 hours of laboratory second semester. Mechanical properties of wood and elements of structures. Lectures, problems, and use of timber-testing equipment. Spring. Mr. Kyanka.
Prerequisites: Calculus, physics.

386. Elementary Wood Technology (2)
One hour of lecture, 3 hours of laboratory. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U.S. timber by gross feature. Spring. Mr. De Zeeuw and Staff.

387. Wood Structure and Properties (4)
Two hours of lecture, 6 hours of laboratory. Identification variability and anatomical characteristics of wood and papermaking fibers. Uses, properties and sources of wood and fibers. Structure of wood in relation to defects, properties and uses. Fall. Mr. De Zeeuw and Staff.
Prerequisite: FBO 100 or consent of instructor.

390. Field Trip (2)
Two weeks supervised study and reporting of representative wood products industries. Spring. Staff. Required of all students in WPE. Estimated individual expenses are $100—$150 while on the trip.

400. Introduction to Forest Products (2)
Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. Fall.

404. Design of Wood Structural Elements (3)
Lectures plus laboratory exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall. Mr. Kyanka.
Prerequisite: WPE 362.

422. Composite Materials (3)
Two hours of lecture, 3 hours of laboratory. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites, and extruded and molded products. Fall. Mr. Moore.
Prerequisites: WPE 320, and WPE 326. Concurrent or prior registration in WPE 362 or 302.

442. Light Construction (3)
Two hours of lecture, 2 hours of discussion, problems and practice. Elements of light frame construction, blue print reading, and estimating. Fall and Spring. Mr. G. Smith.

444. Materials Marketing (3)
Three hours of lecture and discussion. Marketing functions, agencies and management in the wood products and related industries. Principles of salesmanship and their application. Spring. Mr. G. Smith.

450. Construction Equipment (3)
Three hours lecture. Principles of selection, operation and maintenance of construction equipment. Primary types of site preparation, handling and assembly devices and their efficient utilization will be examined. Spring. Mr. Kyanka.
Prerequisite: Senior standing.

454. Construction Management (3)
Two hours lecture, 3 hours of laboratory. Conception, management and control of the construction processes with emphasis on specifications, costs, legal boundaries, erection planning and control, inspection and supervision. Spring. Mr. Whitt.
Prerequisite: Senior standing.

470. Production Systems I: Analysis (3)
Two hours of lecture, 3 hours of laboratory. Elements of system engineering. Analysis of performance characteristics of integrated production systems. Analysis of long-range vs. short-range system planning. A comprehensive lab problem is commenced which deals with the analysis prerequisite to the establishment of a manufacturing plant in a wood-processing industry. Fall. Mr. Whitt.
Prerequisites: Senior status and INE 548, APM 491, and concurrent registration in INE 575 or equivalent.

472. Production Systems II: Synthesis (3)
Two hours of lecture and 3 hours of laboratory. Organization for production. Manufacturing engineering and production planning and control. Plant layout and materials handling. A comprehensive problem of production system synthesis is carried out in a succession of lab exercises oriented toward a wood-processing industry. Spring. Mr. Whitt.
Prerequisite: WPE 470 or equivalent.

497. Senior Seminar for Wood Products Engineering Majors (2)
Discussion and assigned reports in current problems and new developments in wood products engineering. Fall. Staff.

498. Research or Design Problem (1-3)
Conferences, library, laboratory, and/or field research on a specific problem in wood products engineering. Typewritten report (original and one copy) required. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

596. Special Topics (1-3)
Lecture, conferences, discussions and laboratory. Special topics in Wood Products Engineering including techniques in scientific photography, microscopy, laboratory instrumentation, and computer applications as well as other topics of departmental interest. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

SYRACUSE UNIVERSITY COURSES REQUIRED IN COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY CURRICULA

ACC—ACCOUNTING

204. Financial Accounting Systems (3)
Fundamentals of financial accounting systems are described and applied to business organizations. Topics include: the recording process, income determination, asset valuation, financial statements, funds statements, ratio analysis and use of financial accounting information for decisionmaking.

252. Introdudction to Managerial Accounting (3)
Financial information for internal managerial decisions and decisionmaking are discussed. Topics include: Introduction to capital budgeting, methods of increasing equities, management of working capital, operating budgets, cost analysis, product costing, variance analysis and financial control system.
Prerequisite: ACC 204 or equivalent.

ARC—ARCHITECTURE

294. Introduction to Architecture (3)
A continuation of ARC 293 which is a survey of the background and influences relating to architecture.

LPP—LAW AND PUBLIC POLICY

355. Introduction to the Legal System (3)
The law as an instrument of social control. An understanding of peoples' rights and duties is developed through a study of basic legal concepts, procedures and reasoning.
Prerequisite: Junior standing or permission of instructor.

557. The Law of Commercial Transactions (3)
The legal aspects of commercial transactions are studied, with special attention given to contracts, the sale of goods, the use of commercial paper, the treatment of security, and the protection of consumers.
Prerequisite: LPP 355 or permission of instructor.

CHE—CHEMISTRY

106, 116. General Chemistry Lecture (3)
Fundamental principles and laws underlying chemical action; states of matter, atomic and molecular structure, chemical bonding, stoichiometry, properties of solutions, chemical equilibrium and introduction to thermodynamics. CHE 107 and 117 or 129 and 139 must be taken concurrently.

107, 117. General Chemistry Laboratory (1)
Open to students in CHE 109 and 119 or CHE 106 and 116. An experimental study of basic principles and techniques of chemistry. The states of matter, determination of formulas and molecular weights, simple volumetric and gravimetric analysis, heats of reaction. Studies of equilibrium, rates of reactions and qualitative analysis.

332. Quantitative Analysis, I and II (2)
The fundamentals of gravimetric and volumetric analysis. Two lectures per week. CHE 333 must be taken concurrently; it is recommended that CHE 326 also be taken concurrently.
Prerequisite: CHE 285.

333. Quantitative Analysis Laboratory, I and II (1-2)
Laboratory to accompany CHE 332. Must be taken for 2 credits by all chemistry majors.

346. Physical Chemistry, I and II (3)
The properties of gases, liquids and solids. Elementary thermodynamics and chemical equilibrium. Three lectures per week.
Prerequisites: One year of college physics and differential calculus.

356. Physical Chemistry, I and II (3)
Solutions, electrochemistry, kinetics and elementary statistical thermodynamics. Three lectures per week.
Prerequisite: CHE 346.

357. Physical Chemistry (1 or 2)
Experimental techniques of physical chemistry and error analysis. Measurement of molecular weights, reaction rates, heats of reaction, equilibrium constants, spectroscopy. One or two laboratory periods. CHE 346 and 356 are either prerequisites or corequisites.

434. Instrumental Methods, I and II (2)
The theory and application of instrumental techniques to the solution of chemical problems. Two lectures per week. CHE 435 must be taken concurrently.
Prerequisites: CHE 332, 333, and 356.

435. Instrumental Methods Laboratory, I and II (1-2)
Laboratory to accompany CHE 434. Must be taken for 2 credits by all chemistry majors.

CIE—CIVIL ENGINEERING

325. Mechanics of Deformable Bodies (3)
Theories of stress, deformation and stability of elastic and nonelastic bodies subjected to various force systems.
Prerequisites: MEE 225 and MAT 398 (the latter may be taken concurrently).

326. Engineering Materials (3)
Study of the atomic, molecular and crystalline structures of solid engineering materials. The explanation and interpretation of physical, mechanical and electrical properties of materials based on these structures. Two 1-hour lectures and one 2-hour laboratory per week.
Prerequisite: CIE 325 or permission of instructor.

327. Principles of Fluid Mechanics (4)
Dimensional analysis; hydrostatics; equations of motion; Bernoulli's equation; Euler's momentum theorem; one-dimensional analysis; velocity potential; stream function; laminar viscous flow; Reynolds' stresses; isentropic flow.
Prerequisites: MAT 398, MEE 226.

437. Soil Mechanics and Foundations I (3)
Study of the formation and composition of soil. Concepts of soil mechanics, including hydraulic and mechanical properties. Two lectures and one laboratory per week.
Prerequisites: CIE 325, 327.

ELE—ELECTRICAL ENGINEERING

221. Electrical Science I (3)
Introduction to electric and magnetic field and circuit concepts; resistance and diode circuits; network reduction using techniques like Thevenin's theorem; elements of transient and steady state circuit analysis.
Prerequisites: MAT 295, 296, PHY 103, 104.

222. Electrical Science II (3)
Mathematical description of electric and magnetic fields; elements of electromechanical conversion; analysis and design of simple electronic circuits, with emphasis on semiconductor diodes and transistors.

FIN—FINANCE

355. Money and Banking (3)
Introduction to general principles of money and banking, including organization and control of the banking system, commercial bank functions and operations, organization and operation of the Federal Reserve System, and monetary theory and policy.
Prerequisite: ECO 205.

GOL—GEOLOGY

101. General Geology (3)
Introduction to chemical, physical and biological processes and principles affecting the history and development of the earth. Lectures, laboratory and field trips.

105. Earth Science (3)
An introduction to earth science providing an integrated approach to the study of the solid earth, continental surfaces, atmosphere and oceans. Lectures, no laboratory, no prerequisite, not for geology majors.

INE—INDUSTRIAL ENGINEERING

548. Engineering Economic Analysis (3)
Deals with the economic factors of engineering decisions: the "will it pay?" aspect of engineering. Study of comparisons between old and alternative proposed economic plans from an engineering economy viewpoint involving consideration of management, materials, design, machine selection.
Prerequisite: Junior standing.

575. Industrial Methods and Systems Engineering (3)
Study of man-machine relationships, workplace design, process selection with emphasis on production subsystems, and automation. Special topics include measurement of human and machine activity, flow analysis, line balancing, feedback systems and control theory.
Prerequisites: INE 525 and 332, or equivalent.

MAR—MARKETING MANAGEMENT

355. Marketing and Society (3)
An analytical study of marketing as a major business function and a social process. Introduces analysis of market forces; marketing opportunities; determination of price, product, distribution, promotion and organization policies required to control and fulfill planned marketing programs.

MAT—MATHEMATICS

015. Plane Trigonometry (3)
Prerequisites: One year plane geometry and 1½ years algebra. No credit given if taken in high school. Will not satisfy Arts and Sciences group requirements.

016. College Algebra (3)
Prerequisite: One year of plane geometry and 1½ years algebra. Will not satisfy Arts and Sciences group requirements.

125. Elementary Analytic Geometry (3)
A study of geometry by algebraic means with emphasis on representation of lines, conics and other curves by equations; polar coordinates; parametric equations; solid analytic geometry.
Prerequisites: MAT 015 and 016 or equivalent.

226. Differential Calculus (3)
Limits; derivatives of algebraic and transcendental functions; applications to maxima and minima problems, curve tracing and rates of change; differentials.
Prerequisite: MAT 125.

227. Integral Calculus (3)
Law of the mean, definite and indefinite integrals, techniques of integration, geometric and physical applications.
Prerequisite: MAT 226.

328. Topics in Calculus (3)
Improper integrals, indeterminate forms, infinite series and expansion of functions, partial differentiation with applications, multiple integrals.
Prerequisite: MAT 227.

585. Higher Mathematics for Engineers I (3)
Solution of ordinary differential equations, including series solution; vector algebra and calculus, line and surface integrals, integral theorems; expansion in Fourier series.
Prerequisite: MAT 328 or 398.

MEE—MECHANICAL ENGINEERING

225. Engineering Mechanics (4)
Fundamental concepts; elements of vector algebra; forces, moments, equivalent systems; free-body diagrams. Statics and dynamics of particles, systems of particles and rigid bodies; translation, rotation, plane motion. Centroids, centers of mass, moments of inertia. Impulse-momentum, work-energy methods.

226. Engineering Mechanics (3)
Continuation of MEE 225. D'Alembert's principle. Kinematics of moving reference frames, Coriolis acceleration. Three-dimensional rigid-body dynamics; the gyroscope. Introductions to orbit theory and vibration analysis. Selected additional topics in dynamics.
Prerequisite: MEE 225 or permission of instructor.

351. Fundamentals of Thermodynamics I (3)
Basic concepts and methods in engineering thermodynamics. The laws of thermodynamics and their implications in mechanical, chemical, electrical and magnetic systems. Properties of solids, liquids and gases, including perfect gases and mixtures thereof.

PHY—PHYSICS

103 and 104. General Physics (4)
Basic course dealing with the fundamental principles of physics. Lectures with demonstrations, discussion, recitations and laboratory. The first semester covers the fields of mechanics, heat and sound; the second semester, electricity and light.
Prerequisite: Course in trigonometry, or trigonometry as a parallel course.

211/212. General Physics for Science Students, I, II (4)
An advanced level introductory course that makes use of calculus methods. First semester: mechanics, heat and sound. Second semester: electricity and magnetism, light and some atomic physics. Lectures, recitations, and laboratory.
Corequisite: MAT 295 or equivalent.

361. Introduction to Modern Physics (3)
Recent developments, including atomic theory, quantum theory, electronic structure of atoms and molecules, radioactivity and structure of the nucleus.
Prerequisites: PHY 103 and 104 or equivalent.

PAD—PUBLIC ADDRESS

215. Public Speaking (3)
Application of the principles of informing, interesting and motivating an audience; emphasis upon selection, organization and development of ideas. Students deliver, listen to and criticize expository and persuasive speeches. No prerequisite. Required of all students in the School of Speech and Dramatic Art. To complete a year in public address, students should elect PAD 235 or 535.

Summer Attendance

A wide array of courses at the undergraduate and graduate levels is available to College of Environmental Science and Forestry students in the Syracuse University summer sessions. Research problems, theses, and special courses regularly available at the College may also be taken during the summer sessions. Syracuse University courses taken must be an integral part of the student's planned program and *be approved by his faculty advisor.*

Transfer students are advised to review their special course needs with the Office of Admissions and to consider summer attendance where completions of background courses in mathematics, chemistry, economics, or general education subjects are necessary for fall semester entry in full standing. Information on courses available on the Syracuse campus, session dates, and registration procedures are available upon request from the Office of Student Affairs or the Office of Graduate and Instructional Affairs at the College. Summer session tuition charges at the College for New York State residents are $21.50 for undergraduate lower level students, $26.75 for undergraduate upper level students, and $40.00 for graduate level students per credit. Tuition charges for non-residents of New York State are correspondingly $35.75, $43.50, and $50.00 per credit.

SUMMER FIELD PROGRAMS

Program in Field Forestry

Charles Lathrop Pack Demonstration Forest
Warrensburg Campus
Warrensburg, New York

A five-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted twice each summer at the Pack Demonstration Forest near Warrensburg, New

York. These sessions are coordinated with the Syracuse University summer sessions, permitting students to attend an on-campus session and a field session in the same summer. The courses presented in the field forestry program are listed in both the forest biology and resources management curricula sections. Room, board, and fee charges approximating $175 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the junior year. *Transfer students* planning to enroll in either the resources management or forest biology curriculum should write to the Director, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the field forestry program is required of students in resource management prior to the fall term of their junior year. Students in forest biology are also required to attend either this program or the program at Cranberry Lake Biological Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

Program in Environmental Biology

Cranberry Lake Biological Station
Charles Lathrop Pack Demonstration Forest
Cranberry Lake Campus
Cranberry Lake, New York

The Summer Program in Environmental Biology provides graduate students and undergraduate biology majors with the opportunity to continue their studies and research at a lake-and-forest field station in the summer. Qualified students from other institutions are welcome and are encouraged to attend.

Cranberry Lake and its environs are ideally suited for an advanced biology summer program. The surrounding topography is rolling hill and lake country dotted with numerous small ponds, closed bogs, and stream drainages. The lake itself is the third largest body of water in the Adirondacks. Because eighty percent of the shoreline is in State ownership, the lake remains relatively unspoiled by recreational developments and is free of pollution problems. Much of the original forest cover in the region was harvested years ago; today a rich variety of community types occupy those sites as the vegetation reverts again to the natural forest condition. The remaining virgin forests also provide the student with many examples of stable forests, each type reflecting the particular environmental conditions controlling forest development. A wealth of wildlife parallels the variety of cover types over the region. The area is centrally located providing easy access to a wide range of additional ecosystems ranging from bog to alpine types.

Facilities include four classroom-laboratories; dining facilities capable of serving 150; faculty quarters and cabins; an administration building; 12 cabins housing 6-8 students each; a recreation hall; and several smaller, supporting buildings.

The eight-week program extends from late June into mid-August and is divided into two four-week sessions. Courses are taught in blocks of two-day units, permitting concentrated study without hourly interruptions. These courses are designed to emphasize and effectively utilize the unique nature of this Adirondack setting and include the ecology of plants, invertebrate and vertebrate animals, in such diverse offerings as aquatic ecology, bryophyte ecology, insect ecology, vertebrate ecology, micro-community ecology, ornithology, forest communities, ecological measurements, forest pathology and limnology. The offerings vary from year to year, and interested students should contact the Director, Cranberry Lake Biological Station, State University of New York College of Environmental Science and Forestry, Syracuse, New York 13210 for additional information.

Forest Technician Program

THE PROGRAM

In 1912, some 1800 acres of land in the Adirondack Mountains were donated as a site for the development of a Ranger School by the College. Since that time, the forest technician program has trained more than 2,600 graduates, most of whom are now working in a variety of nationwide forest activities, and has earned the School a national reputation for excellence.

The 2-year curriculum trains students as forest technicians. The degree of Associate in Applied Science in Forest Technology (A.A.S.) is awarded upon the successful completion of the curriculum. The objectives of the curriculum are to provide students with a knowledge of the field practices of forestry as related to forestry managerial needs; the ability to work and communicate effectively with professional and paraprofessional forestry personnel; and an understanding of the sciences and practices of forestry with some emphasis on ecological applications.

Graduates are generally classified as forest technicians or forestry aides in initial employment positions. Forestry agencies and wood-using industries employ forest technicians as an important part of their forest management teams, usually as the "men on the ground" who plan and execute the field practice of forestry.

Since this curriculum is structured as a terminal, 2-year program at the paraprofessional level, students interested in a professional degree in forestry are advised to enroll initially in one of the College's 4-year undergraduate programs.

The freshman year of the forest technology curriculum consists primarily of general studies' courses which may be taken on the Syracuse Campus or at accredited community and junior colleges and agricultural and technical institutes.

The second year of the curriculum is taken at the College's Ranger School on the Wanakena Campus. Presented in a varied forest environment, the curriculum's emphasis is on practical field training and on the relationships between forest technology and managerial needs. Fifty percent of the studies is devoted to field exercises, most of which are held in the School's forest. This rolling belt of managed forest, containing both hardwood and coniferous species, covers an area some 3½ miles long with widths varying from 6/10 to 2¼ miles. On two sides the forest

is bounded by State Forest Preserve Lands. The forest is also adjacent to an area of several square miles of virgin timber within the Adirondack Forest Preserve. This excellent forest backdrop for the technology program provides a most diverse laboratory for instructional purposes.

Since the Ranger School is situated within a forest environment, some applicants to the forest technology program may mistakenly believe that the program is one of forest lore and wilderness survival. It is, therefore, strongly emphasized that the forest technology curriculum demands high quality academic achievement. Students cannot complete the program without concentrated and consistent study. Courses are offered in eight-week modules. Classes are scheduled from 8 a.m. to 5 p.m., Monday through Friday, with classroom and laboratory or field time equally divided. The intensity of the program normally requires a minimum of 70 hours a week of evening and weekend study, daily classes, and laboratory/field exercises. Several short trips, at no additional expense to the student, are made during the year in connection with courses in logging, forest recreation, forest mensuration and silviculture. A longer trip of seven days' duration emphasizing regional forestry practice is sponsored during the spring semester of the second year. Students must bear their proportionate share of the cost of this field trip which consists primarily of plane fare, lodging and meal expenses.

LIFE AT WANAKENA

The Wanakena Campus of the College of Environmental Science and Forestry is located on the banks of the Oswegatchie River near the picturesque hamlet of Wanakena. Approximately 65 miles northeast of Watertown, New York, and 35 miles west of Tupper Lake, New York, the School's buildings and its surrounding forest border on Cranberry Lake.

The main School building consists of a central service unit with dormitory wings on either side. The central unit contains classrooms, laboratories, library, a student lounge, faculty offices, the library, a kitchen, dining room and 47 student rooms, each housing two students.

Faculty living quarters are nearby on the campus. Other buildings include a maintenance shop, garages, a sugar house and storage buildings.

The close proximity of faculty offices and student quarters and the intensive field-work pattern enables students to consult easily and frequently with the faculty. The School considers this traditional close student-faculty association to be of major benefit in its training program.

A small library of approximately 1,500 volumes consists of highly specialized materials required for the teaching and study programs of the School.

Students taking the second year of the forest technology curriculum at the Wanakena Campus are required to live in the School's dormitories. An exception may be made for married students who may bring their families and rent their own private accommodations in the vicinity of the Wanakena Campus. Such accommodations are not plentiful. It is

recommended that each married student arrange rental arrangements well in advance of the registration date.

The Wanakena Campus does not maintain an infirmary, nor does it have on its staff a physician or nurse. There are two physicians and a dentist available in the immediate area as well as an excellent Community Hospital in nearby Star Lake, New York. In emergency situations, the School transports the sick or injured student to the local physician of his choice or to the hospital. Furthermore, there is no student accident or sickness insurance plan available through the Wanakena Campus, so that it is strongly suggested that the student consider such coverage before reporting to the Campus.

Because of the comparatively isolated location of the Wanakena Campus, a stock of books and supplies used in connection with the second year of the program is maintained on campus for sale to students.

During the first year of the program, College-enrolled students will be guided by the rules and regulations that govern their attendance at the Syracuse Campus. During the Second year of the program, students will be guided by the general rules and regulations for all College students and an additional set of Wanakena Campus "house rules" that supplement the College's general rules and regulations.

ADMISSION

Admission Requirements

Admission requirements for entrance into the forest technology curriculum are generally the same as for the other curricula of the College of Environmental Science and Forestry. Minimum requirements are 16 Carnegie high school units along this pattern: English, 4; history (social science), 2; science, 2 (one must be chemistry or physics); mathematics, 3 (including trigonometry or Math 11); and electives. Mechanical drawing and typing are strongly suggested electives.

An applicant must submit the test results of any one of the following: New York State Regents Scholarship Examination, College Entrance Examination Board (CEEB), Scholastic Aptitude Test (SAT), or American College Test (ACT).

The Director of Admissions may waive some of the above requirements under special circumstances.

In addition to the above-listed requirements, the following requirements must be met by all applicants:

1. The applicant must be strongly motivated toward a career as a forest technician.
2. The applicant must be aware of and willing to accept the work requirements of this field-forestry program and its strenuous physical demands.
3. The applicant's parents (if the applicant is under 21 years of age) must be fully aware of the field nature of the study program, its rigorous study-work regime and supporting academic facilities.
4. A full medical examination report must be submitted.

Admission Procedures

The decision to admit any student to the Forest Technician Program rests solely with the College of Environmental Science and Forestry. Most openings in the program are filled by students who received conditional acceptances while still seniors in high school, contingent on successful completion of the first year of college. Remaining openings are filled by transfer students who have already attended college. Therefore, it is suggested that the potential forest technician student apply while still a high school senior. Transfer admission at a later date is still possible for those not conditionally accepted in high school.

There are two procedures:

1. Seniors in high school who wish to spend the first year of the forest technician program on the Syracuse Campus should submit the regular freshman application (S-1) with supplemental forms to the College, using Curriculum Code 620 (Forest Technology).
2. Seniors in high school who wish to attend the first year of studies at another college (e.g., a community college), and the second year on the Wanakena Campus should: a.) Submit a regular freshman application (S-1) with supplemental forms to the College of Environmental Science and Forestry, using Curriculum Code 620 (Forest Technology). On one of the supplemental forms the student can indicate what school has been chosen for the first year. b.) Submit a regular application to the school selected for the first year of studies, using Curriculum Code 620.

Transfer Students

Students with previous college experience or who are currently enrolled at another college may apply for transfer. Courses transferred for credit must be appropriate to the freshman year course of studies and comparable in subject matter content and level. No transfer credit will be allowed for the second year courses taken at the Wanakena Campus. Transfer applicants must submit a recent official copy of their college transcript and a list of courses they anticipate completing prior to enrollment.

Students spending the first year of studies at some other college must complete the following courses or their equivalents before they will be permitted to enroll in the Wanakena Campus portion of the program.

English	*6 semester hours*
Math (College Algebra and Trigonometry)	*6 semester hours*
General Biology (or Botany—course should be plant-oriented)	*6-8 semester hours*
Economics	*3 semester hours*
Electives (Recommended: Public Speaking, Technical Report Writing, Geology)	*9 semester hours*
	30-32 semester hours

EXPENSES

Costs of the first year will vary with the specific institution attended.

Estimated costs of the second-year program on the Wanakena Campus are as follows:

	Tuition	*Board & Room*	*Books & Supplies*
New York Resident	$ 650	Approx. $1200	Approx. $275
Nonresident	$1,075	Approx. $1200	Approx. $275

An additional estimated expense of $150.00 will likely be incurred to cover the cost of laundry and clothing. The cost of the 5-day regional forestry practice trip during the spring semester is estimated at approximately $200. There is also a $10.00 graduation fee and a $10 student activity fee.

FINANCIAL ASSISTANCE

Financial aid is available upon acceptance to the College of Environmental Science and Forestry. There are three basic loans: scholarships or grants, part-time employment and long-term loans.

More detailed information on these financial aid opportunities can be found on pages 15—19 of this bulletin and in the *Undergraduate Financial Aid Bulletin*.

The student must file an application with the Office of Financial Aid at the Syracuse Campus and submit a *Parents' Confidential Statement* to the College Scholarship Service, Princeton, New Jersey 08540.

PLACEMENT

The School assists in placement of graduates. The reputation of the College's Ranger School usually results in graduates being able to find employment readily. Employment is common with local, state and federal forestry and land resource agencies, private forestry enterprises and surveying firms. Positions most frequently filled by recent graduates include: state forest ranger, state forest technician, forestry aide, industrial forest district supervisor, timber inventory specialist, timber sales supervisor, forest surveyor, forest engineering aide, forest protection technician, forest research technician and forest equipment salesman.

FOREST TECHNOLOGY CURRICULUM
(Associate in Applied Science Degree)

Freshman Year *Credit Hours*

(Syracuse Campus or preferably taken at a two-year college)

First Semester	[1]FBO 100	General Botany	4
	[2]English		3
	[3]Math		3
	[4]Electives		4
	GFO 032	Orientation	0
			14
Second Semester	[1]FZO 100	General Zoology	4
	[2]English		3
	[3]Math		3
	ERM 204	Introduction to Economics for Forestry	3
	[4]Elective		3
			16

Senior Year
(Wanakena Campus)

First Semester	FTC 200	Dendrology I	2
	FTC 202	Plane Surveying I	4
	FTC 204	Forest Mensuration and Statistics I	3½
	FTC 206	Forest Ecology	3
	FTC 208	Forest Installations	3
	FTC 209	Forest Roads	2
	FTC 213	Forest Protection I	2
	FTC 223	Graphics	1
			20½
Second Semester	FTC 201	Dendrology II	½
	FTC 203	Plane Surveying II	3
	FTC 205	Forest Mensuration and Statistics II	2
	FTC 207	Aerial Photogrammetry	2
	FTC 211	Silviculture	2
	FTC 212	General Forestry	1
	FTC 214	Personnel Management	1½
	FTC 215	Timber Harvesting	2
	FTC 216	Wood Technology	1½
	FTC 217	Forest Management	2
	FTC 218	Forest Recreation	1½
	FTC 219	Elements of Wildlife Ecology	1½
	FTC 221	Water Resource Management	2
	FTC 225	Regional Forestry Practices	1
	FTC 227	Forest Protection II	2
			25½

[1]Courses selected may be in general biology but at least one course in introductory botany is preferred.

[2]Freshman English or equivalent.

[3]Competency in plane trigonometry and college algebra is required. If demonstrated, credits become electives.

[4]Courses related to Technical Report Writing and Speech are strongly recommended. Additional electives in biology and geology also should be seriously considered.

[5]Students are expected to complete the one-day orientation session to be given at the Wanakena Campus in late May, prior to the Fall registration.

A total of 76 credit hours is required. Upon satisfactory completion, an Associate Science (A.A.S.) degree in Forest Technology will be awarded.

FOREST TECHNOLOGY

200. Dendrology I **(2)**

32 hours of lecture and 42 hours of field time. A study of the distinguishing characteristics, growth features, distribution, associates and importance of the major tree species of North America.

Seasonal field identification and on-the-spot discussion of habitats, associates, and the place in succession of the predominant forest trees and shrubs as found in the Adirondack area of the Northeast, plus a limited number of introduced species. Fall. Mr. Coufal.

201. Dendrology II **(½)**

10 hours of field time. A continuation of Dendrology I, with special emphasis on identification and use as site indicators, for example ground cover plants. Spring. Mr. Coufal.

Prerequisite: FTC 200.

202. Plane Surveying I **(4)**

50 hours of lecture and 110 hours of field time. An introduction to the theory and practice of plane surveying. Emphasis is on individual skill development through small crew projects handling typical surveying equipment in typical field situations. Lecture topics include theory of measurements and errors, mathematics for ordinary surveying, field problems and the production and preparation of maps. Field projects include traversing with both foresters' and engineers' tools, leveling and the actual production of several maps. Fall. Mr. Sterbenz.

203. Plane Surveying II **(3)**

18 hours of lecture and 86 hours of field time. A continuation of F. Tech 202 with emphasis on small field projects including boundary surveying, triangulation, circular curves and more. Classroom work develops the mathematical principles behind the solution of field problems. Several maps are prepared. A day trip is scheduled to the County Court House to examine a typical system of filing and recording property boundary information. Other topics include the Survey of the Public Lands and surveying as a profession. The use of the computer in problem solving is included. Spring. Mr. Sterbenz.

Prerequisites: FTC 202; FTC 223.

204. Forest Mensuration and Statistics I **(3½)**

66 hours of lecture and 40 hours of field time. A classroom and field study of the basic principles and skills required for the measurement of standing trees and their products. Volume tables, their use and construction are studied. Sampling designs are statistically approached from the standpoint of sampling errors and necessary sampling intensity. Cruise reports are required in which the student presents cruise results in tabular form. Fall. Mr. Martin.

205. Forest Mensuration and Statistics II **(2)**
2 hours of lecture and 56 hours of field and laboratory time. A field problem of practical nature utilizing methods for collecting, analyzing and presenting data dealing with timber volumes. Spring. Mr. Martin.
Prerequisite: FTC 204.

206. Forest Ecology **(3)**
42 hours of lecture and 50 hours of field time. Study of weather and weather data collection; students manning a forest weather station. Study of weather and soil factors as to how they affect trees and forests, plus the interactions within the forest community and with the environment. Introduction to cover type mapping. Final field problem and report on detailed measurement and analysis of a belt transect. Fall. Mr. Remele.

207. Aerial Photogrammetry **(2)**
20 hours of lecture and 36 hours of laboratory. Development of the ability to interpret important ground features by viewing aerial photos singly and in pairs, using stereoscopic techniques and equipment. Scale problems and the making of reliable horizontal and vertical measurements. Radial line plot control for the transfer of detail to base maps. Forest type mapping and forest mensuration using photos. Spring. Mr. Remele.

208. Forest Installations **(3)**
40 hours of lecture and 60 hours of laboratory or field time. This course provides the student with the technical competence necessary to use, plan, construct and maintain such typical forest improvements as telephone lines, radio systems, trails and light frame structures. Fall. Mr. Miller.

209. Forest Roads **(2)**
22 hours of lecture and 38 hours of laboratory or field time. This course provides the student with the technical competence necessary to administer, locate and design the construction and maintenance of a typical forest gravel road. Fall. Mr. Miller.
Prerequisite: FTC 202.

211. Silviculture **(2)**
46 hours of lecture and 32 hours of field and laboratory time. Orientation regarding the place, terminology, and methods of silviculture. Coverage of the most generally used techniques for establishing and manipulating the more important forest types in the Northeast for ecological and economical satisfaction. Field demonstration and practice in planting, thinning, pruning, timber marking and chemical silviculture. Spring. Mr. Remele.
Prerequisite: FTC 206.

212. General Forestry **(1)**
24 hours of lecture. This course provides the student with an understanding of the nature of their employment opportunities, how and where to apply for employment, and a review of the history of forest technician education with special emphasis on the Ranger School. Spring. Mr. Castagnozzi.

213. Forest Protection I **(2)**
24 hours of lecture and 24 hours of field and laboratory time. A study of the insect and disease agents that damage trees and their role in the total forest community. The course covers identification of local forest insects and disease-causing organisms, study of the major pest groups of other forest regions, and control measures including the effects of pesticides on the environment. Field trips cover local pests and the damage caused, while laboratory work covers major groups of pests likely to be encountered elsewhere. Fall. Mr. Coufal.

214. Personnel Management (1½)

26 hours of lecture. A study of company and agency organization groups including selection of and placement of personnel, training of personnel and performance evaluations, planning for and administering crew responsibilities, human relations in the working situation and special personnel problems of the forest technician and forester are covered.

Techniques of foremanship are applied in various field exercises in other courses, along with the study of safety hazards, accident prevention, accident classification and accident reporting. Spring. Mr. Miller.

215. Timber Harvesting (2)

21 hours of lecture and 35 hours of field time. This course acquaints the student with the basic harvesting methods and techniques, with emphasis on the Northeast, along with the knowledge of how and where harvesting fits in with other forest uses. Students gain technical competence in timber sale contract administration and basic timber appraising. Spring. Mr. Miller.

216. Wood Technology (1½)

17 hours of lecture and 20 hours of laboratory. Study of the development of various cell and tissue structures within trees, the gross structural features of wood, and the part these features play in the physiological processes of living trees. Physical properties of wood are studied with special emphasis given to those gross features which identify species. Attention is given to wood quality, defects of wood, and those special features which make certain species desirable for specific uses.

In the laboratory a variety of samples from the more commercially important lumber trees of North America are identified by the use of a gross feature key and 10X magnification. Spring. Mr. Martin.

217. Forest Management (2)

24 hours of lecture and 12 hours of field or laboratory time. The relation of silviculture to management. Subdivisions and classification of forest properties. Determination of growing stock and growth. The forms of managed forests and methods by which forests are brought to a regulated condition. Field and lab work in preparation for a report giving recommendations for management of a portion of the School Forest. Spring. Mr. Remele.

Prerequisite: FTC 206.

218. Forest Recreation (1½)

20 hours of lecture and 32 hours of laboratory or field time. This course acquaints the student with the forest recreational resources—its present and future needs. Principles of recreation development and management are discussed with special emphasis placed on the technical aspects. Spring. Mr. Miller.

219. Elements of Wildlife Ecology (1½)

36 hours of lecture and 4 hours of field time. A study of the principles of wildlife ecology with fundamentals related to the actions of the preservationist, conservationist, and particularly those of the forest manager. Spring. Mr. Martin.

Prerequisite: A course in biology or its equivalent.

221. Water Resource Management (2)

30 hours of lecture and 40 hours of field time. A comprehensive study of the concepts of the hydrologic cycle and quantification of its components. Particular stress on basic water measurements, erosion sedimentation and protection of the soil-water resource. Spring. Mr. Suhr.

Prerequisites: FTC 202, FTC 206, FTC 207.

223. Graphics **(1)**

16 hours of lecture. An introduction to lettering and drafting with emphasis on the skills needed by the forestry or surveying technician. Individual skill development is achieved through many projects. The theory behind each aspect of the project is covered in lecture and each student is then expected to complete the project on their own time. Several lettering plates are produced in addition to precision drawing for the production of maps. Other projects include the use of plastic and scribe materials for map production.

The use of drafting machines is explained and demonstrated for the students. Fall. Mr. Sterbenz.

225. Regional Forestry Practices **(1)**

40 hours of field time. A 7-day field trip to provide concentrated and varied field observation. It is conducted during the Spring semester to give the student first-hand observation of the current forestry practices in various parts of the United States. Spring. Staff.

227. Forest Protection II **(2)**

27 hours of lecture and 27 hours of field and laboratory time. A continuance of the study of insects begun in Forest Technology 213, Forest Protection I, with emphasis on insect identification and ecology as keys to control.

The basic principles of forest fire behavior, fire danger and fire danger rating, and the prevention and control of forest fires are covered. Fire simulation exercises and practice of fire suppression techniques are given. Spring. Mr. Coufal.

Prerequisite: FTC 213.

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SYRACUSE, NEW YORK 13210

CHEMISTRY ★ BIOLOGY ★ BIOMETRY ★ BOTANY ★ BUILDIN

STRUCTION ★ CELLULAR ULTRASTRUCTURE ★ CHEMICA

Undergraduate Studies

State University of New York COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

1976

LOGY ★ CHEMISTRY ★ ECOLOGY ★ ECONOMICS ★ ENGINEERING

OMOLOGY ★ ENVIRONMENTAL STUDIES ★ FIBER PHYSICS ★ FORES

HNOLOGY ★ LAND USE ★ LANDSCAPE ARCHITECTURE

NOLOGY ★ MATERIALS MARKETING ★ METEOROLOGY

ROSCOPY ★ MYCOLOGY ★ NATURAL PRODUCTS ENGINEERING

RATIONS RESEARCH ★ ORGANIC MATERIALS SCIENCE ★ OUTDOO

REATION ★ PAPER ENGINEERING ★ PAPER SCIENCE ★ PATHOLOGY

TOGRAMMETRY ★ PHYSIOLOGY ★ POLYMER CHEMISTRY

DUCTION SYSTEMS ENGINEERING ★ REGIONAL PLANNING

OTE SENSING ★ RESOURCE MANAGEMENT ★ RESOURCE POLICY

CULTURE ★ SOILS ★ THERMODYNAMICS ★ URBAN ANALYSIS

ER RESOURCES ★ WILDLIFE ★ WOOD PRODUCTS ENGINEERING

OD SCIENCE ★ WORLD FORESTRY ★ ZOOLOGY ★ BIOCHEMISTRY

CORRESPONDENCE DIRECTORY

Detailed information about the College may be obtained by addressing inquiries to:

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College of Environmental Science and Forestry
Syracuse, New York 13210

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Director of Admissions
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473-8708

Financial Assistance
Coordinator of Financial Aid
109 Bray Hall
473-8884

Transcripts and Academic Records
Registrar
111 Bray Hall
473-8717

Housing
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Office of Residential Life
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Syracuse, New York 13210
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The calendar, courses, tuition and fees described in this Bulletin are subject to change at any time by official action either of the State University of New York Board of Trustees or of the College of Environmental Science and Forestry.

State University of New York

COLLEGE OF

ENVIRONMENTAL SCIENCE AND FORESTRY

1976 - 77
Undergraduate Studies Bulletin

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Academic Calendars

SYRACUSE CAMPUS

FALL 1976

Registration	September 8-9	Wednesday-Thursday
First Day of Classes	September 10	Friday
Yom Kippur (no classes)	October 4	Monday
Thanksgiving Vacation	November 24-28	Wednesday-Sunday
Last Day of Classes	December 15	Wednesday
Reading Day	December 16	Thursday
Exam Period	December 17-23	Friday-Thursday

SPRING 1977

Registration	January 17-18	Monday-Tuesday
First Day of Classes	January 19	Wednesday
Spring Recess	March 12-20	Saturday-Sunday
Last Day of Classes	May 3	Tuesday
Reading Day	May 4	Wednesday
Exam Period	May 5-11	Thursday-Wednesday
Commencement	May 14	Saturday

FOREST TECHNICIAN PROGRAM—WANAKENA CAMPUS

FALL 1976

Students Arrive	August 19-20	Thursday-Friday
Classes Begin	August 23	Monday
Thanksgiving Recess	November 20-28	Saturday-Sunday
Semester Ends	December 17	Friday
Intercession	December 18- January 16	Saturday-Sunday

SPRING 1977

Classes Begin	January 17	Monday
Spring Recess		
a. Second half of class	February 19-26	Saturday-Saturday
b. First half of class	February 27-March 6	Sunday-Sunday
Semester Ends	May 27	Friday
Graduation	May 28	Saturday


COLLEGE OF

ESF: What's In A Name?

1911. Governor John A. Dix signed a bill establishing the New York State College of Forestry at Syracuse University.

1948. Legislative action incorporated in State University of New York all state-supported higher education. Thus, the State University College of Forestry at Syracuse University.

1972. By special legislative act, the College was renamed the State University of New York College of Environmental Science and Forestry.

Why, in the first place, all the name changes? And, secondly, what difference do they make? What, really, is in our name?

ESTABLISHING A TRADITION

While a professional forestry education in this country is almost entirely a development of the twentieth century, its primary roots can be traced back as early as 1862 when Congress passed the Morrill Act establishing a system of land-grant colleges.

The growing importance of forests in America's economy was reflected in the 1870 Census, when, for the first time, information on forest resources was included. Several attempts to establish a national school of forestry were made; while none was approved, the movement shows that there was considerable demand for professionally trained foresters.

By 1900 there was a spirit of reform in the country—the same spirit that produced the early muckrakers also produced a generation interested in the conservation, preservation and careful management of precious natural resources. Between 1903 and 1914, 21 schools of forestry were established.

The first college of forestry in this country to offer a full, four-year undergraduate program was established in 1898 at Cornell University. Under the leadership of Bernard E. Fernow, students were introduced to critical field experience in their junior and senior years at the college's 30,000-acre forest in the Adirondacks. There, Fernow taught many experimental management practices, including clear-cutting and surface-burning. These techniques have always been controversial, and they aroused criticism by the wealthy summer residents in adjacent areas

of the Adirondacks. After only five years of operation, the Cornell College of Forestry was closed in 1903 when the State Legislature, yielding to the influential property owners, ended fiscal support.

The beginnings and early development of the New York State College of Forestry were largely due to James R. Day, Chancellor of Syracuse University, and community leaders who were attuned to the growing national sentiment favoring forest conservation and who sensed the need for a professional school of forestry. The legislative act which created the College instructed that the institution "conduct such special research in State-wide investigations in forestry as will throw light upon and help in the solution of forestry problems. . ." and that it be "the institution for educational work in forestry in the State."

From the very first years of its existence under the first dean, Hugh P. Baker, the College responded to the broad needs of environmental professionalism. While other schools and colleges of forestry became more specialized, the College at Syracuse broadened to include the essentials of environmental science: design, engineering and the life sciences, as well as resource management.

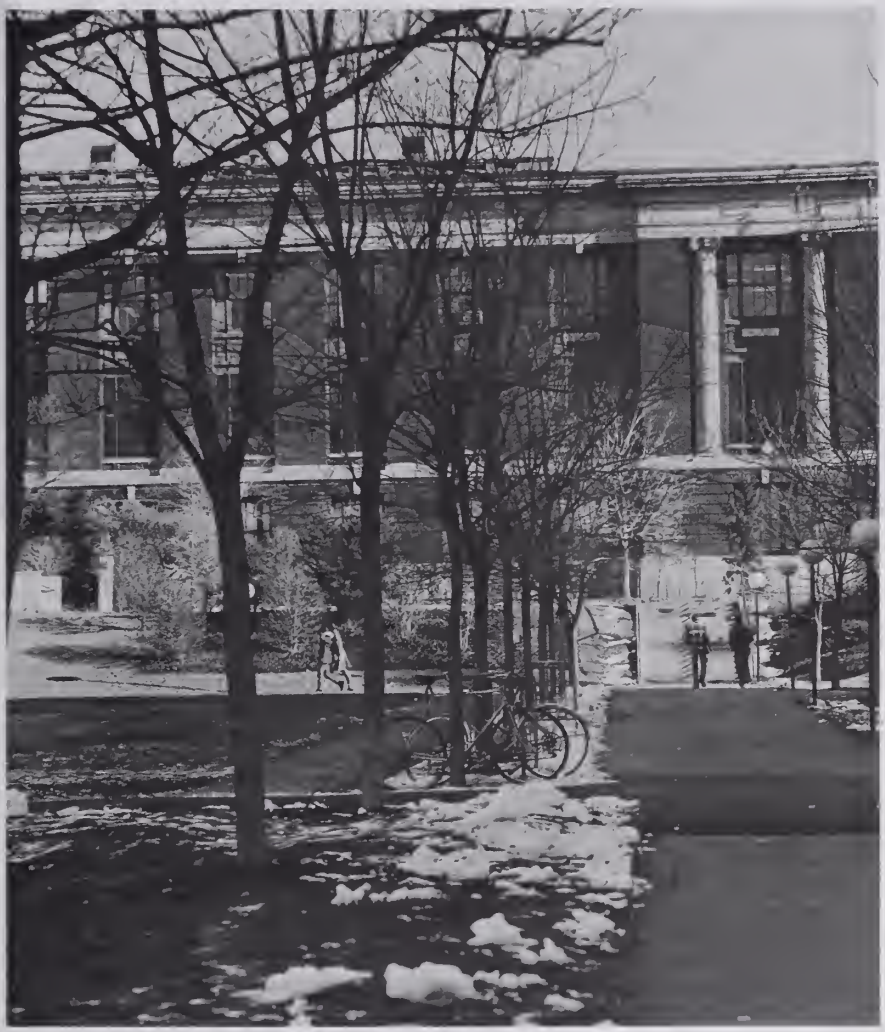
BROADENING THE BASE

With the formation of the State University of New York in 1948, coordination and systematization came to higher education in the state. The University, according to its charter, was to "supplement, not supplant, the great network of private colleges and universities." The College of Forestry which, from its beginning had been state-supported and governed by a Board of Trustees made up of eight members appointed by the Governor and four *ex-officio* members, was recognized as a specialized college within the State University system.

Stemming from Chancellor Day's early sponsorship of the College, Syracuse University and ESF have long been engaged in numerous fruitful devices of institutional cooperation. This relationship is probably the most outstanding example in this country of collaboration between public and private institutions of higher education. Even as a part of State University, the College maintains this unique position. The major character of the relationship stems from the fact that the College purchases from Syracuse University the major portion of its lower division instruction, thus allowing the College to more fully develop its professional senior division and graduate level instruction.

Other cooperative areas are living centers and dining facilities, athletic programs, the use of the University's infirmary and health counseling services, the bookstore facilities, the University library system and participation in numerous social activities including the elaborate religious, dramatic and cultural benefits of a large university.

Since the early days of the College, every graduate—whether he is awarded a baccalaureate, master's or doctoral degree—receives two diplomas, one from the College and one from Syracuse University. Indeed, the commencement exercises are held jointly. Upon graduation, students become alumni of the College and also of Syracuse University.



ESF TODAY

The third phase in the evolvement of the College's name came in 1972 when it was rechartered as the State University of New York College of Environmental Science and Forestry. Thus, the name reflects more deeply the traditional grounding and concern of forestry in the environment; it illuminates more clearly the capabilities of its program.

For over 60 years, the full thrust of the State University of New York College of Environmental Science and Forestry has been focused on the environment on all of its six campuses and in each of its three mission areas—instruction, research and public service. The College has been, and continues to be, devoted to the advancement of environmental science and forestry.

The Mission: Instruction, Research, Public Service

INSTRUCTION

Professional Education

In the Fall of 1975, student enrollment reached 2,491. Of this number, 2,039 were undergraduates and 452 were graduate students. In addition, there were 24 students engaged in postdoctoral work.

At the baccalaureate level, the College offers professional study in seven four-year curricula: *biology; chemistry* (with options in biochemistry and natural products or natural and synthetic polymer chemistry); *forest engineering; paper science and engineering* (with options in paper science or paper engineering); *wood products engineering* (with options in wood science, building construction, production systems engineering or materials marketing); *resource management;* and *landscape architecture.*

Each of these curricula leads to the bachelor of science degree. In the case of landscape architecture, an additional year of study results in a bachelor of landscape architecture degree; and in the forest engineering program, a fifth year leading to a bachelor's degree in civil engineering can be taken at Syracuse University or State University at Buffalo.

Several curricula allow students to minor in environmental studies, applied management, urban forestry, regional planning, world forestry,

conservation education and communications, management science and forest resources science.

Graduate Education

The College awarded its first graduate degree in 1913. Today, the College offers programs in 12 major disciplinary and interdisciplinary areas: *environmental science, botany and forest pathology, entomology, forest zoology, chemistry, paper science and engineering, wood products engineering, forest engineering, forestry economics, forest management, silviculture and landscape architecture.*

Graduate study leads to the master of science degree and the doctor of philosophy degree. A postdoctoral study program, closely related to the College's research effort, is also available.

Technical Education

At the paraprofessional level, the College has been training forest technicians since 1912 at its Wanakena Campus in the Adirondack Mountains. It is the oldest Ranger School in the United States.

In 1973 a two-year *forest technology* curriculum replaced the one-year certificate program. Graduates are awarded an associate in applied science degree. In the new curriculum, students take their first year of general education either at the College's main campus in Syracuse or at an accredited junior college. The second year, with its emphasis on practical field training on the relationships between forest technology and managerial needs, is taken at Wanakena with its 2,800 acres of forested land. Graduates of this degree program in practical forestry are prepared for positions as forest rangers; federal, state and private industry forest technicians and forestry aides; company district forest supervisors; timber inventory specialists; timber sales supervisors; forest surveyors and engineering aides; and forest protection technicians.

Continuing Education

The philosophy that education is a lifelong pursuit is an ancient one and was written into the law creating the College. This concept is doubly important to the sciences and professions in this technological age when, with new knowledge bursting in all directions, major environmental problems still remain to be resolved. The informational needs of New York's citizens also are undergoing change. The increasing urban character of our population, the changing pattern of agricultural and forest land ownership and use, the rise in level of education and sophistication in a more efficient society, and the increase in leisure time, travel mobility and need for recreational facilities and pursuits all contribute to a growing need for educational opportunities in the environmental sciences and forestry for adult audiences.

The College has, over the years, succeeded in communicating knowledge on forest resources management, utilization and conservation to a wide variety of off-campus publics. The entire College faculty has contributed to these programs. To reinforce this commitment, the College established a School of Continuing Education upon which to base expanded educational opportunities at both the undergraduate and graduate course levels.

Conferences, symposia, seminars and short courses on various aspects of forestry and the related sciences are conducted at both the basic and applied levels. Audiences include forest owners, managers and operators; wood engineers and forest industries personnel; academic and scientific groups, conservation and recreation personnel from local and other public and private planning groups and citizen-action committees. Upon request, continuing education programs can be designed to meet specific needs of professional organizations, agencies and industry. Credit or non-credit courses, at campus or off-campus sites, can be arranged.

Expansion of "in-service" training courses, establishment of "environmental learning centers" on College forest properties and production of media materials for public information and education are examples of activities directed toward updating and upgrading professional clients and broadening the public's awareness and appreciation of New York's forest-lands and other natural resources.

For information on specific continuing education projects, inquiries should be sent to Dean, School of Continuing Education.

RESEARCH

The College's commitment to scientific inquiry stretches far back to its second year of existence. In 1912, Dean Hugh P. Baker initiated the first research project of the College by joining forces with the U.S. Forest Service in an industry study designed to show what kinds of firms were using wood in New York State and the species and quantities of lumber they used.

In the 1970's, the College's research program has attracted a world-wide clientele of industrial, governmental, professional and scientific groups, and through liaison with them, the program maintains its vigor

and relevancy to the important environmental issues of the decade. Support from this clientele amounts to about $2.5 million a year.

Students and faculty from all disciplines contribute to the depth and diversity of the research program. Their findings are transferred into professional practice applications by the College's demonstration and information function. Recent examples of the program include land use studies for the New York State Commission to Study the Tug Hill; fish and wildlife studies for the New York State Commission to Study the Catskills; the development of polymeric materials for artificial human organs; non-chemical alternative control measures for destructive insect pests like the gypsy moth; and new pulping processes leading to pollution-free water and air effluents.

The Institute of Environmental Program Affairs

The Institute of Environmental Program Affairs (IEPA), created at the College in 1972, is an umbrella-like structure that coordinates the overall research effort of the College with the efforts of other academic institutions, public agencies and private industries for a concerted attack on compelling and complex environmental problems. IEPA culminates the College's ongoing examination of its appropriate role as a leader in environmental education for the 1970's and beyond in face of urgent appeals for multidisciplinary approaches, for problem-oriented task forces by both faculty and students, and for the greater application of higher education to society's needs. Because it is a process, the Institute preserves the identity of each collaborator: institutions, faculty members and students come together for just as long as necessary to solve a problem, then return to other ongoing areas of interest. Recent projects have included: regional resources and environmental studies for the St. Lawrence-Eastern Ontario Commission; studies of wetlands evaluation systems for the Adirondack Park Agency; a study of limestone quarry reclamation, sponsored by the Allied Chemical Corporation; and development of environmental impact assessment guidelines for the New York State Department of Environmental Conservation.

Applied Forestry Research Institute

Much of the research being conducted at universities and institutes, while of value to long-range scientific study and technological progress, is of limited, immediate application for forest practitioners. With this consideration, the Applied Forestry Research Institute (AFRI) was established in 1967 at the College with the cooperation of the New York State Department of Conservation. At the time of its founding, AFRI was charged with the task of carrying out research in the state that can be implemented at once by practicing foresters and forest resource managers.

The need for such research becomes more acute with time: the demands placed on the forest resource are ever increasing, and conservation groups are deeply concerned about the environmental impact of forestry's operations.

Practical research interests of AFRI include forest engineering (mechanized logging, woods and mill safety, and testing of timber harvesting techniques and equipment; hardwood and conifer management; forest protection (pest and disease control); and multiple land-use management.

Because of its location on ESF's main campus, AFRI has access to the College's extensive research equipment and instruments, including electron microscopes, plant growth chambers, photogrammetric facilities and computer center.

There is close cooperation with the College's highly competent teaching-research faculty who provide the latest information about basic research findings by disciplines as well as supporting technical information and techniques. This liaison allows for the exchange of views between the academician and the field practitioner.

AFRI is supervised by a director, and has a staff of nine full-time research associates and two technical assistants.

Empire State Paper Research Institute

The Empire State Paper Research Institute (ESPRI), located on the main campus, is the only world-wide basic research organization in the pulp and paper field. It performs investigations in cooperation with the Empire State Paper Research Association (ESPRA), which is comprised of 62 pulp and paper companies in 11 countries. The Institute was established in 1945 when the members of ESPRA recognized the need for new scientific and technical knowledge and methods, and since then ESPRI has been able to maintain an efficient balance between the practical and theoretical bases of the pulp and paper industry.

Housed in the modern J. Henry Walters Hall with its own pilot paper mill, and staffed by scientists who are internationally recognized for their accomplishments, ESPRI provides a research base for long-range industry development. Its program has widened in scope to cover almost all aspects of pulping and papermaking, including additive retention, oxygen pulping and bleaching, effluent control, sheet drying and printability.

State University Polymer Center

In 1966 the College's polymer research institute was designated as the State University of New York Polymer Research Center in order to stimulate University-wide interest in polymer chemistry.

Scientists at the College have made many original contributions to the field of pure and applied polymer chemistry, including the development of living polymers, the study of anionic polymerization and electron-transfer initiation, and work on the permeation of gases and films through polymeric films.

College faculty members specializing in polymer chemistry have trained several hundred graduates and postdoctoral researchers, many of whom now hold leading positions in universities and industrial and governmental laboratories.

U.S. Forest Service Cooperative Research Unit

The Northeastern Forest Experiment Station of the U.S. Forest Service maintains a center for recreation research at the College. Forest Service personnel collaborate directly with faculty and students on research projects in this new area of resource management in order to develop methods for evaluating the quantitative and qualitative aspects of recreation demand and their relationship with multiple-use forest management problems.

Among the many undertaken areas for investigation are a leisure-time use study of Onondaga County residents and a project to determine aesthetic preferences for various types of timber harvesting practices.

Nelson Cortlandt Brown Laboratory for Ultrastructure Studies

This center, located in Baker Laboratory, is a teaching, research and service facility of the College. It is equipped to handle virtually every type of modern microscopy operation, including light, scanning electron and transmission electron. Among the major items of equipment are: an RCA EMU-3 transmission electron microscope; an RCA EMU-4, an ETEC autoscan scanning electron microscope, several types of light microscopes, high vacuum evaporators and microtomy equipment.

The primary service of the center is teaching; course offerings include microtechnique, photomicrography, electron microscopy and interpretation of cellular ultrastructure. A second function of the center is to provide research on a service basis to faculty and students and to the community at large.

PUBLIC SERVICE

The College, throughout its 65-year history, has continued to respond to its specific legislative mission prescribing major responsibilities in the area of public service. Public education and information, technical advice and guidance to cooperating local, state and federal agencies and organizations, and technical assistance to the forest and wood-using industries constitute the principal formal public service activities. The Institute of Environmental Program Affairs (described in the Research section) coordinates the College's public service activities on the professional level.

While the list of public service contributions is lengthy, a few other examples include: the College's Film Library; the Tree Pest Service, which provides technical advice to private citizens and to governmental agencies; the participation of ESF faculty members in Central New York's Poison Control Center; and membership in PACE (Planning Approaches for Community Environments), a faculty-supervised student design and planning service to benefit community development. Altogether, the public service programs of the College reach approximately one million New York State residents each year.

The Campuses

The College has a multiple campus system with regional campuses and field stations located at Syracuse, Tully, Wanakena, Warrensburg, Cranberry Lake, Newcomb and Clayton. This system is composed of about one million square feet of facilities and 25,000 acres of land. Collectively, they represent the largest fully utilized campus in the world.

THE SYRACUSE CAMPUS

The main campus is in Syracuse, and lies on 12 acres adjacent to Syracuse University, in an area that traditionally has been known as "The Hill." Located here are the Schools of Biology, Chemistry and Ecology; Environmental and Resource Engineering; Environmental and Resource Management; Landscape Architecture; and Continuing Education. In addition, the main campus houses the Institute of Environmental Program Affairs, the Applied Forestry Research Institute, the Empire State Paper Research Institute, the State University Polymer Research Center, a cooperative research unit of the U. S. Forest Service, and an ultrastructure laboratory.

Specialized facilities at the Syracuse campus include electron microscopes, plant growth chambers, air-conditioned greenhouses, an animal environmental simulating chamber, a bio-acoustical laboratory, a 1,000-curie cobalt-60 radiation source, radioisotope laboratory, computer center, and specialized instrumentation including nuclear magnetic resonance spectrometer, electron spin resonance spectrometer, mass spectrometer, ultracentrifuge, X-ray and infrared spectrophometer. Photogrammatic and geodetic facilities of the forest engineering department include one of the most extensive arrays of equipment in the United States, with a Nistri TA-3 stereocomparator, Mann comparator, computerized Nistri photocartograph, and nine other varieties of plotters. The paper science and engineering laboratory has a semicommercial paper mill with accessory equipment. The wood products engineering department has a complete strength-of-materials laboratory as well as a pilot scale plywood laboratory and a machining laboratory. The greenhouses and forest insectary are used to produce plant and insect material for classroom and laboratory. Extensive collections are available for study, including wood samples from all over the world, botanical materials, insects, birds, mammals, and fishes.

The **F. Franklin Moon Library** contains more than 65,000 cataloged items. Over 800 journals and corresponding indexes are currently received. The collections constitute an information center for forestry and environmental science programs in ecology, botany and pathology, biochemistry, chemical ecology, forest chemistry, polymer chemistry, economics, entomology, environmental studies, industrial pollution abatement, landscape architecture, environmental design, management, paper science and engineering, photogrammetry, silviculture, soil science, water resources, world forestry, wildlife biology, wood products engineering and zoology. These are supplemented by large collections in the environmental resource field. Additional strength is found in the comprehensiveness of abstract and indexing services relevant to the College's programs. The library also offers a selected and broad choice of general-interest reading material.

The collections of Syracuse University Libraries and State University Upstate Medical Center are within walking distance. They may be used by all members of the College of Environmental Science and Forestry. Arrangements often can be made to use industrial libraries in the Syracuse area. Other collections are accessible through the Inter-library Loan privilege.

The library building, opened in 1968, can accommodate 132,000 volumes and can seat 575 persons. The main reading areas are in the center of the upper level surrounding open stacks, a current periodicals room, bibliographic center, individual study carrels and library staff offices. The archives, special collections, conference rooms, audio-tutorial center and informal study rooms are located on the lower level.

The audio-tutorial center provides facilities for study with nonbook materials. Slides and cassettes prepared as integral units of particular courses are held on reserve for use in the center. Materials are available

for review on weekends, evenings and times when other facilities are closed.

Leisure reading material is distributed throughout the total collection which represent the Robin Hood and Raymond F. Crossman collections, and contain books on national and world social problems, humanities, education and popular books concerned with the environment. The archives consists of historical items relevant to the College and forestry developments in New York State. The special collections room contains rare and valuable books and folios.

Reference service, orientation and bibliographic instruction (Library Research 300) are provided by the librarians. Study guides, user aids and other such publications are prepared and distributed by the librarians as needed.

The **Educational Communications** unit directly supports the program areas of the College through development and application of media materials and methods for the classroom, for the presentation of research findings and for public service endeavors. These include television programming, slide/tape and motion picture production. Other services to the College community include engineering, A-V equipment distribution, and maintenance and support functions. The Educational Communications staff also participates directly and actively in instructional programs in environmental communication at both the undergraduate and graduate levels as well as through the School of Continuing Education.

The College's **Computer Center** has a Control Data 3200 computer system utilized in its academic and research programs, and to a moderate extent, for its administrative data processing needs. The instructional work consists of courses which teach the use of computers and those which use the computer to assist in teaching applied subjects. The major use is in the graduate programs where students perform research in areas such as hydrology, transportation networks, forest and tree growth studies, genetics, disease and insect behavior and controls, land use, production and processing techniques, polymer and cellulose chemistry, cellular ultrastructure, photogrammetry and remote sensing, landscape architecture, and other supporting and related fields.

THE TULLY CAMPUS

Located about fifteen miles south of Syracuse is the Tully Campus composed of the Heiberg Memorial Forest, classrooms and research facilities.

Heiberg Memorial Forest has a diversity of terrain and forest growth. There, planting from known seed sources from many parts of this country and throughout the world is utilized both as an extensive outdoor teaching laboratory and as a site for intensive research.

THE WANAKENA CAMPUS

The Wanakena Campus is located on the Oswegatchie River, 65 miles northeast of Watertown, New York and 35 miles west of Tupper Lake,

New York. This campus supports the College's **School of Forest Technology**, the oldest forest technician school in the country, and its instructional and demonstration forest. It is on this campus that forest technicians are trained in an associate degree program.

THE WARRENSBURG CAMPUS

Each summer, the Warrensburg Campus hosts a program devoted to the field application of environmental principles and practices for students majoring in resource management and environmental biology. Formal continuing education courses also are held here for such groups as State foresters, mill owners and logging operators.

The Warrensburg Campus also contains the **Charles Lathrop Pack Demonstration Forest**, which, since 1927, has been under intensive management for the combined purpose of instruction, demonstration and research.

THE CRANBERRY LAKE CAMPUS

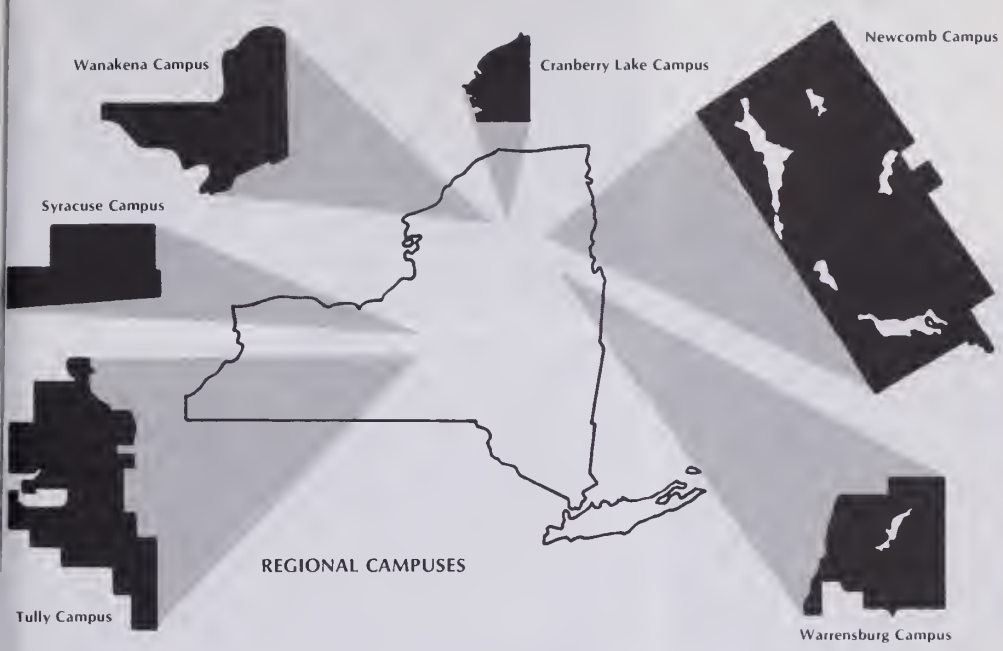
The Cranberry Lake Campus, accessible only by water, is the site of the College's biological station, where, every year, a cooperative program in environmental biology is sponsored jointly by the College and other institutions of higher education. Bounded by 150,000 acres of forest preserve, by Cranberry Lake, and by isolated forest bogs and beaver meadows, the extensive facilities are intensely utilized in a comprehensive curriculum of upper-level and graduate courses.

THE NEWCOMB CAMPUS

Located in the central Adirondack Mountains, Newcomb is the largest of the regional campuses and home to the **Adirondack Ecological Center** where extensive studies of animal biology and ecology are carried out. Located there also is the **Archer and Anna Huntington Wildlife Forest**.

THE FIELD STATIONS

In addition to its Regional Campus System, the College operates several field stations which directly support the programs of the institution. The 44-acre **Forest Experiment Station**, located only a few minutes drive from the main campus, is used to support main campus academic programs. Located at the Station are a large arboretum, tree nursery and experimental greenhouse facility. Adjacent to the Tully Campus is the College's **Genetic Field Station**. With its irrigation system and layout of level blocks, it is an excellent facility for developing hybrids, for grafting experiments, and for research in heritability. A magnificent island, the **Ellis International Laboratory**, is situated in the heart of the Thousand Islands-St. Lawrence River area off the village of Clayton. Accessible only by water, this laboratory, which is the College's most recent property acquisition, is an unusually appropriate site for College-wide, cooperative and international environmental monitoring and research activities.



REGIONAL CAMPUSES


Larry's
PIZZA
SANDWICHES
TAKE OUT & DELIVERY

The Syracuse Metropolitan Area

The College of Environmental Science and Forestry is located on one of several hills that overlooks Syracuse, a growing metropolitan area of nearly 500,000. Known as the "Salt City" because of the great salt industry which was centered here for more than seventy years, Syracuse is today a city of diversified industry and commerce. The area is a leader in the manufacture of china, quality shoes, air-conditioning equipment, medical diagnostic equipment and decorative home accessories.

The City of Syracuse offers students many cultural, recreational and educational opportunities, including a symphony orchestra, several museums, live theater and historical points of interest.

Called the "Crossroads of New York State," Syracuse is one of the few cities in the nation situated at the crossing point of two major superhighways. It is located at the intersection of the 500-mile New York State Thruway and the north-south Penn-Can Highway. Driving time from New York City, Philadelphia and Boston is about five hours; from Buffalo and Albany about three hours. The city is served also by a modern international airline and major bus and rail lines.

Admission

ADMISSION CRITERIA

The College of Environmental Science and Forestry, since its founding, has continually practiced open and competitive admissions regardless of race, color, sex, religion, national origin, handicap, or age. Pursuant to Title IX of the Education Amendments of 1972 and accompanying Regulations, no person shall be denied the benefits of, or be subjected to discrimination under any academic, extra-curricular, research, occupational training or other educational program or activity operated by this institution.

Admission to the College of Environmental Science and Forestry is based on academic qualifications after careful analysis of information provided by the applicant's high school or other scholastic records, standardized tests, and recommendations. In many cases, an interview may be conducted to assess interests and abilities.

Minimum requirements are at least 16 units along this pattern: English, 4 units; history (social studies), 2 units; science, 2 units (with at least 1 in chemistry or physics); mathematics (through trigonometry), 3 units; and electives, 5 or more units. Recommended electives are mechanical drawing and a foreign language.

WHEN TO APPLY

A candidate for freshman admission usually begins the application process in the fall of the senior year of high school. Review of candidates begins in January and the date for final decision on most freshman applications is May 1. Freshman applicants begin to receive notification of admission after February 15. A copy of the decision letter is sent to the applicant's high school guidance counselor. Freshmen are not usually admitted to the College for the spring semester.

FRESHMAN APPLICATION PROCEDURE

1. To apply for admission, residents of New York State should request the proper forms from their local high school guidance office. Nonresidents should request the forms directly from ESF's Office of Admissions. Revised admission forms are available in September for entry the following year.
2. All freshman applicants must submit the results of at least one of the following tests: the New York State Regents Scholarship (administered only in early October in most high schools in New York); the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB); or the American College Test (ACT). The Director of Admissions has the authority to waive this requirement in certain cases.
3. While a personal interview is *not* required for admission, it may be helpful in college planning. An interview with an admissions officer can be arranged by contacting the Office of Admissions.
4. *Application deadline for freshman admission is February 15.*

CAMPUS VISITS

The College of Environmental Science and Forestry welcomes visits by students and their parents. The Office of Admissions is located in Room 110 Bray Hall. The office is open for interviews Monday through Friday from 9 a.m. until 4 p.m.

ENTRANCE WITH ADVANCED STANDING

Secondary school students may earn college credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry enriched course loads, and may be accomplished in two ways:

1. Courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After a course has been successfully completed, an official transcript or other appropriate document should be sent to the College by the institution along with a catalog description of the course or courses.

2. College-level courses are given by some high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English and foreign languages offer opportunity for degree credit at this College. The determination of credit

is made by faculty members to whom the student's final examination papers are sent after they have been graded.

COLLEGE PROFICIENCY EXAMINATIONS

The New York State College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. The College also accepts the College Level Examination Program (CLEP) of the College Entrance Examination Board. These examinations are open to all who make application.

The College approves of the CPE and CLEP programs in general and will evaluate the performance of participants.

If all College policy requirements are met, grades A and B will receive credit; credit for a grade of C will be granted only upon recommendation of the department of the applicant's major; and no credit will be granted for a grade lower than C.

Application for credit should be made to the Office of Student Affairs. Application for deviation from the prescribed policy may be made to the Undergraduate Academic Affairs Committee.

TRANSFER STUDENTS

Students who are currently enrolled at another institution of higher education or who have previous college experience may apply for transfer. Any student who has been academically dismissed must wait at least one semester before applying to this College.

Application forms should be obtained directly from the College by writing to the Director of Admissions, Attn: Transfer. This material will arrive after 4 - 5 weeks. Revised application forms are available in September for admission the following year.

Students with two years of college can generally arrange their programs to allow transfer to the College of Environmental Science and Forestry with junior standing. Courses transferred for credit must be appropriate to the student's curriculum choice and successfully completed with a passing grade of D or better. (It should be noted, however, that students who transfer courses in which a grade of D has been earned must be aware of possible deficiencies when that material is used in more advanced courses.)

Furthermore, courses to be transferred as required courses in a curriculum must be comparable in content. Course credit hours are transferred, but grades and grade points are not.

In applying to the College for transfer, it is the student's responsibility to submit a recent official transcript from the college he or she is currently attending and similar documents from all colleges previously attended. No official transfer credit will be awarded until all final transcripts are received. Catalogs from each college may also be required.

Application deadline for transfer students is May 1.

DUAL ENROLLMENT WITH COLUMBIA-GREENE

The College of Environmental Science and Forestry and Columbia-Greene Community College have arranged a dual enrollment program. Any applicant for the liberal arts, math and science program with a forest management concentration at the two-year college is evaluated by both institutions. Upon acceptance and successful completion of the associate in applied science degree program, the student is automatically accepted at the College of Environmental Science and Forestry.

INTERNATIONAL STUDENTS

The College accepts international students on the undergraduate level if they can satisfy all regular admissions requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country, if at all possible, and apply to the College as graduate students. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. If an international student wishes to apply as an undergraduate, he must:

1. meet the secondary school requirements for entrance;
2. show that he is proficient in the English language through acceptable results of the Test of English as a Foreign Language (TOEFL) and/or College Entrance Examination Board Achievement Test in English;
3. provide competitive scores on the CEEB's Scholastic Aptitude Test in the verbal and math areas; and,
4. produce evidence that he can meet all financial obligations.

Undergraduate foreign students must file official State University of New York admissions forms. These may be obtained by writing to the Director of Admissions at the College. No fee is required for processing the application. *If the foreign student is accepted, adequate health and accident insurance must be obtained before the student will be allowed to register at the College.*

International students who are currently enrolled at an American college may apply for transfer to the College. They must meet all entrance requirements plus those of a transfer student as listed above. Permission to transfer must be obtained from the U.S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

HEALTH EXAMINATION REPORT

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice.

Student Expenses

APPLICATION FEE

When a student applies for admission to any of the State University of New York units, he pays to the University a nonrefundable application fee of $10 for the first application and $5 for each of the next three applications. Students who apply for transfer from other units of the State University of New York pay no fee.

ADVANCED PAYMENT FEE

New and transfer students pay a fee of $50, which is credited to the student's first semester tuition. This payment should be sent to the Business Office, SUNY College of Environmental Science and Forestry, Syracuse, New York 13210, accompanied by the form provided by the Office of Admissions. The payment is required within 30 days after the date of acceptance and no later than May 1; it is refundable up to May 1.

TUITION AND FEES

The tuition and fee structure of the College of Environmental Science and Forestry includes library, health, infirmary, physical education facilities, ROTC, special testing, and other services, as well as an assessment for student activities and charges for expendable supplies and equipment.

Tuition is $750 per academic year for freshmen and sophomores who are residents of New York State. Tuition is $900 for juniors and seniors.

Tuition for nonresident freshmen and sophomores is $1,200 per academic year; nonresident juniors and seniors pay $1,500.

STUDENT ACTIVITY FEES

In addition to tuition, the student body has voted to assess each student $18 per year to cover the cost of student activities. ESF students also pay yearly Syracuse University fees to cover the costs of the many student activities they participate in; these fees are $24.75 for full-time students and $14.50 for part-time students. An optional yearly fee of $3 supports Syracuse University's Public Interest Research Group (PIRG).

TERMS OF PAYMENT

A check or money order for tuition and fees should be made payable to *State University of New York College of Environmental Science and Forestry*. This payment is required by the last day of the registration period and can be paid at the College's Business Office either prior to registration or during registration. *A fee of $10 is charged for registering later than the established dates.*

HOUSING AND BOARD COSTS

Depending on the room, housing costs at Syracuse University range from $770 to $990 for an academic year. Most rooms accommodate two students and are furnished with beds, mattresses, desks, chairs, study lamps and dressers. A commercial linen service is available for those who order it.

A variety of options on board offerings are available for all students. Costs range from $790 to $1,000 for an academic year.

Housing and board rates are subject to change, and inquiries about them should be addressed to Office of Residential Life, Syracuse University, Syracuse, New York 13210.

Payment for housing and board is made directly to Syracuse University.

COMMENCEMENT FEE

A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

OTHER COSTS

Students majoring in Resource Management attend a 5-week Summer Session in Field Forestry at the Warrensburg Campus between the sophomore and junior years. The cost is approximately $250.

Forest Biology majors attend either the Summer Session in Field Forestry or the Summer Session in Environmental Biology at the Cranberry Lake Biological Station. Cost for the 8-week session is approximately $400.

An extended field trip of up to 3 weeks costs approximately $200 for *Wood Products Engineering students.*

Field trips for *Landscape Architecture students* range between $125 and $150. In addition, students enrolled in the 5-year Landscape Architecture program are required to spend one semester off campus. This is a self-described and student-budgeted program. Costs do not necessarily exceed those of a semester on campus, but additional costs are often incurred depending upon the location chosen.

The cost of books and supplies is approximately $150 a year. Additional costs for personal expenses, recreation, clothes and travel depend on the individual, and they may range from $300 to $500 a year.

REFUNDS

The following policies apply to tuition liability and refunds for students canceling their registration.

A student who is given permission to cancel registration is liable for payment of tuition in accordance with the following schedule:

Liability During	*Semester*
1st week	0
2nd week	30%
3rd week	50%
4th week	70%
5th week	100%

Application for refund must be made within one year after the end of term for which the tuition was paid to State University. The first day of class session is considered the first day of the semester and Saturday of the week in which this first session occurs is considered the end of the first week for refund purposes. It is interpreted that a student who does not attend any class sessions after Saturday of the first week and who notifies the College of his intent to cancel registration on or before the second Saturday following the first day of classes will be considered to have canceled his registration during the first week.

There is no tuition or fee liability established for a student who withdraws to enter military service prior to the end of an academic term for those courses in which the student does not receive academic credit.

A student who is dismissed for academic or disciplinary reasons prior to the end of an academic term is liable for all tuition and fees due for that term.

A student who cancels registration at a unit of the State University and within the same term registers at another unit of the State University is entitled to full credit for tuition and fees paid for that term.

Notwithstanding any other provisions for refund, when a student has withdrawn through circumstances beyond the student's control, under conditions in which the denial of refund would cause undue hardship, the Chief Administrative Officer of the unit may, at his discretion, determine that no liability for tuition has been incurred by the student, provided the student has not completed more than one half of the term and has not received or will not receive academic credit for the term. Such action, including the reason for withdrawal, must be in writing.

Financial Assistance

The College of Environmental Science and Forestry offers three basic forms of student financial assistance: scholarships or grants, part-time employment, and long-term loans. These programs are coordinated to supplement parental support, summer work, savings, and assistance from other sources. Since the source of funds for these programs, the guidelines for determining the recipients, the procedures for applying, and the method of disbursement of funds vary greatly from one program to another, the individual is encouraged to contact the Office of Financial Aid to discuss specific questions.

Aware of the many problems of financing higher education and meeting day-to-day living expenses, financial aid advisors are always available to discuss individual student problems.

HOW TO APPLY

Each year students interested in receiving financial assistance must apply, or reapply. Two forms are necessary for the application process.

1. The candidate must complete a College financial aid application form and return it to the Office of Financial Aid. A student will also receive a Financial Aid Bulletin which more specifically details application procedures.

2. The candidate's parents or legal guardians must complete the Parents' Confidential Statement (which is available from high school guidance counselors, two-year college financial aid offices, or from the College) and forward it to the College Scholarship Service, Box 176, Princeton, New Jersey 08540, where it is analyzed and sent to the College.

Tuition Waivers for International Students

Tuition waivers may be granted each year to qualified students from foreign countries. Interested students should contact the Vice President for Student Affairs or the Director of Admissions.

Regents Programs

Additional information and applications for the following Regents programs are available from:

New York Higher Education Services Corporation
Tower Building
Empire State Plaza
Albany, New York 12226

REGENTS COLLEGE SCHOLARSHIPS (RC)

High school seniors who are New York State residents may qualify by taking the Regents Scholarship Examination.

TUITION ASSISTANCE PROGRAM (TAP)/REGENTS SCHOLAR INCENTIVE AWARD (SI)

These awards are available to New York State residents who are enrolled in full-time degree programs. Based on income, minimum awards begin at $100.

REGENTS WAR SERVICE SCHOLARSHIPS (WS)

Veterans are eligible to take a competitive examination administered during the summer.

REGENTS GRANTS FOR CHILDREN OF DECEASED OR DISABLED VETERANS

These grants are awarded to children of parents who served during specific periods of war or national emergency and who died as a result of such service, or suffered a disability of at least 50 percent. The award entitles a New York State resident to $450 per year.

Vocational Rehabilitation Grants

Financial assistance and program counseling are provided by New York State through the Office of Vocational Rehabilitation for students who qualify.

Veterans' Benefits

The Veterans' Readjustment Benefits Act of 1966 as amended enables veterans to obtain financial aid for their college education.

Additional information and counseling are available from the Office of Veterans' Affairs at the College. Local veterans' administration offices, or the State Regional Office, 111 West Huron Street, Buffalo, New York 14202 can provide information and application forms.

Social Security Benefits

The 1965 Amendments to the Social Security Act extended the age limit for a child's benefits from 18 to 22, providing the child is a full-time student. Local Social Security offices have additional information.

EMPLOYMENT OPPORTUNITIES

College Work-Study Program (CW-SP)

The College participates in the Federal College Work-Study Program. This program provides part-time jobs during the academic year and full-time positions during the summer to students who need financial assistance to attend college.

Other Employment

The College coordinates and maintains lists of part-time and summer employment opportunities. Interested students should contact the Coordinator of Career Services for additional information.

LOANS

National Direct Student Loans (NDSL)

These loans are available to students with financial need who are enrolled at least half-time. An aggregate of $5,000 is the maximum an undergraduate can borrow, and $10,000 is the aggregate a graduate student can borrow. Repayment and 3 percent interest begin 9 months after leaving college. Deferment and cancellation benefits are available for certain situations.

Insured Student Loans

This program is administered by the New York Higher Education Services Corporation (NYHESC) for New York State residents. These loans are available from a bank or other lending agent to students who are registered at least half-time. Undergraduates can borrow an aggregate of $7,500 for their undergraduate studies, and a graduate student can borrow an aggregate of $10,000. Repayment and 7 percent interest begin 9 months after leaving college (an additional 1 percent interest is paid at the time the loan is received). Applications are available at local banks or at the Office of Financial Aid.

Emergency Loans

The College is able to provide registered students interest-free, short-term loans. These loans are available because of the interest and support of the following donors: Alumni Association Short-term Loan Fund, Karl T. Frederick Memorial Fund, C. Ives Gehring Memorial Fund, Milton Hick Memorial Fund, James D. Judson Memorial Fund, David B. Schorer Memorial Fund and Edward Vail Emergency Fund.

Students should contact the Office of Financial Aid when need arises for a short-term loan.

3. Applicants who are financially independent of their parents should obtain the Student Financial Statement (SFS) from two-year college financial aid offices or the College's Office of Financial Aid.
4. Applicants need not wait for notification of acceptance to the College before applying for financial aid. Applications will be accepted after March 15; it should be noted, however, that available funds may already be committed to other students.
5. Students are invited to discuss with the professionals in the Financial Aid Office any problems in financing their education. *Applications for aid should be completed by March 15.*

SELECTION OF RECIPIENTS

In making award decisions, consideration is given primarily to comparative financial need; however, scholastic standing, character, and potential contribution to the College community are also factors in making certain awards.

SCHOLARSHIP AND GRANT PROGRAMS

Supplemental Educational Opportunity Grants (SEOG)

The College is the recipient of funds authorized under Title IV-A of the Higher Education Act of 1965, as amended. These funds enable the College to award grants to students who have high financial need. Grants range from $200 to $1,500 per year and must be matched by other awards.

Forestry Educational Opportunity Grant Program (FEOP)

Students accepted into the FEOP may receive partial tuition waivers and grants to help meet the cost of their education. Students must come from a socio-economically disadvantaged background to be eligible for this program. Interested students should apply to the program in their admissions application, and for the corresponding financial assistance from the Office of Financial Aid.

Basic Educational Opportunity Grants (BEOG)

The BEOG Program was authorized in the Education Amendments of 1972. Grants are available to eligible full-time and half-time students. The amount of the award can vary from $200 to $1,400 depending on the following:

1. The amount of funds made available by the Federal government.
2. The amount determined by an entitlement computation formula.
3. The cost of the student's education as allowed by the program.

Applications are available from high school guidance offices or any college office of financial aid. Students should submit the Student Eligibility Report (SER) as soon as it is received from Iowa City.

Private Scholarships and Grants

The College administers a number of programs which have been established by private individuals, companies, organizations, and foundations. These scholarship and grant programs have varying eligibility requirements and are awarded to students according to their respective guidelines. The following is a list of the programs: Alumni Memorial Awards, Alumni Educational Grants, Allied Paper Salesmen's Association, Inc., Harold L. Austin Memorial Scholarship, Nelson Cortlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Award, Jack L. Krall Memorial Scholarship Fund, Federated Garden Clubs of New York State, Inc., and Heiberg Memorial Fund.

Other opportunities include: Joseph S. Illick Memorial Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, C.E. Libby Award, New York State College of Forestry Foundation, Inc., Portia Farrell Morgan Scholarship, Frank B. Myers Memorial Award, Charles Lathrop Pack Awards, Society of Plastic Engineers, Central New York Section Award, Phyllis Roskin Memorial Award, Ernest Sondheimer Scholarship Award, and Student Association Grants.

Syracuse Pulp and Paper Foundation, Inc. Scholarships

Scholarships from this foundation are awarded to students majoring in paper science and engineering. The scholarship amount is $100 more than the recipient's annual tuition charge. Incoming freshmen and transfer students entering the program should request a Pulp and Paper Scholarship application from the Office of Financial Aid. It is necessary to reapply each year for the scholarship.

State University Scholarships (SUS)

New York State residents who have a family net taxable income of $2,000 or less are eligible for assistance to pay the balance of the tuition not covered by the Tuition Assistance Program Award. Applications for this program are available at the time of registration.

Partial Tuition Waivers

In the Spring of 1972, the State University of New York Board of Trustees established a program of tuition waivers for New York State residents. The program reduces the cost of tuition for many students whose family taxable income is $12,000 or less. The amount of the waiver is based on the tuition charge and the amount of income reported on the Regents application. Students eligible for Regents awards will be asked to file the additional application after the Regents application has been processed. New York State residents who are not eligible for the benefits from Regents programs should write to the Office of Financial Aid for the appropriate application.

Student Life

HOUSING

The College of Environmental Science and Forestry does not operate its own residence facilities or food service. Students enter into a Room and Board Agreement with Syracuse University, which is adjacent to the State-operated College.

Residence in a Syracuse University living center or in an approved fraternity or sorority house (upperclasses only) is required of all single freshman and sophomore students under 21 years of age.

Permission may be granted by the Syracuse University Office of Residential Life allowing the student to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative. Any exceptions to this requirement are listed in the room and board agreements.

Students have a choice of living centers at Syracuse University—large halls, apartment houses, cottages, fraternities and sorority houses, or co-operative units. Graduate student resident advisors live on each floor or in each unit and are available for counseling, advisement, and referral services.

Syracuse University also has housing units available for married students and their families. While veterans are given preference, non-veterans too can usually find housing.

EXTRACURRICULAR ACTIVITIES

Students at the College of Environmental Science and Forestry have many extracurricular activities to choose from, both on campus and in the community.

At the College

ESF students elect class officers annually and the *Student Council* is the official representative body governing extracurricular affairs.

Among the departmental organizations which offer students an opportunity to broaden their knowledge and to meet other students with similar interests are: *Archery Club*, for those interested in field archery; *Bob*

Marshall Club, an organization of students concerned about the future of the Adirondack Mountains; the *Forestry Club*, the traditional sponsor of the Woodsmen's Team; *Botany Club; Mollet Club*, an organization of landscape architecture students; the *Papyrus Club*, organized by paper science and engineering students as a way to keep up with new developments in the industry; the *Wood Products Engineering Club*, a group that sponsors guest speakers and noted lecturers; and the *Zoology Club*, which sponsors lectures, films and field trips.

Other groups on campus include *Vox Silvae*, a debate team; *Saengerbund*, the College glee club; *Robin Hood*, the all-junior honor society; and *Alpha Xi Sigma*, senior honorary society. There are also student chapters of the *Wildlife Society*, the *Society of American Foresters*, and the *American Fisheries Society*.

The two major student publications at ESF are *The Knothole*, a weekly newspaper, and *The Empire Forester*, an annual pictorial review which has won many awards in past years.

ESF students support both a basketball club, and a basketball intramural league.

At Syracuse University

Students at the College of Environmental Science and Forestry have all the privileges of Syracuse University students; participation in student government, organizations, sports, and other extracurricular activities is open to them.

Archbold Gymnasium on the Syracuse University campus is the center of athletics and physical education. It is equipped with regulation basketball courts, volleyball and badminton courts, and handball and squash courts. There are also a weight training room, pool, rowing tank, and rifle range.

Manley Field House provides indoor practice facilities for many sports including football, track, and lacrosse; it is the site of Syracuse University home basketball games.

Facilities at Skytop recreation area include ski tows and a ski jump, a lodge and 22 tennis courts.

The Women's Building offers instructional, social and recreational facilities that include swimming, basketball, bowling, and tennis.

In the Syracuse Area

The City of Syracuse and its surrounding countryside offer many cultural, educational, and recreational opportunities. The City has several fine museums including the Everson, with its outstanding collection of works by local, regional, and international artists; a local repertory theater; several points of historical interest; a professional symphony orchestra; and a newly opened Civic Center which will bring artists from around the world to Syracuse.

Eight parks lie within the city limits; numerous county and state parks, including Beaver Lake Nature Center and Montezuma Wildlife Reservation, are within a short drive.

In the summer, golf enthusiasts have 23 public courses to choose from; water sports fans travel to nearby Lake Ontario, Oneida Lake, and the Finger Lakes. Winter sports, especially skiing and skating, abound in Central New York. Special annual events include the New York State Fair, the Scottish Games, and Regatta Weekend.

COLLEGE SERVICES

Academic and Personal Counseling

The Office of Student Affairs is available throughout the students' college career as a place where they may seek, at any time, the advice of experienced counselors. This office should be the first contact when questions or personal problems arise. General advisement for international students is provided by the Office of International Forestry. The Registrar in the Student Affairs Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition, the Coordinator of Financial Aid in the Student Affairs Office provides information on available scholarships, long-term State and Federal educational loans, work opportunities at the College, and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration, the student is assigned to a faculty advisor for assistance as needed in curriculum decision, program development, and elective decisions. In curriculum selection, special advisors are assigned to provide academic advice as needed. Faculty in the major departments are also available for academic guidance. In addition, many classes are small, permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later and professional life.

Career Services

Every student sooner or later asks the question "How will I apply my education?" To help with the answers, the Office of Career Services offers counseling and guidance to all students as they make the transition from college to career or graduate school.

Objectives of the Office include: providing career, employment, and educational information to all students and alumni; assisting individuals in career objectives and decisions; and providing the College with information for planning and operational purposes.

To provide these services, the Office conducts such activities as: sponsoring career seminars; maintaining listings of full-time, part-time, and summer job opportunities; and making available a "career library,"

made up of specialized directories and reference sources, company literature, and professional organization material. The Office of Career Services also works in liaison with the placement efforts of the Schools at ESF, as well as the Office of Career Services at Syracuse University.

Veterans' Counseling

Veterans can receive personal counseling on social, financial or academic problems through the Office of Student Affairs. Information and application forms for V.A. Educational Benefits, Tutorial Assistance, Work-Study Allowance, and the ESF Veterans' Tuition Deferral Plan are available upon request. A Veterans' Administration representative is available periodically for information pertaining to veterans' welfare and benefits while on campus.

Other Counseling

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with several full-time and part-time denominational chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident advisors are located in all University dormitories, and are available for assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which the major work is taken.

Health and Medical Facilities

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service. They are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement per college year with ordinary medical care in the infirmary. Infirmary usage over 10 days will be at prevailing infirmary rates. Laboratory examinations, if necessary for treatment or diagnosis of common illness, are usually provided without cost. Most common legal drugs are provided without extra charge.

A student accident or sickness insurance plan, available at Fall registration, not only supplements the usual infirmary privileges, but is also a health protection during the summer months when students are not under the care of the Health Service. Married students with dependents who are not covered by Health Service privileges are

strongly urged to provide themselves and their families with special insurance made available to University students. *All international students are required to carry health and accident insurance.*

Military Service

The Registrar's Office keeps on file up-to-date information on Selective Service. Students reaching 18 years of age after arriving in Syracuse may register with Selective Service in the Office of Student Affairs.

Air Force and Army Reserve Officer Training Corps programs are available; however, a minimum of two years is required.

Hearing and Speech Center

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech and voice disorders. This service is without expense to students.

Psychological Services and Research Center

Students desiring an analysis of their aptitudes, abilities and interests may secure special testing programs at the Testing and Evaluation Service Center on the Syracuse University campus.

Reading and Language Arts Center

The Syracuse University School of Education, in cooperation with the College of Arts and Sciences and the Psychological Services and Research Center, maintains a reading and language arts center for research in the learning skills and for training teachers and specialists in reading and language arts. Representatives from the fields of medicine, speech, and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

Alumni Association

The Alumni Office serves as the liaison between the College, the Alumni Association Board of Directors, and more than 6,000 alumni. The Association supports educational programs through scholarships, publishes a quarterly newsletter, and represents alumni concerns.

Undergraduate Rules and Regulations

The complete listing of guidelines for all undergraduate students attending ESF and residing on the Syracuse University campus is found in a separate publication, the *Student Handbook*, which is distributed at registration. Also distributed at registration are copies of "Rules and Regulations of Conduct and Behavior" which pertain to all members of the College community. It is the student's responsibility to be familiar with these regulations and abide by them.

Academic Life

STUDENTS AND FACULTY

Education in the classroom, laboratory and field is a cooperative endeavor between students and faculty, and is an enriching experience for both. This two-way communication is traditional at the College, so much so that deans and department chairmen, with considerable administrative duties, still meet classes and consider it a privilege to do so.

Men and women are enrolled as students at the College, and in the Fall, 1975, numbered 2,491. Of these, 2,039 were undergraduates and 452 were graduate students. In addition, there were students engaged in postdoctoral work. A growing number of students at the College transfer from community colleges and other institutions, and international students are encouraged to apply for admission.

The teaching and research faculty number about 150. Selected professors are designated as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultation. Many of them serve as advisors to undergraduates, a practice which is particularly helpful to students seeking advanced degrees.

ORIENTATION

To ease the adjustment to college life, *all freshmen and new transfer students* are required to attend an orientation period during registration week of the Fall semester. This is an opportunity for new students to meet classmates and members of the faculty and administration. It is also a good way to become acquainted with the College, its functions, operations and services. A special orientation session for international students is provided through the Office of International Forestry.

A weekly one-hour orientation course, *General Forestry 032*, is required throughout the first semester for all freshmen and transfer students. The purpose of this course is to introduce the new undergraduate student to the College standards, counseling services and general College policy.

ACADEMIC ADVISEMENT

Upon arrival at the College, each student is assigned to a faculty advisor who can provide the student with information and advice on courses and programs both at the College and at Syracuse University. The success of this program rests largely upon the student to take the initiative in seeking assistance.

ATTENDANCE

In general, undergraduates are expected but not required to attend all of their scheduled classes. Faculty members may make regular class attendance a course requirement.

DROPPING OR ADDING COURSES

Changes in schedule may be made with the approval of the student's advisor and curriculum director. Such changes take place within the *first three weeks* of the semester.

CHANGE OF CURRICULUM

A student is allowed without petition one change of curriculum after beginning the major work.

WITHDRAWALS

A student who finds it necessary to withdraw from the College must notify the Office of Student Affairs. If the student withdraws before the official drop date for the semester, the student's permanent record card will be marked "no credit for the semester." After that date, entries will be based on the instructor's report as "withdrew passing" or "withdrew failing."

GRADES AND GRADE POINTS

College academic records list credit hours, grades and grade points. Grade points indicate the quality of work done according to the following scale:

Grade	*Quality*	*Grade Points Per Credit Hour*
A	Excellent	4
B	Good	3
C	Average	2
D	Minimum passing	1
F	Failure	0

CREDIT HOUR LOAD

A normal schedule for a full-time student at the College is defined as 12 or more credit hours per semester up to and including 20 hours.

GRADE POINT AVERAGE

The student must obtain a C average (2.0) to be in academic good standing. The student's cumulative average is determined by dividing the number of credit hours carried into the total number of grade points earned for those hours.

COLLEGE HONOR LIST

Students who have carried a minimum of 12 credit hours of course work and who have achieved a minimum semester average of 3.0 are placed on the College Honor List for that semester.

PROBATION

A student whose cumulative or semester grade point average falls below 2.0 will, after review by the Undergraduate Academic Affairs Committee, either be placed on probation or academically dismissed.

FAILURES AND INCOMPLETES

A student who fails a required course must repeat it.

A student is allowed one semester in which to make up an incomplete. Failure to do so results in an F.

GRADUATION REQUIREMENTS

To meet the academic requirements for graduation, a student must:

1. be in residence at the College during the final year;
2. complete the total course requirements of the approved degree program;
3. have a minimum cumulative grade-point average of 2.00.

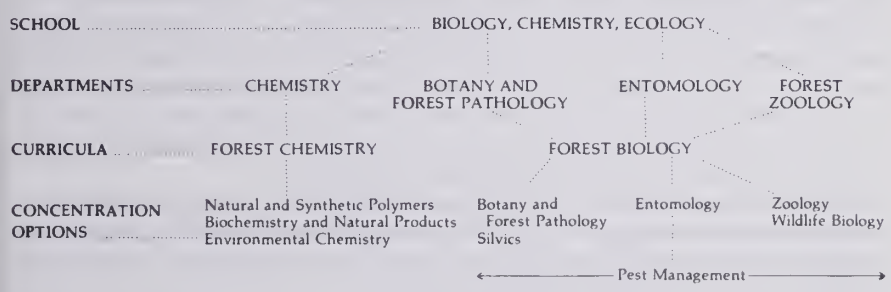
COMMENCEMENT HONORS

Commencement honors are awarded to those students who have attained one of the following academic averages: *cum laude*, 3.0; *magna cum laude*, 3.34; *summa cum laude*, 3.83.

Areas of Study

THE SCHOOL OF BIOLOGY, CHEMISTRY AND ECOLOGY

The School of Biology, Chemistry and Ecology offers two curricula which support the science and ecological areas of environmental science and forestry.



Forest Biology

The School's biology curriculum is designed to educate biologists and to provide them with a firm grounding in forestry principles. The program is directed at both those students planning graduate study in the biological sciences, as well as those students who will seek biologist positions in such areas as forestry research, disease and insect control, recreation, fish and wildlife biology and management.

The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions to a wide range of environmental problems.

Requirements

The curriculum is built around a core of required courses which provide the student with a general education, an introduction to forestry principles and a sound background in biology and the physical sciences. It is designed to achieve breadth in biology as well as depth in a selected area of concentration.

The flexibility of the curriculum allows for the development of a variety of programs within or across the several participating departments, according to the academic and professional goals of the student. All students are considered to be majoring in biology, and each student is assigned an advisor to aid in program decisions.

Attendence in a 5-week or more summer field program is required. Most students attend the College's program at the Warrensburg Campus. Several attend the College's program at the Cranberry Lake Biological Station or that of another approved university summer camp.

Areas of Concentration

Botany and Forest Pathology—This concentration prepares students for a wide variety of opportunities in the botanically-oriented professions. They range from graduate work leading to a master's or Ph.D. degree to botanically allied land management positions, to forest pathology and pest control positions with state and Federal governments, and to a variety of positions requiring an ecological expertise.

Entomology—The Entomology department offers basic courses on insect life, their functions in relation to man and his environment, and the elements for integrated pest management. Opportunities for employment in each of these and related fields exist in federal, state and private agencies as well as with industrial firms. Through selected coursework it is possible to fulfill civil service and industrial standards and to prepare for certification in pest control and pesticide application. Any student contemplating a career in entomology is advised to consult with the chairman of the Entomology department.

Silvics—This concentration grafts an appreciation of the manipulation of forest ecosystems for the benefit of man on to a strong biological base and prepares students for graduate study in silviculture or botany and positions in state and Federal government.

Wildlife Biology—A basic and applied program in fish and wildlife biology is provided for the student whose objectives are to develop some professional skills in the biology and management of these natural resources. However, full professional training normally requires some graduate study that can follow either the zoology or wildlife biology concentrations.

Zoology—This concentration provides a basic and broad program in zoology for the student whose objectives are to go on for graduate study or to develop some emphasis in such subject areas as physiology, soil invertebrate zoology, animal behavior or general ecology.

General requirements for federal and state biology positions are met by the curriculum. Position requirements in a broad range of special

biological fields related to natural resources also may be achieved by selection of electives. Requirements for federal and state forestry positions may be satisfied by choosing specified forestry subjects as electives.

Electives

Students in many concentration areas planning graduate study are urged to take two semesters of a language (as approved by their faculty advisor) as a part of their humanistic-social sciences elective requirement.

Students planning to meet special requirements for biology specialty positions in federal and state service should review the available Civil Service publications and become familiar with the specific course requirements to be met by elective choice.

Students planning to meet special requirements for Federal Civil Service positions in forestry at the GS-5 and GS-7 levels may do so by electing 10 credits in additional forestry courses and attending the Summer Session in Field Forestry at Warrensburg, New York. These special forestry requirements may be fulfilled by courses selected with the approval of the faculty advisor.

Transfer Students

The curriculum is arranged to facilitate transfer of students from the State University community colleges at the end of their freshman or sophomore years. Recommended core courses for students planning to transfer as entering juniors total 64 credits or an associate degree and include: biology (8 credits); general chemistry (8); organic chemistry (8); physics (8); mathematics through integral calculus (8); economics (3); English (6); and electives (14).

Chemistry

The Department of Chemistry offers three areas of concentration, or options, leading to the Bachelor of Science degree: Environmental Chemistry, Biochemistry and Natural Products Chemistry, and Natural and Synthetic Polymer Chemistry. Students in all options, by selecting proper electives, may be certified on graduation as having completed an American Chemical Society approved curriculum. All options are excellent grounding for professional work at the B.S. level or for advanced graduate study.

For students planning to transfer as entering juniors, recommended core courses consist of 64 credits or an associate degree and include: biology 8 credits, general chemistry 8, organic chemistry 8, physics 8, mathematics through integral calculus 8, economics 3, English 6, electives 14.

The first two years of all curricula are identical, and for this reason students should postpone their choice until the beginning of the junior year.

FOREST BIOLOGY CURRICULUM

Freshman Year

			Credit Hours
First Semester	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	FBO 100	General Botany	4
	English		3
	[1]Math		3
	[2]Elective		3
	GFO 032	Orientation	0
			17
Second Semester	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	FZO 100	General Zoology	4
	English		3
	[1]Math		3
	[2]Elective		3
			17

Sophomore Year

First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	PHY 103	General Physics	4
	FBL 320	General Ecology	3
	[2]Electives		6
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	PHY 104	General Physics	4
	ERM 205	Introduction to Macroeconomics	3
	[2]Electives		6
			17

Summer Session Alternate A[3]

SUMMER SESSION IN FIELD FORESTRY. 5 weeks, 6 credit hours. This program is conducted in two separate sessions during the summer period at the College's Pack Demonstration Forest near Warrensburg, New York.

[3]See Note 3 page 51

	ERM 300	Summer Session in Field Forestry	6
			6

Junior Year

			Credit Hours
First Semester	FBO 315	Dendrology I	2
	FEN 350	Elements of Forest Entomology	3
	FBL 330	Principles of General Physiology	3
	[2]Electives		6
			14
Second Semester	FBL 370	Principles of Genetics	3
	FBL 371	Principles of Genetics Lab	1
	APM 491	Introduction to Probability and Statistics	3
	GOL 105	Earth Science (3)	3
	or		
	ERM 345	Soils (3)	
	[2]Elective		2
			12

Summer Session Alternate B[3]

SUMMER SESSION IN ENVIRONMENTAL BIOLOGY. 8 weeks, 8 credits. Courses selected require approval of the student's advisor. Program conducted in June-August at the Cranberry Lake Biological Station, Pack Demonstration Forest, Cranberry Lake.

Summer Session Alternate C[3]

Attendance at other approved biological field stations may be arranged. The courses selected must have the prior approval of the student's advisor.

Senior Year

First Semester	[2]Electives		15
			15
Second Semester	[2]Electives		15
			15

[1]Mathematics through integral calculus (MAT 227 or the equivalent) is required.
[2]In addition to the specified courses, students must meet the following requirements:
(a) 12 credit hours in a selected biology concentration (zoology or wildlife biology, botany and forest pathology, entomology, or silvics.)
(b) 6 credit hours in a second biological area.
(c) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.
(d) 3 credit hours in the Resource Management area.
(e) 9 credit hours in humanities and social sciences chosen with approval of faculty advisor.
(f) 27 credit hours in elective courses selected with approval of the faculty advisor.

[3]Students with a 2.5 academic average or better may substitute for this requirement 8 credit hours of courses at the Cranberry Lake Biological Station or minimum of 6 credit hours at other biological field stations. The courses selected must have the approval of the student's advisor. It is preferable that any substitute program be taken between the junior and senior years.

NOTE: 5 credits of additional forestry courses are recommended for those students not attending the summer session in Field Forestry.

A total of 131 credit hours is required.

CHEMISTRY CURRICULUM

Freshman Year			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
			17
Sophomore Year			
First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	EGL 210	Advanced Composition and Literature	3
	[1]Math or Elective		3
	PHY 211	General Physics for Science Students I	4
	Elective		3
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	EGL 211	Technical Writing	3
	[1]Math or Elective		3
	PHY 212	General Physics for Science Students II	4
	ERM 204	Introduction to Economics for Forestry	3
			17

Biochemistry and Natural Products Chemistry Option

This option is designed for students who wish to approach problems in the life sciences with the tools and point of view of the chemist. In addition to a major concentration in the several branches of chemistry, the student obtains a solid grounding in the fundamentals of physics, mathematics and biology. Professional electives can provide a minor concentration in botany, ecology, entomology, zoology, or physiology. Collaborative efforts of chemists and biologists are providing new solutions to problems of environment, natural resources and health.

BIOCHEMISTRY AND NATURAL PRODUCTS CHEMISTRY CURRICULUM

Junior Year

			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Math or Elective		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		2-3
	Elective		3
			16-17

Senior Year

First Semester	FCH 495	Introduction to Professional Chemistry	2
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	FCH 530	Biochemistry I	3
	FCH 531	Biochemistry Lab	2
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 497	Undergraduate Seminar	1
	FCH 532	Biochemistry II	3
	FCH 477	Wood Chemistry III	2
	[5]EGL 215	Public Speaking	3
	Elective		3
			17

[1]One course of mathematics or applied mathematics beyond MAT 227 or MAT 397, or equivalent, is required.
[2]A sequence of professional electives should be chosen in the junior year. In addition to the freshman biology courses, a student whose emphasis is in biochemistry must take three semester hours of genetics and at least another three semester hour biology course. A student whose emphasis is in natural products must take three semester hours of biology in addition to the freshman biology courses and an additional hour of organic chemistry laboratory (FCH 496) and a second hour of FCH 384.
[3]Introduction to Polymer Science, FCH 450 (3 credit hours) is suggested.
[4]Petition by student to Department for replacement of this requirement will be considered to allow time for special interest.
[5]ERM 464 may be substituted.

NOTE: A total of 133 credit hours is required.

ENVIRONMENTAL CHEMISTRY CURRICULUM

Junior Year

			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Statistics		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	FCH 310	Environmental Chemistry	3
	Elective		3
			17

Senior Year

			Credit Hours
First Semester	FCH 495	Introduction to Professional Chemistry	2
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	FCH 496	Special Problems (Aquatic Chemistry)	3
	[2]Professional Elective		2-3
	[3]Elective		3
	Elective		3
			16-17
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 496	Special Problems (Chemistry of Pollution)	1-3
	FCH 497	Undergraduate Seminar	1
	FCH 477	Wood Chemistry III	2
	[5]EGL 215	Public Speaking	3
	Elective		3
			15-17

[1]A statistics course beyond MAT 227 or MAT 397, or equivalent is required. APM 491 is recommended, but MAT 521 or MAT 525 are acceptable.
[2]A wide variety of courses offered by the departments of chemistry, botany, zoology, ecology, entomology, forest engineering and resource management is available to supplement the environmental chemistry concentration.
[3]Biochemistry I, FCH 530, (3 credit hours) is suggested.
[4]Petition by student to department for replacement of this requirement will be considered to allow time for special interest.
[5]ERM 464 may be substituted.

NOTE: A total of 133 credit hours is required.

Environmental Chemistry Option

The environmental chemistry option is designed for those students who wish to obtain a solid fundamental background in chemistry which will enable them to make a strong contribution towards the identification and solution of problems in the areas of pollution, air and water quality, analysis and basic research in environmental chemistry. A large number of professional electives, available through course offerings of other departments such as biology and engineering, provide the important interface with other disciplines necessary for a working understanding of the complex problems inherent in environmental studies.

Natural and Synthetic Polymer Chemistry Option

This option is designed for students interested in the structure and physical properties of man-made and natural materials, the giant molecules of wood, plastics, polysaccharides, proteins, rubbers and fibers. The recently discovered chemistry of these materials constitutes one-half the concern of the chemical industry and is the origin of a major revolution in our way of life and our understanding of nature. This special subject area is an advanced core of studies beyond the basic courses of the classical undergraduate chemistry curriculum.

NATURAL AND SYNTHETIC POLYMER CHEMISTRY CURRICULUM

Junior Year			*Credit Hours*
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Math or Elective		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		2-3
	Elective		3
			16-17

Senior Year

			Credit Hours
First Semester	FCH 495	Introduction to Professional Chemistry	2
	FCH 450	Introduction to Polymer Science	3
	FCH 551	Polymer Techniques	2
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 552	Polymer Processing and Technology	3
	FCH 497	Undergraduate Seminar	1
	FCH 477	Wood Chemistry III	2
	[5]EGL 215	Public Speaking	3
	Elective		3
			17

[1]One course of mathematics or applied mathematics beyond MAT 227 or MAT 397, or equivalent, is required.
[2]A sequence of two or more professional electives in related disciplines with a minimum of 5 credits should be chosen in the fall of the junior year from the College of ESF offerings. Wood Products Engineering and Paper Science and Engineering courses are recommended.
[3]Biochem I, FCH 530 (3 credit hours) is suggested.
[4]Petition by student to Department for replacement of this requirement will be considered to allow time for special interest.
[5]ERM 464 may be substituted.

NOTE: A total of 133 credit hours is required.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE ENGINEERING

The School of Environmental and Resource Engineering applies the principles and professional skills of engineering analysis and design to creative environmental stewardship, with emphasis on responsible use of renewable natural resources for the benefit of society. The curricula, programs and activities of the School are oriented toward multiple use of forest resources, wood products, paper and related fibrous materials. Environmental considerations, including pollution abatement, waste recovery and recycle, energy conservation, noise control and safety optimization, are basic to all courses and studies.

In each curriculum, fundamental professional requirements are met by a core of required courses, supplemented by optional choices and electives. Students may enter either as freshmen or as transfers from other colleges or universities. Applicants with associate degrees in engineering science, or science and mathematics, usually enter as juniors. Graduates of two-year technology programs also may earn junior standing if their previous studies include one year each of English, general chemistry and general physics, plus mathematics through integral calculus. Courses in general botany, engineering mechanics and economics also are desirable.

The School offers bachelor of science degrees in forest engineering, paper science and engineering, and wood products engineering. Specific requirements in the programs leading to these degrees are described below.

Forest Engineering

The primary objective of this curriculum is to prepare qualified engineering graduates to operate with professional competence within the context of forest and natural resources development. The curriculum is based on the natural and engineering sciences. It utilizes elements of traditional engineering disciplines and develops its unique aspects from interweaving engineering design with an understanding of the natural environment and its renewable resource base including water, soil, timber, wildlife and amenity values. Studies in the humanities and social and economic sciences are integrated throughout the curriculum to help achieve a broad and balanced perspective of professional practice in forest engineering.

In this program students are instructed in the planning, design and construction of systems and facilities to serve the improved utilization of the natural resource base indigenous to the forest environment. Instruction focuses on the engineering activities of: locating *and* quantifying natural resources, harvesting and transporting the primary resources of water and timber; and, designing structures and facilities and pollution abatement schemes in the planning and development of sites and regions for multiple use. Because of the special importance of continual measurement and evaluation of the broad-scaled parameters which affect this resource base, the forest engineering program offers

unique preparation for students aiming toward professional careers involving the conceptualization, design and maintenance of geographically referenced resource information systems. This preparation includes elements of surveying, geodesy, photogrammetry, remote sensing and resource information system design. Additional program emphases such as water resources, construction, etc., may be achieved through the wise use of nondesignated technical electives and designated design electives.

Qualified graduates in search of advanced degree education enjoy ready acceptance to engineering graduate schools throughout the country. Of course, a number of appropriate graduate programs are available at the College and at Syracuse University. In addition, graduates of the Forest Engineering curriculum may enter an established five-year program in either civil, industrial or mechanical engineering at Syracuse University. A bachelor of science degree in engineering will be awarded by Syracuse University upon completion of the requirements of the fifth year.

Prospective entrants to the program with associate degrees in engineering science, or science and mathematics, usually find transfer acceptance as juniors. Students looking forward to the broad educational opportunities offered by the forest engineering program are urged to obtain guidance on specific program requirements from the Admissions Office of the College as early as possible in their preparatory programs.

FOREST ENGINEERING CURRICULUM

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 295	Calculus I	3
	Elective	Humanities or Social Science	3
	GF 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	English		3
	MAT 296	Calculus II	3
	ERM 205	Introduction to Macroeconomics	3
	ERE 100	The Engineer and the Environment	1
			17

Sophomore Year

			Credit Hours
First Semester	MAT 397	Calculus III	3
	GRA 280	Technical Drawing	1
	ERM 206	Introduction to Microeconomics	3
	PHY 103	General Physics	4
	*Engineering Science Elective		3
	Elective	Humanities or Social Science	3
			17
Second Semester	MAT 398	Calculus IV	3
	APM 360	Introduction to Computer Programming	3
	PHY 104	General Physics	4
	MEE 225	Engineering Mechanics	4
	*Elective	Engineering Science, Humanities, or Social Science	3
			17

Junior Year

First Semester	FEG 300	Introduction to Engineering Design	1
	FEG 371	Surveying for Engineers	3
	FBO 315	Dendrology I	2
	APM 491	Introduction to Probability and Statistics	3
	MAT 585	Higher Math for Engineers and Scientists I	3
	CIE 327	Principles of Fluid Mechanics	4
			16
Second Semester	FEG 340	Hydrology	3
	FEG 350	Introduction to Remote Sensing	2
	FEG 363	Photogrammetry	3
	CIE 325	Mechanics of Deformable Bodies	3
	ERM 333	General Silviculture	3
	*Elective	Engineering Science, Humanities, or Social Science	3
			17

Senior Year

			Credit Hours
First Semester	FEG 410	Structures	4
	FEG 422	Production Systems Engineering	4
	ERM 477	Environmental and Resource Management	3
	CIE 437	Soil Mechanics and Foundations I	3
	Elective	Humanities, Social Science, or Technical	2-3
			16-17
Second Semester	FEG 437	Transportation Systems	4
	FEG 447	Hydrologic Controls	3
	FEG 489	Forest Engineering Planning	4
	**Elective in Engineering Design Sequence		3
	Elective	Humanities, Social Science, or Technical	3
			17

Optional Senior Year Emphasizing Surveying

First Semester	FEG 460	Measurement Errors and Adjustment Computations	3
	FEG 486	Cartographic Surveying	3
	CIE 437	Soil Mechanics and Foundations I	3
	**Elective in Engineering Design Sequence		3
	Elective	Humanities, Social Science, or Technical	3
			15
Second Semester	FEG 437	Transportation Systems	4
	FEG 464	Photogrammetry II	4
	FEG 477	Survey Systems Design	3
	FEG 489	Forest Engineering Planning	4
	Elective	Humanities, Social Science, or Technical	3
			18

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1. At least 9 credit hours must be elected in social sciences or humanities, at least 3 credit hours of which must be from the College. Upper division electives are recommended.
2. The asterisked electives recommend the semesters in which the following curriculum requirements can be met through coursework such as, but not limited to:

*At least 6 credit hours elected in engineering sciences

(ECE 221) Electrical Science I
(MEE 323) Vibrations and Controls
(ERE 364) Engineering Materials
(MEE 351) Fundamentals of Thermodynamics
(ECE 222) Electrical Science II
(MEE 327) Advanced Dynamics
(CIE 326) Engineering Materials
(PSE 370) Principles of Mass and Energy Balance

**At least 3 credit hours elected in engineering design or synthesis as part of an advisor approved sequence which complements other required or elected coursework

(FEG 410) Structures
(FEG 422) Production Systems Engineering
(FEG 447) Hydrologic Controls
(FEG 477) Survey Systems Design
(WPE 404) Design of Wood Structural Elements
(CIE 332) Structures II
(CIE 438) Soil Mechanics and Foundations II
(CIE 454) Treatment of Water and Waste Water
(WPE 472) Production Systems II: Synthesis
(MEE 472) Synthesis of Systems

NOTE: A total of 134 credit hours is required for the B.S. degree from the College of ESF in this curriculum.

Paper Science and Engineering

The curriculum in Paper Science and Engineering is designed to provide a broad base of study and to prepare students for a variety of careers in the paper and related industries. Excellent opportunities are provided for men and women qualified to fill positions as research chemists, process engineers, technical service representatives, line management personnel, and many others.

The program provides education in the physical sciences, mathematics, and engineering, combined with a specific understanding of the chemistry and anatomy of wood, pulping of wood, chemistry and physics of paper and paper formation, and the chemical engineering of pulp and paper processing. Qualified graduates who wish to continue their formal education find excellent opportunities for graduate studies, either in specialized paper science curricula at the College or elsewhere, or in general science and engineering programs throughout the country.

Students having an associate degree in engineering science can complete their baccalaureate degree program in two years. Transfer students with other preparation also may enter with junior standing if they present 68 credits of acceptable courses including the following subjects:

English ..... 6 credits
General Chemistry ..... 8 credits
Organic Chemistry ..... 8 credits
General Physics ..... 8 credits
Mathematics ..... 9 credits
Economics ..... 6 credits

PAPER SCIENCE AND ENGINEERING CURRICULUM

Freshman Year			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	ERM 205	Introduction to Macroeconomics	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	ERE 100	The Engineer and the Environment	1
			17

NOTE: A total of 134 credit hours is required.

[1]Mathematics through MAT 328, or the equivalent, is required.

Sophomore Year

			Credit Hours
First Semester	[1]Math or Elective		3
	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	PHY 103	General Physics	4
	Elective		3
	ERM 206	Introduction to Microeconomics	3
			17
Second Semester	[1]Math or Elective		3
	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	PHY 104	General Physics	4
	EGL 211	Technical Writing	3
	Elective		3
			17

Junior Year

First Semester	FCH 475	Wood Chemistry I	2
	FCH 476	Wood Chemistry II	2
	CHE 346	Physical Chemistry	3
	PSE 300	Introduction to Papermaking	3
	WPE 387	Wood Structure and Properties	2
	WPE 388	Wood and Fiber Identification Lab	2
	PSE 370	Principles of Mass and Energy Balance	3
			17
Second Semester	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	PSE 301	Pulp and Paper Processes	3
	PSE 302	Pulp and Paper Processes Lab	1
	Elective		3
			14

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—2 credit hours. Twelve weeks' full-time pulp or paper mill employment approved by the Department between the junior and senior years.

Senior Year

First Semester	PSE 461	Pulping Technology	4
	PSE 465	Paper Properties	5
	PSE 491	Paper Science and Engineering Project I	1
	PSE 575	Unit Operations I: Fluid Mechanics and Heat Transfer	3
	PSE 576	Unit Operations II: Process Control and Mass Transfer	2
	GRA 280	Technical Drawing	1
			16
Second Semester	PSE 466	Paper Coating and Converting	3
	PSE 468	Papermaking Processes	3
	ERM 465	Managerial Economics	3
	PSE 492	Paper Science and Engineering Project II	3
	PSE 578	Unit Operations III: Mass Transfer	3
	PSE 579	Unit Operations IV: Recovery Processes Operations	2
			17

WOOD PRODUCTS ENGINEERING CURRICULUM
WOOD SCIENCE OPTION

			Credit Hours
Freshman Year			
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
			16
Sophomore Year			
First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	EGL 211	Technical Writing	3
	MAT 328	Topics in Calculus	3
	PHY 104	General Physics	4
	ERM 204	Introduction to Economics for Forestry	3
			17
Junior Year			
First Semester	CHE 346	Physical Chemistry	3
	WPE 322	Mechanical Processing	3
	FBO 315	Dendrology I	2
	APM 491	Introduction to Probability and Statistics	3
	Wood Anatomy Sub-option:		
	FBL 330	Principles of General Physiology	3
	or		
	Wood Physics Sub-option:		
	APM 360	Introduction to Computer Programming	
	WPE 387	Wood Structure and Properties	2
	WPE 388	Wood and Fiber Identification Laboratory	2
			18
Second Semester	CHE 356	Physical Chemistry	3
	WPE 326	Fluid Treatments	3
	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	[1]Electives		6
			15

Senior Year			Credit Hours
First Semester	WPE 422	Composite Materials	3
	Wood Anatomy Sub-option:		
	Elective	(3)	
	PHY 261	Introduction to Modern Physics (3)	6-7
	Wood Physics Sub-option:		
	MEE 225	Engineering Mechanics (4)	
	Elective	(3)	
	Elective		3
	[1]Elective		2-3
			15
Second Semester	WPE 362	Timber Mechanics	4
	WPE 498	Research or Design Problem	3
	Wood Anatomy Sub-option:		
	WPE 688	Commercial Timbers of the World (3)	
	FBO 585	Plant Anatomy (3)	6
	Wood Physics Sub-option:		
	MEE 226	Engineering Mechanics (3)	
	FCH 520	Nuclear and Radiation Chemistry (2)	
	FCH 521	Nuclear Chemical Techniques (1)	
	[1]Elective		3
			16

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

[1]It is recommended that at least 9 credit hours of these electives be in the social sciences or humanities.

NOTE: A total of 133 credit hours is required.

Wood Products Engineering

The Department of Wood Products Engineering prepares students for a wide variety of professional occupations concerned with the use of wood as a primary building material. Four curriculum options are available: building construction, materials marketing, production systems engineering, and wood science.

As the only major construction material derived from a renewable natural resource, increasing attention is being focused on wood as an alternative for other materials which originate from and deplete nonrenewable resources. Thus a principal aim of the departmental program is to teach students the fundamentals of efficient wood processing and distribution or final use, whether as a piece of furniture or a complete house.

Students may enter either as freshmen or as transfers from other colleges or universities. Transfer students with associate degrees will be accepted with full junior standing if they show adequate preparation in subjects essential to their intended options within the department. To avoid preparation deficiencies which may delay graduation, students considering transfer into the wood products engineering curriculum are urged to consult with the College's admissions officers and chairman of the department for detailed guidance concerning specific requirements in each option.

Wood Science Option

The basic aim of the wood science option is to give students a sufficiently basic and broad scientific background so that they will be prepared to enter graduate school for advanced degrees and ultimately go into positions in research and/or development work in industry, government laboratories, or universities.

The wood science option has two major subdivisions:1) The biological aspects of wood science in which the relationships between the pure biological sciences and the anatomy-property relationships of wood are brought out, and 2) The physical science aspects of wood science in which the basic physical sciences are used to help characterize the structure-property relationships in wood. Students may further broaden their background in either of these programs through the wise use of electives.

WOOD PRODUCTS ENGINEERING CURRICULUM
BUILDING CONSTRUCTION OPTION

			Credit Hours
Freshman Year			
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	English		3
	[2]MAT 125	Elementary Analytic Geometry	3
	[1]Elective		3
	GFO 032	Orientation	0
			16
Second Semester	ERM 205	Introduction to Macroeconomics	3
	English		3
	[2]MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
	ERE 100	The Engineer and the Environment	1
	EST 100	Introduction to Environmental Studies	3
			15
Sophomore Year			
First Semester	WPE 322	Mechanical Processing	3
	ERM 206	Introduction to Microeconomics	3
	[2]MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			16
Second Semester	EIN 211	General Geography	3
	APM 360	Introduction to Computer Programming	3
	PHY 104	General Physics	4
	[1]Elective		3
	[2]Elective		3
			16

Junior Year

			Credit Hours
First Semester	WPE 387	Wood Structure and Properties	2
	MEE 225	Engineering Mechanics	4
	APM 491	Introduction to Probability and Statistics	3
	FEG 371	Surveying for Engineers	3
	ACC 204	Financial Accounting Systems	3
			15
Second Semester	ERE 362	Mechanics of Materials	3
	ERE 364	Engineering Materials	3
	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	ACC 252	Introduction to Managerial Accounting	3
	[1]Elective		3
			15

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

Senior Year

First Semester	WPE 422	Composite Materials	3
	FEG 410	Structures	4
	CIE 437	Soil Mechanics and Foundations I	3
	OPM 365	Management of Operations	3
	[1]Elective		3
			16
Second Semester	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Laboratory	1
	WPE 450	Construction Equipment	3
	WPE 454	Construction Management	3
	FEG 342	Hydraulics in Construction	4
	[1]Elective		3
			16

[1]It is recommended that 12 credit hours of electives be taken in the social science-humanities areas. The remaining electives shall be selected from the following areas:

a. From another engineering discipline at the College of ESF or S.U.

b. General technical or management areas.

[2]Students wishing to pursue a fifth year in civil or mechanical engineering should take MAT 295, 296, 397, 398.

NOTE: A total of 127 credit hours is required.

Building Construction Option

The current pressures for new housing and urban reconstruction have led to an option that develops a deep awareness of the effects of construction on the environment, as well as the efficient use of materials, particularly wood. There is an increasing demand for technically trained specialists in the construction industry and supporting fields who have the skills to use efficiently the wide variety of wood-based building materials, with consideration to their place in respect to other materials and to the purpose of the end product.

The specialty electives are designed to allow the opportunity for concentration areas related to the individual's career objectives. It is felt that the wide range of construction activities found in practice cannot be adequately serviced by a rigid program of study.

Suggested areas and available courses have been grouped below. Many courses are not mentioned, but most relevant material should be under the following areas:

Engineering	*Management*	*Environment*
Structural Analysis	Marketing	Urban Planning
Building Systems	Business Law	Solid Waste Disposal
Adv. Soil Mechanics	Accounting	Waste Water Treatment
Photogrammetry	Finance	Environmental Sanitation
Thermodynamics	Industrial Management	Land Use
Transportation	Operations Research	Landscape Architecture
Systems Analysis	Real Estate	

With careful planning and use of electives, students can obtain a B.S. degree in civil or mechanical engineering at Syracuse University with an additional year's work. Similar adjustments can be made to facilitate continuation in an MBA program.

WOOD PRODUCTS ENGINEERING CURRICULUM
PRODUCTION SYSTEMS ENGINEERING OPTION

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	[1]Elective		3
	GFO 032	Orientation	0
			17
Second Semester	ERM 205	Introduction to Macroeconomics	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
			15

Sophomore Year

First Semester	ERM 206	Introduction to Microeconomics	3
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			16
Second Semester	APM 360	Introduction to Computer Programming	3
	EGL 211	Technical Writing	3
	MAT 328	Topics in Calculus	3
	PHY 104	General Physics	4
	[1]Elective		3
			16

Junior Year

			Credit Hours
First Semester	WPE 322	Mechanical Processing	3
	WPE 387	Wood Structure and Properties	2
	IOR 548	Engineering Economic Analysis	3
	APM 491	Introduction to Probability and Statistics	3
	MEE 225	Engineering Mechanics	4
	WPE 388	Wood and Fiber Identification Lab	2
			17
Second Semester	WPE 321	Adhesives and Coatings Lab	1
	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Lab	1
	ERE 362	Mechanics of Materials	4
	ERM 461	Operation Cost Control	3
	MEE 351	Fundamentals of Thermodynamics	3
			16

WPE: 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

SUMMER EXPERIENCE: 2 months' experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required. Usually fulfilled between the junior and senior years.

Senior Year

First Semester	WPE 422	Composite Materials	3
	WPE 470	Production Systems I: Analysis	3
	WPE 497	Senior Seminar for Wood Products Engineering Majors	2
	ELE 221	Electrical Science I	3
	IOR 575	Industrial Methods and Systems Engineering	3
	Technical	Elective	3
			17
Second Semester	WPE 472	Production Systems II: Synthesis	3
	WPE 498	Research or Design Problem	3
	ELE 222	Electrical Science II	3
	[1]Electives		6
			15

[1]It is recommended that students elect at least 9 credit hours from the social sciences or the humanities.

NOTE: A total of 131 credit hours is required.

Production Systems Engineering Option

The goal of this option is to provide an engineering background in the fields of process development, plant design, and production management of modern industries utilizing wood and related materials. Modern production plants are complex systems of machines, men, money and management integrated for production in highly competitive markets. Because the design and operation of such systems are essentially an engineering problem, this option provides a solid foundation in fundamental sciences and applied mathematics which are the basic tools

needed. Beyond the basics, students take courses in engineering and management sciences essential to the planning and development of production processes and to the design and operation of modern manufacturing facilities.

Production systems engineering students may arrange with their advisors to prepare for special program options leading to admission into a bachelor of science degree program at Syracuse University in either industrial or mechanical engineering. Seniors presenting acceptable Graduate Record Examination scores may be admitted to an M.S. program in industrial engineering at Syracuse University. With adequate planning such degrees can usually be obtained after one year's additional work.

Materials Marketing Option

This option is designed to prepare students for professional careers in technical sales, and the management of distributive enterprise, in the wood products and allied industries. It brings together the essential elements of production, distribution, and consumption of the principal product of our only major renewable natural resource. The program involves development of basic knowledge of the materials and their properties, their efficient processing and fabrication, and the effective use of these products. Because marketing channels vary widely in nature, size, and complexity to meet the equally varied needs of commercial, industrial, and consumer markets, preparation must also include the sound general business orientation required of any segment of the economy.

With careful planning, students electing the materials marketing option may obtain the degree of Master of Business Administration from Syracuse University with one year's additional work beyond the bachelor's degree.

WOOD PRODUCTS ENGINEERING CURRICULUM
MATERIALS MARKETING OPTION

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	English		3
	MAT 125	Elementary Analytic Geometry	3
	Elective		3
	GFO 032	Orientation	0
			16
Second Semester	EGL 215	Public Speaking	3
	CHE 116	General Chemistry	3
	English		3
	MAT 226	Differential Calculus	3
	ERE 100	The Engineer and the Environment	1
	Elective		2-3
			15-16

Sophomore Year

			Credit Hours
First Semester	ACC 204	Financial Accounting Systems	3
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	GRA 280	Technical Drawing	1
	Elective		2-3
			16-17
Second Semester	APM 360	Introduction to Computer Programming	3
	ACC 252	Introduction to Managerial Accounting	3
	EGL 211	Technical Writing	3
	PHY 104	General Physics	4
	Elective		3
			16

Junior Year

First Semester	APM 491	Introduction to Probability and Statistics	3
	ERM 206	Introduction to Microeconomics	3
	WPE 322	Mechanical Processing	3
	WPE 387	Wood Structure and Properties	2
	Elective		4-6
			15-17
Second Semester	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	WPE 389	Wood Identification Laboratory	1
	ERE 364	Engineering Materials	3
	ERM 205	Introduction to Macroeconomics	3
	LSA 343	Structural Materials and Elements	3
	Elective		3
			16

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

Senior Year

First Semester	WPE 422	Composite Materials	3
	WPE 442	Light Construction	3
	WPE 497	Senior Seminar for Wood Products Engineering Majors	2
	LPP 355	Introduction to the Legal System	3
	MAR 355	Marketing and Society	3
	Electives		2-3
			16-17
Second Semester	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Laboratory	1
	WPE 444	Materials Marketing	3
	ERM 404	Economics of Wood-Using Industries	3
	FIN 355	Money and Banking	3
	Elective		3
			15

NOTE: A total of 127 credit hours is required.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE MANAGEMENT

The School of Environmental and Resource Management prepares students for the critical role of managing forest and related resources and their associated environments for human benefit. Management in this sense embraces the integration of basic ecological and social principles into comprehensive programs of planning, manipulation and use of forest and open lands for the sustained production of timber, forage, water, wildlife and recreational values consistent with national needs and the protection and enhancement of environmental quality. It includes further the effective implementation of these programs via the administrative process in accordance with established policies and goals and in cooperation with individuals and organizations, both public and private.

Students completing the resource management curriculum are qualified for professional practice as foresters and environmental managers with public and private organizations or as private consultants serving a wide array of clients. The significance of such service to human welfare and the potential it offers for a meaningful career can be more fully appreciated when it is recognized that forest lands alone comprise nearly 60 percent of the land area of New York State and roughly a third of that, respectively, of the United States and the world. The goods and services that flow from this vast resource base are of critical and growing importance to the needs of modern society and influence in a major way the quality of the environment.

The program also offers opportunity for students to pursue special interests, to prepare for advanced study or to develop their capabilities for service in a variety of fields pertinent to renewable natural resources and the environment, but not specifically forestry oriented.

The Management Curriculum

Though it represents the oldest area of professional instruction in the College, this is a newly-revised curriculum which was implemented with the entering Freshman class in 1973. A core of required courses, totaling 99 semester hours, presents the basic principles and practices that underly the purposeful management of forest and related resources for optimum production and use of any one or more of their potential products and services.

Extensive elective opportunities, totaling over one-fourth of the program, are available to help broaden the student's general education, to strengthen perceptions and integration of knowledge and to enable the student to enhance depth of understanding in areas of environmental and resource management of special interest or as a base for subsequent study at the graduate level. Areas of concentration provide meaningful sequences in terms of subject matter coverage. Such areas currently include *forest resource science, management science, environmental education and communications, urban forestry, world forestry,* and *applied resource management* within which emphasis may be focused on multiple-use forest

management, or on single-use values such as timber, forage, watershed, wildlife, recreation and aesthetics.

Additional areas of concentration may be developed in cooperation with other disciplinary units of the College, Moreover, students need not select a given area of concentration, but may choose elective courses in accordance with their respective interests and needs, the only restriction being that such selections have the approval of the student's faculty advisor.

A significant feature of the elective component of the curriculum is that the spring semester of the senior year consists wholly of electives and thus is available for a variety of independent or group study activities. These may be conducted in whole or in part on any one of the College's several campuses, or off campus at another institution, in cooperation with some resource management agency or firm or in conjunction with an overseas academic program operated by the College. Proposals for off-campus study are subject to faculty review and are carried out with varying degrees of faculty guidance to ensure adherence to academic standards.

Considerable emphasis in the curriculum is placed on field instruction to provide students with intimate knowledge of how the forest ecosystem functions and how it is manipulated and used. Attendance at a 5-week, 6-credit hour Summer Session in Field Forestry is required following completion of the sophomore year. This session serves as the major avenue of entrance into the curriculum for transfer students.

Transfer Students

The curriculum is designed to facilitate to the fullest extent possible the transfer of qualified students from liberal arts and science programs in community colleges and other institutions of higher learning. For students contemplating such *transfer as entering juniors*, it is recommended that they have at least 64 semester hours of credit or an associate degree with from 37 to 54 of their credits distributed among specific course areas as presented below. Transfer students having the minimum level of credits shown will be able to complete the requirements of the curriculum beyond the Summer Session in Field Forestry with four additional semesters of course work. With anything less than the minimum credits shown, it will be necessary for a student to extend the period of study to include courses during the summer or an additional semester.

	Minimum Credit Hours	Desired Credit Hours
Botany	4	4
Zoology		4
Chemistry	8	8
Physics (mechanics, heat and sound)	4	8
Mathematics	3	6
Social Sciences:		
Introductory Sociology 3		
	12	18
Introductory Psychology 3		
Introductory Economics 6		
Introductory Political Science 6		
English	6	6
	37	54
Electives	27	10
	64	64

ENVIRONMENTAL AND RESOURCE MANAGEMENT CURRICULUM

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	[1]Communication Skills I		3
	[2]Math		3
	ERM 100	Introduction to Forestry and Environmental Management	3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	ERM 201	Social Sciences I—Sociocultural Processes	6
	[2]Math		3
			17

Sophomore Year

First Semester	ERM 202	Social Sciences II: Economic Processes	6
	[1]Communication Skills I		3
	PHY 103	General Physics	4
	[3]Elective		3
			16
Second Semester	ERM 203	Social Sciences III: Political Processes	6
	PHY 104	General Physics	4
	[3]Electives		6
			16

SUMMER SESSION IN FIELD FORESTRY—5 weeks, 6 credit hours: Required of all students following the sophomore year and prior to registration for the junior year (including junior year transfer students who elect this curriculum).

ERM 300 Summer Session in Field Forestry 6

			Credit Hours
Junior Year			
First Semester	ERM 331	Introduction to the Physical Environment	6
	ERM 332	Silvics—Silviculture	8
	ERM 360	Principles of Management	3
			17
Second Semester	ERM 361	Management Models	3
	ERM 362	Forest Information Systems	4
	APM 491	Introduction to Probability and Statistics	3
	[3]Electives		6
			16
Senior Year			
First Semester	APM 492	Forest Biometrics	3
	ERM 400	The Social Environment of Resource Management	3
	ERM 470	Management of the Forest Enterprise	3
	[3]Electives		6
			15
Second Semester	[3]Electives		17
			17

[1]This requirement may be met by English 211 or 215 or by comparable courses designed to develop both the written and oral skills of students.

[2]Mathematics through Integral Calculus is required.

[3]Elective hour requirements are free to the extent that (a) they are in courses selected with the approval of a faculty advisor and (b) at least *nine* such elective hours are centered in forest biology and environmental and resource engineering, but with no less than one elective course in each of these broad fields.

NOTE: A total of 137 credit hours is required.

THE SCHOOL OF LANDSCAPE ARCHITECTURE

The School of Landscape Architecture offers a four-year program in Environmental Studies and a five-year professional program in Landscape Architecture.

Landscape Architecture

Education in the design professions today is witness to a great deal of concern for school objectives, programs and organization. The central issue relates to the force and pace of change that characterizes the work of the environmental designer and brings him into ever challenging situations. The present condition of cities, depletion of natural resources and pollution of air and water all pose severe and complex threats to society. Concurrently, a greater awareness and desire for environmental quality tax the resources and ingenuity of those in the design profession.

Several trends have emerged in recent years that suggest conditions for present and future educational programs. It is clear that an interdisciplinary approach to environmental problems is indicated and includes landscape architecture, architecture, engineering and planning, with specific attention to the biological and behavioral sciences. It is also clear that the educational purpose must relate more directly to the health and well-being of man and be designed for versatility rather than the narrow concerns of career orientation. Finally, that contemporary education should orient the student to systems thinking in his approach to knowledge, society and the individual.

In an effort to recognize and respond to the demands and responsibilities of the times, the following curriculum is offered in environmental studies and landscape architecture. The major characteristics of the programs are: an expansive frame of reference for landscape architects as major contributors to the solution of environmental problems, with a concurrent broad educational base for their professional training; provision for flexibility to accommodate shifts in educational goals, particularly within the design professions; articulation with the programs of the two-year colleges to permit ready transfer to professional programs; and professional training to adequately meet the educational standards of accrediting bodies, the American Society of Landscape Architects and the Division of Professional Education of the New York State Education Department.

The curriculum is based on three consecutive educational sequences: The *first two years* may be taken at this college or at any other school or college. Students may enter at the freshman, sophomore, or junior level depending upon acceptable transfer credit. Requirements for students planning to *transfer* as entering juniors are as follows: (a) Associate degree or acceptable transfer credit totaling a minimum of 62 semester credit hours or their equivalent; (b) Botany, 3 credits; and (c) the equivalent of college algebra and trigonometry plus high school chemistry or physics. A recommended course series prior to transfer would include English (composition) (4 credits); English (literature) (6); speech (3); biological sciences (6); social sciences (9); art media (2); geology (3); geography (3);

and humanities (6). This series is strongly recommended but not required, except as noted above. Deficiencies in these areas will be accommodated as possible during subsequent semesters and summer school sessions.

The *third and fourth years* are devoted to a broad spectrum of courses dealing with a variety of aspects of environment and man's relationship to it, synthesized through development of ability in both the functional and creative design processes. The successful completion of this 127-hour program qualifies the student to receive a bachelor of science degree with a major in environmental studies. The education is broad but with sufficient training to focus the student's concerns for the physical environment and its significance. At this point, students may pursue graduate study, or may apply to continue study toward the first professional landscape architectural degree.

The *fifth year* is comprised of three major components beginning with a short summer session course in plant materials. The fall semester is devoted to a unique program of off-campus study coupled with a concentration of professional course work in the final semester. The off-campus experiential studio is described and conducted by small groups of students with study topics correlated with locational opportunities throughout the world. Successful completion of this 33-hour program of 500 level course work leads to the degree of Bachelor of Landscape Architecture, the first professional degree. Study beyond this point is accommodated by the MLA programs.

LANDSCAPE ARCHITECTURE CURRICULUM

First Year			*Credit Hours*
First Semester	English		3
	FBO 100	General Botany	4
	Philosophy Elective		3
	GRA 182	Art Media I	1
	EST 100	Introduction to Environmental Studies	3
	GFO 032	Orientation	0
			14
Second Semester	English		3
	FZO 100	General Zoology	4
	Economics Elective		3
	GRA 183	Art Media II	1
	Anthropology Elective		3
	Elective		3
			17

Second Year

			Credit Hours
First Semester	English		3
	GRA 284	Art Media III	1
	Psychology	Elective	3
	Electives		8
			15
Second Semester	English		3
	Philosophy	Elective	3
	Sociology	Elective	3
	GRA 285	Art Media IV	1
	Electives		6
			16

Third Year

First Semester	LSA 320	Introduction to Landscape Architecture and Design Theory	2
	LSA 326	Landscape Design Studio I	4
	FBL 320	General Ecology	3
	FEG 271	Plane Surveying	3
	FBO 315	Dendrology I	2
	Elective		3
			17
Second Semester	LSA 327	Landscape Design Studio II	4
	LSA 343	Structural Materials and Elements	3
	LSA 345	Elements of Site Engineering	3
	APM 360	Introduction to Computer Programming	3
	EIN 211	General Geography	3
			16

Fourth Year

First Semester	FEN 432	Insects and Site Planning	1
	FBO 432	Diseases of Woody Ornamentals	1
	LSA 432	Plant Materials Culture	1
	LSA 422	Landscape Design Studio III	4
	LSA 440	Site Development Systems	3
	EIN 470	Art History	3
	EIN 411	Principles of Land Use	3
			16
Second Semester	[1]LSA 425	Orientation for Experiential Studio	3
	LSA 423	Landscape Design Studio IV	4
	EIN 471	History of Landscape Architecture	3
	ARC 294	Introduction to Architecture	3
	EIN 451	Fundamentals of City and Regional Planning	3
			16

Summer Session

LSA 533: Plant Materials. Three-week course in Plant Materials. 3 credit hours.

Fifth Year

			Credit Hours
First Semester	OFF-CAMPUS PROGRAM		
	LSA 524	Experiential Landscape Design Studio V	16
			16
Second Semester	LSA 522 or LSA 525 or LSA 527	Landscape Design Studio VI	4
	LSA 545	Professional Practice Studio II	2
	LSA 547	Principles of Professional Practice	2
	LSA 562	Architecture	3
	Elective		3
			14

[1]All students must have completed the equivalent of college algebra and trigonometry plus H.S. chemistry or physics and botany and 62 credit hours before entering third year.

NOTE: At the beginning of the 4th year students will state their degree intentions at Registration; applications for the BLA program will be accepted during Spring Registration. Approval of the SLA Faculty is necessary for admission to the BLA program. Students in the terminal B.S. program will substitute an elective for LSA 425.
The B.S. degree requires a total of 127 credit hours.
The BLS degree requires 33 hours of 500-level course work. A total of 160 credit hours is required.

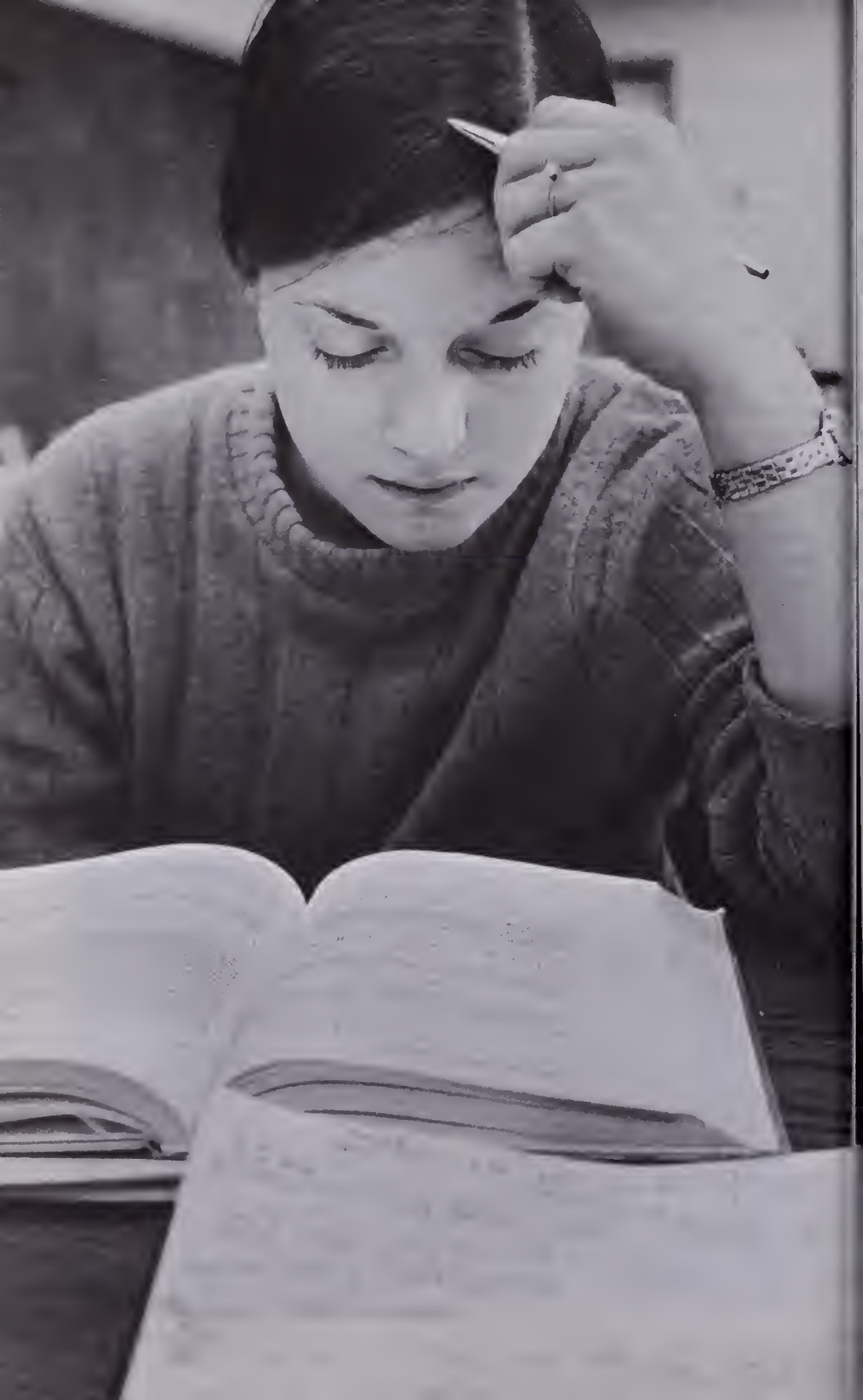
Concentration in Environmental Studies

The College of Environmental Science and Forestry has historically provided educational programs focusing on the scientific, managerial, engineering and design skills basic to the solution of environmental problems. The concentration in environmental studies is designed (1) to provide the specialist trained in these areas with an introduction to and appreciation of the nature of man and of his institutions and their profound effect on any solution proposed for an environmental problem, and (2) to allow students in diverse areas of specialization to work together on real environmental problems in such a manner that they learn to appreciate the multifaceted nature of these problems and to work comfortably and knowledgeably with persons of diverse subject matter background.

Students electing this concentration will take a two-course sequence designed to establish an environmental awareness early in their undergraduate careers. The first of these courses—Environmental Studies 100: Introduction to Environmental Studies—will explore the cultural, socio-economic, and political factors that condition mankind's view of the environment. The second course—Environmental Studies 101: Human Ecology—will build upon the student's awareness of human values and their importance in environmental study. Students will analyze the components, first of simple and then of progressively more complex ecosystems; study the interaction of these components via the flow of energy and natural nutrient cycles, goods and services in qualitative and simple quantitative terms; and finally, impose and evaluate the influence of man's attitudes and value systems on these ecosystems. Subsequently, as the student's disciplinary competence develops, he will elect at least two seminars (Environmental Studies 497), and two hours of problems' courses (Environmental Studies 498). These are designed to provide students of diverse backgrounds to bring their special skills to focus and to work together on problems of environmental importance.

In addition to the courses listed above, and the course requirements of the diverse curricula of the College, there is a wide diversity of additional courses available for election of students interested in environmental studies, provided elective hours are available. Members of the Undergraduate Environmental Studies Advisory Group are available to discuss these with the students.

This program will educate a person to both a disciplinary specialization and a keen appreciation of how this specialization can be applied in the environmental decade of the "70's."



Course Offerings

Undergraduate students at the College of Environmental Science and Forestry not only have the academic resources of their own institution, but also the resources of nearby Syracuse University and State University Upstate Medical Center.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, English, business law, personnel relations and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics and the arts. Descriptions of required Syracuse University Courses are included following College of Environmental Science and Forestry courses.

DESCRIPTION OF COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

Course Numbering System (Effective June, 1973)

Code Levels:

000-099	Noncredit courses
100-199	Freshman courses
200-299	Sophomore courses
300-499	Junior and Senior courses designed primarily to serve as an undergraduate elective and/or as a requirement in an undergraduate curriculum with the number appropriate to the level where the course appears as a requirement or is normally scheduled as an elective in the major program.

500-599 Graduate courses designed expressly for graduate students in areas supporting their specialization or interdisciplinary program, or for fifth year professional students with a baccalaureate degree (e.g. BLA students with B.S. in Environmental Studies), and available for undergraduate credit by selected upper division undergraduate students with superior academic records.

600-699 Graduate courses designed for beginning graduate students. Undergraduates are permitted admission only by petition with a well-documented justification approved by the undergraduate advisor and curriculum director and the instructor of the course. (See the *Graduate Studies Bulletin* for these courses.)

ESF COURSES—SYRACUSE CAMPUS

APM—APPLIED MATHEMATICS

360. Introduction to Computer Programming (3)
The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages or problem solving. The course will cover instruction in Fortran IV, and an Assembly language plus some discussion of PL/1, Algol, APL, and use of software operating systems. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring. Mr. C. N. Lee and Staff.

460. Information Processing Fundamentals (3)
Three hours of lecture per week. The course presents problem solving and analytical structures, and practice in their application by use of a digital computer. Selected portions from the two general processing categories of numerical analysis and information systems are presented for discussion and study. The purpose is to develop an awareness with some understanding and proficiency in automated problem-solving systems. Fall. Mr. C. N. Lee and Staff.
Prerequisites: Integral calculus and proficiency in computer programming.

491. Introduction to Probability and Statistics (3)
Two hours lecture, 3 hours laboratory. Elementary probability, theoretical and sampling distributions, hypothesis testing, statistical estimation, analysis of variance, regression and correlation, nonparametrics and sampling concepts. Fall and Spring. Staff.
Prerequisite: Two semesters of calculus.

492. Forest Biometrics (3)
Two hours lecture, 3 hours laboratory. Analysis of variance including nested and cross-classification. Matrix approach to multiple linear regression and weighted least squares. Nonlinear regression. Sampling methods and design. Applications to forestry problems. Fall.
Prerequisite: APM 491 or equivalent.

500. Introduction to Computer Programming for Graduate Students (3)
The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages for problem solving. The course includes a rather detailed study of Fortran IV, plus some discussion of an Assembly language and moderate study of Cobol and APL. To provide completeness, some attention is also afforded to techniques of representing information, managing files, error control, and to operating systems and job control. This course or a

demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring.

EGL—ENGLISH (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES)

210. Advanced Composition and Literature (3)
Further development of reading and writing skills acquired in freshman English. Understanding of imaginative literature promoted through the study of selected works in American literature in their historical context. Practice in the principles and techniques of critical writing coordinated with reading assignments. Fall. Mr. Lalor.

211. Technical Writing (3)
Instruction in the principles and techniques of technical writing in general; in the letter, memorandum and report, and in the special techniques of technical writing in particular. Course work includes lectures and discussions, reading assignments in the required text and supplementary materials, and numerous written assignments including a formal report presenting the results of an investigation. Spring. Mr. Lalor.

215. Fundamentals of Public Speaking (3)
Study of and practice in the application of the principles of good oral communication in extemporaneous person-to-group format. Students participate in information and problem-solving group discussions and prepare, deliver, listen to and criticize information and persuasive talks. Fall. Mr. Lalor.

400. American Writers and the Natural Environment (3)
The tracing of the changing concepts of the natural environment in American writings from the Puritans to the present. Fall.

EIN—ENVIRONMENTAL INFLUENCES (LANDSCAPE ARCHITECTURE)

(See also courses listed under GRA and LSA.)

211. General Geography (3)
Three hours of lectures, assigned readings, written reports per week. Discussion of basic geographic concepts and methods, explanation of the significance of man-land relationships as exemplified through the regional distribution and spatial patterns of natural and cultural features, description of geologic processes and other physical features such as soils, climates and natural vegetation. Not open to geography or geology majors. Spring.

411. Principles of Land Use and Planning (3)
Three hours lecture, reports, assigned readings. Explanation of factors which influence the use, development and control of land. Discussion of government's role in land development and control. Consideration of unique values of land competition for the use of space, planning for better land use, introduction to planning concepts and techniques and other topics. Fall.

451. Fundamentals of City and Regional Planning (3)
Three hours of lectures, assigned readings, written reports per week. Discussion of the meaning and purposes of city and regional planning. Examination of the historical development of urban places. Explanation of the principal elements of the comprehensive planning process, including goal formulation and decisionmaking, social and advocacy planning, planning for community facilities and planning administration. Discussion of the methods and objectives of city and regional planning. Spring.
Prerequisite: Permission of instructor.

470. Art History (3)
Three hours of lecture per week. Informal lectures and class discussion will emphasize and review assigned text and other readings and handout notes. Slides will be shown regularly; notebooks, reports, quizzes and examinations. Evolutionary nature of the main

cultural periods of Western man and fine arts as man's selected environment will be the course emphasis. Fall.

471. History of Landscape Architecture (3)
Three hours of lecture per week. Informal lectures, and class discussion, notebooks, reports, assigned text, and assigned reserve shelf reading, optional text, and handout notes, weekly quizzes and exams. Slides. Historical study and style analysis of Western man's efforts to design his environment and his changing attitudes and relationships to environment. Also, non-Western coverage where significant or influential on Western Man. Study of historical personalities as well as periods that are of environmental concern up into the modern period. Spring.
Prerequisites: EIN 470 or equivalent history of arts course.

ERE—ENGINEERING (ENVIRONMENTAL AND RESOURCE ENGINEERING)

100. The Engineer and the Environment (1)
One hour of lecture per week. Introduction to engineering practice in relation to environmental considerations and the needs and resources of society. Historical development of engineering and technology. Mission and content of engineering curricula. Representative case studies and project assignments. Open to all students. Spring. Mr. Jelinek and staff.

362. Mechanics of Materials (3)
Three hours of lecture. Theories of stress, deformation, and stability of common structural materials subjected to various force systems. Fall.
Prerequisite: Integral calculus, statics.

364. Engineering Materials (3)
Two hours of lecture and one 3-hour laboratory a week. An introduction to the study of materials science emphasizing the structure and properties of materials used in the construction industry in general. Lab work includes fabrication, testing and evaluation of actual systems. Spring. Staff.
Prerequisites: Junior standing, physics, chemistry and engineering mechanics.

496. Special Topics (1-3)
Lectures, readings, problems, and discussions. Topics as announced in the areas of environmental or resource engineering. Fall and/or Spring. Staff.

ERM—RESOURCES MANAGEMENT (ENVIRONMENTAL & RESOURCE MANAGEMENT)

100. Introduction to Forestry and Environmental Management (3)
Two 1½ hour meetings per week. An introduction to environmental and resources management. Emphasis is placed on the breadth of the field and on the important interrelations among the social, physical and managerial aspects within which the environmental manager operates. Specific topics include: resources, institutions, values, the physical environment, the organism, the biological system, goals, management problems, information and analysis and dealing with people. Fall.

201. Social Sciences I—Socio-Cultural Processes (6)
Six hours lecture and discussion. Introduction to the concepts, theories and terminology of psychology, anthropology and sociology, which are relevant to the understanding of the interrelationships of human social groups with their environments and resources. Human social and cultural behavior as possible reflections of adaptations to past environments; human cultural and social organization as adaptations to resources of present-day environments; human ecology as it relates to human economic and political systems. Spring.

202. Social Sciences II: Economic Processes **(6)**

Five 1-hour lectures and one 1-hour discussion per week. The course has two major subdivisions: macroeconomic processes are concerned with the composition, measurement and determination of national income, with the financial institutions of the United States and with fiscal and monetary policies; microeconomic processes are concerned with pricing of output and resource allocation, the theory of consumer demand, the theory of the firm and industrial organization, the role of labor unions in the United States and microeconomic policies of the Federal Government. Fall.

203. Social Sciences III—Political Processes **(6)**

Introduction to the concepts, theories and terminology which will provide students with a general understanding of the American political system, with emphasis upon how this system carries out and affects environmental and resource administration. The need and potential for, and direction of, change within and through the political system, and the roles of experts in defining and effecting change receive special consideration. Spring. Mr. Muniak.

204. Introduction to Economics for Forestry **(3)**

Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. Spring. Mr. Petriceks.

205. Introduction to Macroeconomics **(3)**

Three hours of lecture and discussion. Composition, measurement and determination of national income. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. Spring. Mr. Bennett and Staff.

206. Introduction to Microeconomics **(3)**

Three hours of lecture and discussion. Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in antitrust policy. The Theory of International Trade. Fall. Mr. Bennett and Staff.

300. Summer Session in Field Forestry **(6)**

Fundamental training in forestry disciplines demonstrating elements of resource inventory, ecology and utilization within the context of total resource management. Course consists of five 6-day weeks of field exercises, reports and projects in areas of surveying and cartography, forest and tree measurements, dendrology, ecology and utilization of forest goods and services. Daily exercises develop understanding through active physical participation by students. Two repeating sessions per summer held at Warrensburg Campus. A service charge is required covering individual expenses while in residence at Pack Demonstration Forest, Warrensburg, New York. Staff.

331. Introduction to the Physical Environment **(6)**

Lectures, discussions, field and laboratory work blocked in time and subject matter with ERM 332, Silvics-Silviculture. Study of the environmental media: air, soil and water, through examination of the flow of energy and matter within and between these components of the environment. Drawing together information from geology, physical geology, soil science, water science and meteorology, this course provides understanding of these areas, their interactions, and the interface with the biological system. Fall.

Prerequisite: Junior year standing in ERM curriculum or equivalent. Course should be taken concurrently with ERM 332, Silvics-Silviculture, because of the blocking of these two courses.

332. Silvics-Silviculture **(8)**
Three 1-hour lectures and five 3-hour labs or field trips per week. Fundamentals of silvics and practices of silviculture enabling manipulation of forests to attain objectives of the forest owner. Emphasis is placed on the biological interrelationships within the forest community, including site factors and forest stand dynamics, and the consideration of these in silvicultural operations. Fall.
Prerequisites: Summer Session in Field Forestry, Physical Environment (taken concurrently) or permission of instructor.

333. General Silviculture **(3)**
Three hours of lecture per week for first half of semester; 2 hours of lecture and 3 hours of laboratory or field work per week during second half of semester. Presentation of silvicultural concepts, principles and practices. Not designed for biology or resource management majors. Spring. Mr. Lea.
Prerequisite: Junior standing.

345. Soils **(3)**
Two hours of lecture and 3 hours of laboratory. Introduction to the fundamentals of soil science with particular references to forestry, but including other land uses. Spring. Mr. Craul.
Note: Not available to Environmental and Resource Management students.

351. Meteorology and Fire Behavior **(3)**
Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall. Mr. Herrington.
Prerequisite: PHY 103 and 104 (Calculus helpful but not required).

360. Principles of Management **(3)**
Three hours of lecture and recitation. Basic principles and concepts of management which are universally applicable to any organization, business enterprise or public agency. The various approaches to management including the classical, behavioral and quantitative concepts with emphasis upon the integrative approach, now required to meet modern society's changing life styles and values and the new awareness of the public regarding environmental matters and natural resources management. Fall.

361. Management Models **(3)**
Two hours of lectures, 3 hours of laboratory. Introduction to the various models used in managerial decisionmaking. Emphasis is on the characteristics of the various models: their formulation, assumptions, uses and limitations. The major topics covered will include: the role of models in management; simple optimization; constrained optimization; multivalued choices; time adjustment of value; simulation; and models in nondeliberated decisions. Integration of the deliberative and intuitive models is stressed. Spring. Staff.

362. Forest Information Systems **(4)**
Data needs, as specified by management goals and resource constraints, and the manner in which these needs influence acquisition, storage, retrieval and prediction. Spring.

364. Soil and Water Conservation **(3)**
Three lectures per week. An integrated historical survey of water and related land resource conservation in the United States. Interrelationships of planning, administration, and evaluation of policies, programs and projects by all levels of government and private units. Fall. Mr. Black.

371. Range Management **(2)**
Two hours of lecture. Range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring.

372. Planning and Developing Access for Forest Use (3)
Two hours lecture, and one 3-hour laboratory/discussion. Planning and developing suitable access necessary in producing a wide range of goods and services derived from forest land. Overland and aerial access systems including costs, consideration of user characteristics, aesthetics, standards, maintenance and evaluation of alternatives in location and development. Fall. Mr. Koten.
Prerequisite: Senior standing or permission.

373. Timber Harvesting (3)
Two hours lecture and one 3-hour lab/discussion. Harvesting as a production system including equipment, equipment mixes, costs and manpower in serving and logmaking and primary and secondary transportation. Evaluation of various systems as to environmental impacts. Wood as a raw material to the primary processing system and trees as inputs to the harvesting system. Spring.

400. The Social Environment of Resource Management (3)
Three hours of lecture and discussion. This course describes the institutional framework within which the resource manager practices his profession. It intends to show how economics, law, public policy, pressure groups and financial considerations constrain the professional judgment of the resource manager and the goals and objectives of the institution employing him.
Prerequisites: Silvics-Silviculture, Principles of Management, Management Models, Information Systems; Senior standing.
Note: This course will be offered for the first time in the Fall, 1976.

402. Legal Aspects of Surveying (3)
Three credit hours of lecture and discussion. Fundamental principles of real property law with special reference to boundary survey, conveyances, rules of evidence, title insurance, rights, duties, and liability of professional land surveyors. Case material and appropriate New York State statutes will be discussed. Fall. Mr. Horn.

404. Economics of Wood-Using Industries (3)
Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decisionmaking by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring.
Prerequisite: ERM 204 or equivalent.

405. World Forestry Resources: Problems and Prospects (3)
Three hours of lecture and discussion plus guided readings, pertaining to world forest resources and the problems and opportunities associated with their use and development. Major topics include: world forest resources; production and trade; principal wood-producing countries; forestry and the problems of underdevelopment; and special areas and topics of interest to world forestry. Spring. Staff.
Prerequisite: Upper division status. Senior status preferred.

429a. Environmental Impact: Principles and Strategy (1)
One hour of lecture. Principles and theory of environmental impact and statements of impact as required by Federal law. Administrative procedures for review and evaluation. Procedural strategy and effective constitution before various governmental levels. Means of obtaining and sources of authoritative information. Spring. Messrs. Black, Herrington and Staff.
Prerequisite: Senior standing.

429b. Environmental Impact: Principles and Strategy (2)
Two hours of discussion. Principles and theory of environmental impact and statement of impact as required by Federal law. Administrative procedures for review and evaluation. Procedural strategy and effective constitution before various governmental levels. Means

of obtaining and sources of authoritative information. Spring. Messrs. Black, Herrington and Staff.

Prerequisite: 429a.

430. Application of Ecology (3)

Two hours of lecture and discussion and 1 to 3 hours seminar, laboratory or field trip per week. Examination of ecological concepts relevant to practices modifying terrestrial ecosystems for human benefit. Discussion of selected ecological literature, seminars and field trips by specialists in various fields of applied ecology, and student presentations exploring ecological implications of specific problems or situations. Course designed for interdisciplinary participation. Fall or Spring. Mr. Richards.

Prerequisites: An ecology course or permission of instructor. Senior standing desirable.

431. Principles of Silviculture (3)

Three hours of lecture during the first half of the semester; 2 hours of lecture and 3 hours of laboratory during the second half of the semester. The forest as a community. Site factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owners. Spring. Mr. Berglund.

Prerequisites: Summer Session in Field Forestry, FBO 330 or FBO 530 concurrently, or permission of instructor.

Note: Not available to Environmental and Resource Management students.

432. Practices of Silviculture (3)

Two hours of lecture and one 3-hour laboratory or field trip. Theory and practices of silviculture manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, plantings and other silvicultural operations in their relationships to economic and ecological factors. Fall. Mr. Johnson.

Prerequisite: ERM 431 or permission of the instructor.

Note: Not available to Environmental and Resource Management students.

434. Greenspace Silviculture (3)

Two hours of lecture and discussion, 1 to 3 hours seminar, workshop or field trip per week. Concepts and techniques applicable to the manipulation of vegetation systems primarily for their on-site values in park, recreation or multiple-use land, roadsides, utility rights-of-way, buffer and protection areas, etc. Fall. Mr. Richards.

Prerequisite: At least one general or plant ecology or silvics course. Senior standing desirable.

435. Regional Studies (2)

Two hours of lecture. Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography, geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. Spring. Mr. Johnson.

Prerequisite: ERM 432.

436. Forest Mensuration (3)

Two hours lecture and one 3-hour laboratory. Principles and methods of measuring log, tree, and forest characteristics in time and space. Direct and indirect measurement by sampling and regression. Methods for forest resources inventory of timber and other goods and services. Spring.

Prerequisite: APM 492 or permission.

440. Forest Hydrology (3)

Two hours of lecture, 3 hours of laboratory. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion, and other variables. Fall and Spring. Mr. Eschner and Mr. Black.

441. Forest Influences (2)
Two full days/week for 4 weeks. Field observation of the effect of the presence of forest vegetation on easily quantified parameters of climate and the hydrologic cycle. Basic measurements of precipitation, radiation, temperature, interception, soil moisture, groundwater and streamflow. Summer Session II. Cranberry Lake Biological Station.

442. Practice of Watershed Management (3)
Two hours of lecture, 3 hours of laboratory. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring. Mr. Eschner
Prerequisite: ERM 440.

446. Forest Soils (3)
One hour of lecture, 1 hour of discussion, 4 hours of laboratory, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development—soil properties relationships. Methods of soil sampling and laboratory analysis. Fall. Mr. Leaf.
Prerequisite: ERM 345.

452. General Meteorology (3)
Three hours of lecture. Examination of the physical processes of the atmosphere as they relate to the exchange of heat, moisture and momentum in the earth-atmosphere system. Emphasis on the meteorological and micrometeorological basis of climate and its interaction with the biological world. Spring. Mr. Herrington.
Prerequisite: Junior standing or permission of instructor.

453. Meteorology Laboratory (1)
Three hours of laboratory. An extension of SIL 452 which provides analysis and discussion of the atmospheric processes important to weather and climate. Major topics include air mass analysis, surface weather map analysis, and climatological summarization procedures. Spring. Mr. Herrington.
Prerequisites: ERM 452 or concurrently and permission of instructor.

455. Forest Tree Improvement (3)
Two hours of lecture, 3 hours of laboratory or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. Spring. Mr. Westfall.
Prerequisites: FBL 370 and 371 strongly advised.

456. Management of the Forest Business (3)
Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to RMP 611. Fall or Spring. Staff.

460. Resources Policy (3)
Three hours lecture/discussion. Analysis of resources policy positions, goals, concepts, methods, and processes that give purpose, guidance, and direction to public and private resources use and relationships. Consideration of major policy issues and alternatives, and interrelationships of diverse influences and pressures that determine policy modifications, emphasis, and outcomes. P. F. Graves. Fall.

461. Operation Cost Control (3)
Three hours lecture. Management uses of accounting data. Essentials of cost accounting and the uses and misuses of historical cost data in management decisionmaking. Concepts of financial analysis of past and projected cash flows, and various methods of comparing alternatives. Fall and Spring. Staff.
Prerequisite: Permission of instructor.

462. The Structure of Management Decisions (3)
Three hours of lecture. Introductory course in managerial decisionmaking. Covers theory, concepts and methodology of management practices and relates these to the realities of decisionmaking. Uses the problem solving approach in preparing the prospective resource manager or administrator for an understanding of the application of decisionmaking models. Spring. Staff.
Prerequisites: ERM 460, APM 491 or equivalent and permission of instructor.

463. Principles of Forestry Economics (3)
Two hours of lecture, 3 hours of laboratory. Economics of the production of forest goods and services. Land, labor and capital and their combination in forest production. Supply and demand of various forest products and their changes over time. Economics of taxation and public policy formation. Emphasis is placed upon principles and methods of analysis useful in understanding and in making resource management decisions. Fall. Mr. Christiansen.
Prerequisite: ERM 206 or equivalent.

464. Applied Communications (3)
Two hours of lecture. Three hours of laboratory during first part of course. Major media production project required. Course objective is to acquaint students with the basic principles of instructional communications in the teaching-learning process. Various media including television, motion pictures, exhibits, illustrated lectures, slide talks, newspapers, etc. are examined with emphasis on their utilization in environmental education. Also, consideration is given to instructional design for meeting predetermined learning objectives in various publics—lay and professional adult audiences, school children, etc. Spring. Mr. Hanselman and Staff.

470. Management of the Forest Enterprise (3)
Two hours of lecture and one of discussion/laboratory. This course is concerned with the management alternatives, both of a technical and social nature, that are available in the planning for and the production of timber, recreation, wildlife, forage and water from the forest and with the criteria for choice to meet management objectives. Fall.
Note: This course will be offered for the first time in the Fall, 1976.

471. Resources Management (3)
Three hours lecture/discussion/recitation/case studies. The interrelationships between man and forest land resources and the multiple services which these resources provide; the extent and nature of responsibilities of the resource manager to the community and to society in his stewardship of natural resources. Spring.

472. Fundamentals of Outdoor Recreation (3)
Three hours of lecture per week. Introduction to the programs and practices of Federal, state and local agencies and private organizations involved in planning, administration and management of outdoor recreation areas. Emphasis is on major recreational issues and conflicts faced by area managers, and how they integrate solutions into their plans. Spring. Mr. Gratzer.

473. Planning and Development of Forest Recreation Areas (3)
Three hours of lectures or equivalent laboratory and assignments per week. Planning and designing forest recreation areas, structures and facilities. Development of construction plans for camp and picnic sites, for waterfront areas and for trails. Emphasis is on the functional relationship between planning and design, management and maintenance. Field trips required. Fall. Mr. Gratzer.
Prerequisite: ERM 472 and permission of instructor.

474. Advanced Practices of Silviculture (3)
Four hours of lecture and seminar during the first half of the semester; 6 hours of field exercises thereafter. Development of silvicultural decisions in management of woodlands. Trips to forest areas. A cultural plan prepared to attain assigned objectives. Spring. Mr. Lea.
Prerequisite: ERM 432.

475. Sociology and Psychology of Leisure Behavior (3)
Three hours lecture and discussion. Introduction to theory and research findings dealing with the sociological and psychological aspects of leisure behavior; field work and lectures demonstrate applications, particularly with regard to leisure behavior. Spring. Mr. Morrison.
Prerequisites: ERM 472, Fundamentals of Outdoor Recreation, and an introductory course in sociology or psychology, or instructor's permission.

476. Management Planning and Operations (3)
Three hours of lecture and recitation. The overall management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration and human relations in the context of a practical operating land ownership. Spring. Mr. Horn.

477. Forest Management (4)
Three hours of lecture supplemented by 1 hour of discussion and/or lecture. Public and private forest policy formation; principles of modern management; overall management and operation of a productive forest property. Primarily for forest engineers. Not available to Resource Management undergraduates. Fall or Spring. Mr. Koten.
Prerequisite: Mensuration and silviculture or by permission of the instructor.

496. Special Topics in Environmental and Resource Management (1-3)
Guided readings, lectures and tutorial conferences for the undergraduate student from any school of the College, designed to help him apply economic analysis to questions within his area of interest. Illustrative topics include the economics of land use and planning; of forest culture; of outdoor recreation; of water or timber management, or related resource production; of wood-using industry; and of the distribution or consumption of forest resources. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

497. Resources Management Seminar (3)
Three hours of group discussion and analysis. Current literature, plans and principles, and new developments in forest management. Fall or Spring. Staff.

498. Special Studies in Environmental and Resource Management (1-3)
Independent research in environmental and resource management for selected undergraduate students. Selection of subject areas determined by the student in conference with appropriate faculty member. Final written report is required for departmental record. Fall or Spring. Staff.
Prerequisite: Consent of instructor and department chairman.

EST—ENVIRONMENTAL STUDIES

100. Introduction to Environmental Studies (3)
Lecture and discussion on the nature of man, his social, cultural, economic and political institutions and how these condition his views of the environment. Fall. Staff.

101. Human Ecology (3)
Study of the principles of ecosystem structure and function developed in the context of human values and societal structures. Spring. Staff.
Prerequisite: EST 100.

497. Undergraduate Seminar (1)
Seminars on problems of environmental concern. The subject of the seminar will be announced prior to registration. Fall and/or Spring. Staff.

498. Undergraduate Problem **(1-3)**
Interdisciplinary research designed to solve environmental problems. Selection of subject matter to be determined by students in conference with the Undergraduate Environmental Studies Advisory Group. Problem analysis and programs for solution in the form of a final report required. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

FBL—BIOLOGY (FOREST BIOLOGY)

320. General Ecology **(3)**
Two hours lecture, 3 hours of field trips during the first half of the semester. Three hours lecture during the second half of the semester. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography, and representative ecosystems. The ecological impact of man is reviewed. Fall. Mr. Alexander.
Prerequisite: A year course in biology or equivalent.

330. Principles of General Physiology **(3)**
Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Fall. Mr. Brezner.
Prerequisite: One semester of organic chemistry.

370. Principles of Genetics **(3)**
Three hours of lecture and discussion. A general course covering concepts of genetics and evolution basic to upper division biology and biochemistry courses. Includes the inheritance and analysis of Mendelian and quantitative traits, the chemical nature of the gene and its action, the genetic structure of populations and their evolution. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.
Prerequisites: Forest Botany 100 and Forest Zoology 100 or a 1-year college introductory biology course.

371. Principles of Genetic Laboratory **(1)**
Three hours of autotutorial laboratory. Experiments with plants and animals and computer simulation exercises demonstrate the basic principles of inheritance of Mendelian and quantitative traits and changes in populations caused by major forces in evolution or by breeding procedures. Numerical methods for characterizing quantitative traits and for testing hypotheses are introduced. Spring.
Corequisite: FBL 370 or equivalent.

372. Introduction to Quantitative and Population Genetics **(1)**
Ten lecture-discussions and four autotutorial laboratories the second half of the semester (incl. Lecture-Lab Modules 5 and 6 of FBL 370 and 371). Basic genetic concepts of quantitative inheritance, the structure of populations and evolution. Laboratory experiments and computer simulations are used to demonstrate these concepts. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.
Prerequisite: An introductory genetics lecture-laboratory course deficient in these areas of genetics and permission of instructor. (Not open to students taking FBL 370 and 371.)

405. History of Natural Science **(1)**
One hour of lecture. A review of the history of western science from pre-Ionian times to Darwin, with evaluation of the impact of culture and religion on scientific progress. Spring. Mr. Brezner.

421. Ecology of Freshwaters **(2)**
Note: SUNY Albany No. BIO 421.
Two full days a week for 4 weeks. Experimental and observational studies of environmental and biotic interactions, influencing productivity of freshwaters. Basic

concepts at the organismic, population and community level. Summer Session I, Cranberry Lake Biological Station. Staff, SUNYA.
Prerequisite: A course in ecology.

496. Topics in Biology (1-3)
Experimental, interdisciplinary, or special coursework in biology for undergraduate students. Subject matter and method of presentation varies from semester to semester. May be repeated for additional credit. Fall or Spring. Staff.

497. Undergraduate Seminar (1)
Literature surveys and seminars on topics of biological interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring. Staff.

498. Research Problem in Biology (1-3)
Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

540. Chemical Ecology (3)
Two hours of lecture and 1 hour of discussion. A treatment of biological phenomena incorporating elements of ecology, physiology and chemistry as a basis for development, behavior and survival. Emphasis is on intra- and interspecific relationships involving chemical messengers at the organismal, population and community levels. Spring. Mr. Simeone.
Prerequisites: Organic chemistry, general ecology, general physiology.

FBO—BOTANY (FOREST BOTANY AND PATHOLOGY)

100. General Botany (4)
Prerequisite to all other courses in Botany. Two hours of lecture and 4 hours of lecture-laboratory in the Autotutorial Learning Center. An introduction to plant biology with special emphasis on the structure and function of the green plant. Fall. Mr. Geis.

310. Classification of the Plant Kingdom (3)
Two hours of lecture and 3 hours of lab. Introductory study of the plant kingdom with emphasis on the angiosperms. Spring. Mrs. Wang and Staff.

315. Dendrology I (2)
One hour lecture and one 3-hour laboratory/field trip each week. Field study, identification, taxonomy and elementary silvics of important forest trees of North America. Fall. Mr. Ketchledge.

330. Plant Physiology (2)
Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Will not satisfy the plant physiology requirement of botany majors. Fall. Mr. Schaedle.
Prerequisite: FBO 100 or equivalent.

360. Forest and Shade Tree Pathology (3)
Two hours of lecture and 3 hours of autotutorial laboratory. Major diseases of forest, shade and ornamental trees and deterioration of forest products will be discussed with emphasis on disease identification, principles of disease development, effects of disease on the host and practical control measure. Spring. Mr. Manion.

415. Dendrology II (1)
One 3-hour field trip/laboratory each week. A continuation of Dendrology i emphasizing trees and shrubs ecologically important in the central New York region and economically important in North America. Fall. Mr. Ketchledge.

422. Ecology of Forest Communities (2)
Note: SUNY Albany No. BIO 422.
Cranberry Biological Station. Session II. Two full days per week for 4 weeks. Study of the structural and functional characteristics of selected Adirondack forest ecosystems; techniques of vegetational and environmental analysis. Special requirement: students must be prepared to go on two overnight camping trips to an isolated study area. Mr. Ketchledge.
Prerequisites: At least 1 semester of general ecology plus 15 hours of other biological sciences.

425. Plant Ecology (3)
Two hours of lecture and discussion and one laboratory session per week. A first course in plant community ecology dealing with the dynamics of community development and change and the process of community analysis and description. Spring.
Prerequisites: FBL 320, ERM 432 or equivalent.

440. Environmental Microbiology (3)
Three hours of lecture and discussion. Topics to be discussed include: kinds of microbes and their morphology, how viruses and bacteria grow and reproduce, physiology of microorganisms, microbial transformation of the natural and polluted environment, symbiotic relationships of microbes with plants and animals, and microbes as model systems for higher organisms. Spring. Mr. Flashner and Mr. Griffin.
Prerequisites: Junior or Senior standing or permission of instructor.

460. Field Problems in Forest Pathology (2)
Two full days per week for 4 weeks. Field study of important tree diseases in the Adirondacks, including heartrots, root-rots, cankers, rusts, foliage diseases, mistletoe, and physiological diseases. Also field study of mycorrhizae and other tree-root mutualisms. Summer Session I, Cranberry Lake Biological Station.

461. Principles of Forest Pathology (3)
The equivalent of three credit hours per week as lecture, discussion or laboratory. Concepts and principles of tree diseases in relation to forest practices and practical experience in disease diagnosis and impact evaluation.
Prerequisite: FBO 360 or consent of instructor.

490. Plant Propagation (2)
One combined lecture-demonstration-laboratory per week plus supervised greenhouse assignments.
Instruction in principles and practices of plant propagation and in related greenhouse operations. Spring. Mr. Ketchledge, Mr. Wilcox and Staff.
Prerequisite: 20 hours of biology, including dendrology and general physiology.

510. Mycology (3)
Two hours of lecture, 3 hours of laboratory. Fundamentals of the morphology, taxonomy, cytology, life histories and ecology of fungi. Laboratory experience in culturing and identification of fungi. Fall. Mr. Griffin.

515. Systematic Botany (3)
Two hours of lecture, 3 hours of laboratory. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. Fall.
Prerequisite: FBO 310 or permission of the instructor.

530. Plant Physiology (2)
Two hours of lecture. Internal processes and conditions in higher plants with emphasis on physiological and biochemical concepts. For students majoring in the biological sciences. Spring. Mr. Wilcox.
Note: Botany majors electing this course for their concentration must also take FBO 531.

531. Plant Physiology Laboratory (2)
Two lab sessions. Introduction to current methods and procedures of physiological research including nutrition, tissue culture, photosynthesis, respiration and hormonal regulation of growth. Spring. Mr. Schaedle.
Prerequisites: FBL 330, corequisite FBO 530, or permission of the instructor.

585. Plant Anatomy (3)
Two hours of lecture, 3 hours of laboratory. An introductory course in plant anatomy designed to familiarize the student with the organization and development of the primary and secondary plant body of higher plants. Spring. Mr. Tepper.
Prerequisite: FBO 100.

FCH—CHEMISTRY

221. Organic Chemistry I (3)
Two hours of lecture, 1 hour of recitation. A survey of representative classes of carbon compounds with an emphasis on structure, nomenclature and fundamental reactivity and other important properties, uses and characteristics. Fall.
Prerequisite: One year of freshman chemistry.

222. Organic Chemistry Laboratory I (1)
One 3-hour laboratory period. Laboratory techniques in organic chemistry. Melting points, distillation, recrystallization, extraction, column and thin layer chromatography. Qualitative functional group analysis. Fall. Staff and laboratory assistants.
Prerequisite: One year of freshman chemistry.
Corequisite: FCH 221 or equivalent.

223. Organic Chemistry II (3)
Two hours of lecture, 1 hour of recitation. A study in depth of the reactivity characteristics of the various classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three-dimensional characteristics of carbon compounds. Spring.
Prerequisites: One year of freshman chemistry and 1 semester of organic chemistry.

224. Organic Chemistry Laboratory II (1)
One 3-hour laboratory period. Continuation of FCH 222. Simple physical, quantitative and instrumental techniques applied to organic chemistry. Gas chromatography, polarimetry, kinetics. Introduction to synthesis. Spring. Staff and laboratory assistants.
Prerequisite: FCH 222 or equivalent.
Corequisite: FCH 223 or equivalent.

310. Introduction to Environmental Chemistry (3)
Three hours of lecture. Introduction to the chemistry and physics of the atmosphere and aquatic systems. The course includes: chemical and physical properties of water, complexation and chelation, colloidal suspensions, pollution and trace substances in water, water purification, photochemical smog, pollutants and particulate matter in the atmosphere, pesticides, food additives, energy, et cetera. Spring.
Prerequisites: Two years of chemistry or permission of instructor.

325. Chemistry III (4)
Two hours of lecture, one 6-hour laboratory period. Classical and recent literature synthesis of organic compounds, employing advanced techniques. Fall. Mr. LaLonde.
Prerequisite: Two semesters of elementary organic chemistry.

380. Instrumental Methods of Analysis (3)
Two hours of lecture and one 3-hour laboratory. Lecture includes theory, applicability, and limitations of a number of current methods of instrumental analysis. Laboratory sessions provide practice with several of these techniques.
Prerequisites: General chemistry and quantitative analysis.

384. Spectrometric Identification of Organic Compounds (1-2)
Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the second half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultraviolet spectrometry will be applied to identification of organic natural products. Spring. Mr. Silverstein.
Prerequisites: Organic chemistry; 1 semester of advanced organic chemistry for second credit.

450. Introduction to Polymer Science (3)
Three hours of lecture. Introduction to the chemistry, physics and properties of synthetic polymers. Description and classification of polymers. Polymer synthesis. Polymer solutions. Polymer solid states, including discussion of rubber elasticity, glass transition, crystallization, viscoelasticity. Structure and properties of fibers, films, elastomers, foams. Fall. Mr. Sarko and Mr. Smid.
Prerequisites: One year of organic chemistry and 1 year of physical chemistry.

475. Wood Chemistry I (2)
Four hours of lecture first half of semester. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses, and lignin. Cellulose derivatives. Wood extractives. Bark chemistry. Distribution of the cell wall constituents in wood. Fall. Mr. Timell.
Prerequisites: FCH 221—224 or equivalent.

476. Wood Chemistry II (2)
Four hours of lecture second half of semester. Interaction of cellulose with water and alkali. Effect of acids on cellulose, hemicelluloses and lignin. Sulfonation and oxidation of lignin. Action of alkali on cellulose, hemicelluloses and lignin. Topochemistry of the major wood delignification reactions. Wood defects. Chemical by-products from wood. Manufacture of cellulose acetate and rayon. Fall. Mr. Timell.
Prerequisite: FCH 475.

477. Wood Chemistry III (2)
Chemistry of pectin and starch. Photosynthesis, with emphasis on the chemical, dark phase. Biosynthesis of sucrose, starch, and plant cell wall polysaccharides. Biosynthesis of aromatics, with emphasis on lignin. Effects of growth hormones on structure and chemistry of plant cell walls. Spring. Mr. Timell.

478. Wood Chemistry Laboratory (1)
Gravimetric and spectrophotometric determination of lignin in wood. Determination of number-average and weight-average molecular weights of ethylcellulose. Separation of larch arabinogalactans A and B and estimation of their molecular weight and molecular-weight distribution by gel permeation chromatography. Fall. Mr. Timell.

495. Introduction to Professional Chemistry (2)
Professional ethics and responsibilities of the practicing chemist. Employer-employee relations, legal and legislative relations. Alternate employment opportunities. Professional organizations. Safety in the laboratory. Organization and use of chemical literature. Selection of research topic and literature survey. Fall. Mr. Schuerch and Staff.
Prerequisite: Upper division status. Senior status preferred.

496. Special Problems in Chemistry (1-3)
An opportunity for a special problem, technique development, independent or unstructured study in an area related to the chemical profession. The work may be

technical, professional or interdisciplinary. Advisors outside this department may be solicited. A brief proposal must be presented for approval with specific arrangements outlined including faculty advisor and objectives of the study. Evidence of competence and appropriate effort is required for credit. A written report will be expected. Fall and Spring. Staff.

Prerequisite: Upper division status.

497. Undergraduate Seminar (1)

One hour per week. Literature surveys and seminars on topics of current research interest and recent advances in chemistry. Spring. Staff.

498. Introduction to Research (5)

Eighteen hours of laboratory per week, library search and report writing. Solution of a selected research problem using special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring. Staff.

520. Nuclear and Radiation Chemistry (2)

The two 1-hour lectures will cover the information required for the basic understanding of nuclear reactions, the types of radiation emitted, the instrumentation necessary to detect and measure this radiation, the principles of radioisotope tracer techniques, and radiation chemistry which is the effect of radiation on organic systems. Visits to the Cornell Reactor and the Nuclear Medicine Department of the Upstate Medical Center will be arranged. Spring. Mr. Meyer.

Prerequisites: Physical, organic and inorganic chemistry or by permission of the instructor.

Note: This course can be taken independently of FCH 521.

521. Nuclear Chemical Techniques (1)

The laboratory will consist of one 4-hour laboratory class every 2 weeks, with 1 hour to be made up at the student's discretion to accommodate counting periods which extend over several weeks. A short movie by the AEC each week will be required for the sixth hour. The laboratory will give each student the opportunity to use the individual counting instruments, gain experience in the handling and preparation of radioactive samples and the use of the 1000 Curie cobalt source in radiation chemistry. Spring. Mr. Meyer.

Prerequisite: Physical, organic and inorganic chemistry or permission of the instructor. Advance tentative registration is required.

Corequisite: FCH 520.

530. Biochemistry I (3)

Three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers, and biological oxidations will also be covered. Fall. Mr. Walton.

Prerequisite: One year of organic chemistry.

Pre- or corequisite: One year of physical chemistry.

531. Biochemistry Laboratory (2)

Six hours of laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry and methods involved in the isolation, purification, and assay of enzymes. Fall. Mr. Walton.

Prerequisites: One semester of quantitative analysis with laboratory.

532. Biochemistry II (3)

Three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and biochemical properties of lipids, theories on the origin of life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins and other aspects of nitrogen metabolism. Spring.

Prerequisites: FCH 530 and its pre- and corequisites.

539. Principles of Biological Chemistry (3)
Three hours of lecture. Principles of biochemistry with emphasis on their relationship to biology. Topics include basic metabolic pathways, structure and function of proteins, enzymes, and nucleic acids, energy relationships, and biochemical control mechanisms. Fall. Mr. Walton.
Prerequisite: A 2-semester course in organic chemistry is desirable, but a 1-semester course is acceptable. This course is not open to chemistry majors.

540. Chemical Ecology
This course is the same as FBL 540. Refer to description on page 93.

551. Polymer Techniques (2)
One hour of lecture and discussion and 3 hours of laboratory; lab reports. Techniques of polymer preparation: free radical solution and emulsion polymerization, copolymerization. Molecular weight determination by light scattering, osmometry, viscosity, ultracentrifugation. Structure characterization by X-ray diffraction, electron microscopy, nuclear magnetic resonance, optical rotatory dispersion, polarized microscopy, stress-strain and swelling equilibrium. Fall. Mr. Sarko.
Prerequisites: One year of organic and 1 year of physical chemistry.

552. Polymer Processing and Technology (3)
Industrial methods of production and processing of polymeric materials such as fibers, films, plastics, elastomers, foams, composites, adhesives and coatings, including discussions on the correlation between polymer structure and polymer properties. Spring. Mr. Smid and Staff.
Prerequisites: Introduction to Polymer Science, FCH 450.

FEG—FOREST ENGINEERING

271. Plane Surveying (3)
Two hours of lecture and recitation, 3 hours of field or office practice. A comprehensive development of the principles of plane surveying. Use of modern instruments and methods, computations related to topographic mapping and site development. Fall. Mr. Bender.
Prerequisite: Plane trigonometry, or permission of instructor.

300. Introduction to Engineering Design (1)
One hour of lecture and discussion. An introduction to methodologies for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall. Staff.
Prerequisite: Junior standing.

302. Forest Engineering Problems (3)
Three hours of lecture and discussion. An introduction to methodologies of forest measurements for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Spring. Staff.

340. Hydrology (3)
Two hours of lecture and 3 hours of laboratory and discussion per week. Analysis of the waters of the earth; their occurrence, circulation and distribution; chemical and physical properties; and interaction with their environment, including their relation to living things. A system's perspective is developed towards the solution of typical hydrologic problems. Spring. Mr. Tully.
Prerequisite: 327, Principles of Fluid Mechanics; APM 491, Introduction to Probability and Statistics; and APM 360, Introduction to Computer Programming or equivalent.

342. Hydraulics in Construction (4)
Three hours of lecture, 3 hours of laboratory. The physical, mechanical, thermal and hydraulic properties of fluids relevant to the construction industry. A study of solutions to hydraulic problems in contemporary construction activities. Not open for credit to forest engineering students. Spring. Staff.
Prerequisites: Physics and differential calculus.

350. Introduction to Remote Sensing for Engineers (2)
Two hours of lecture plus selected laboratory exercises. The fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys and site development analyses. Spring.
Prerequisite: Junior standing in engineering and concurrent registration in FEG 363.
Note: A student may not enroll in, nor receive credit for, both FEG 350 and FEG 352.

352. Introduction to Remote Sensing (3)
Two hours of lecture and 3 hours of laboratory per week. Qualitative and quantitative introduction to the fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys, site development studies and land use analyses. Oriented for multidisciplinary participation. Spring. Mr. Lillesand.
Prerequisite: Junior standing, physics and calculus or consent of instructor.

363. Photogrammetry (3)
Two hours of lecture and discussion, 3 hours of laboratory. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation and unique requirements are considered. Fall and Spring. Mr. Brock.
Prerequisite: FEG 271 (or FEG 371 concurrent).

371. Surveying for Engineers (3)
Two hours lecture and recitation, 3 hours of laboratory. The principles of plane surveying for engineers. Subject areas to be treated include linear and angular measurements in both the horizontal and vertical planes; error analysis; horizontal and vertical control and associated computations; areal and volumetric computations; circular and parabolic curves; state plane coordinates; astronomical observations for direction of lines; and consideration of potential computer relationships. The laboratory is essentially the same as FEG 271, but with additional work. Field work and computations culminate in a topographic map. Fall. Mr. Bender.
Prerequisite: Differential and integral calculus.

410. Structures (4)
Three hours of lecture, 3 hours of laboratory. Engineering principles in the analysis, planning, design, construction and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems and other facilities. Properties of timber, concrete, steel and other structural materials. Fall. Mr. Tully.
Prerequisite: CIE 325 or concurrent registration.

422. Production Systems Engineering (4)
Four hours of lecture per week. An introduction to concepts of production systems and procedures for planning, designing and managing production and large-scale physical systems with an emphasis on the coordination of resources to achieve well-defined objectives. Topics include: the concept of systems analysis as a design process; linear and dynamic programming; and select mathematical and economic techniques applicable to resource engineering and management. Fall.
Prerequisite: ERM 206, FEG 300, APM 491, MAT 585.

430. Soil Mechanics (2)
Two hours of lecture, 3 hours of laboratory (9 weeks only). The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. A 9-week course, concluding with

specifications of engineering soils. Credit towards forest engineering degree may be granted only by the completion of additional assigned work. Fall. Mr. Tully.

Prerequisite: Senior class standing or permission of instructor.

Note: A student may not enroll in and receive credit for both FEG 430 and FEG 432.

432. Soil Mechanics for Engineers **(3)**

Two hours of lecture, 3 hours of laboratory. The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. Application of these and other engineering principles to the design of earthen structures common to the forest environment. Fall. Mr. Tully.

Prerequisites: FEG 340; also, CIE 325 concurrently.

Note: A student may not enroll in and receive credit for both FEG 430 and 432.

437. Transportation Systems **(4)**

Three hours of lecture and 3 hours of laboratory. Interrelationships among natural features, transportation types, design and management objectives to provide the most effective system within the given framework. Basic engineering principles in the planning location, design, construction and maintenance of suitable transportation systems to serve various aspects of forest resource management. Spring. Staff.

Prerequisites: FEG 371 and FEG 432 or equivalents.

442. Hydraulic Operations **(2)**

Three hours of lecture, 3 hours of laboratory. A 7-week course beginning at mid-semester, which studies solutions to hydraulic problems in contemporary construction operational activities. Not open to students having previous credit for FEG 342. Spring. Mr. Tully.

Prerequisites: Senior class standing in engineering or permission of instructor based on a background in hydraulics.

447. Hydrologic Controls **(3)**

Three hours of lecture and discussion. A continuation of FEG 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring. Mr. Tully.

Prerequisites: FEG 340, FEG 430 or FEG 432, CIE 327 or equivalents as evaluated by the instructor.

460. Measurement Errors and Adjustment Computations **(3)**

Two hours lecture, one 3-hour lab each week. The study of measurement errors and the adjustment of observations oriented toward geodesy and photogrammetry. Topics include error definitions, weighted observations, method of least squares, matrix algebra in adjustments, variance-covariance matrix, the error ellipse, the general case of adjustment, and the design of survey networks. Fall or Spring. Mr. Brock.

Prerequisite: Calculus, APM 491 or equivalent

464. Photogrammetry II **(4)**

Two hours of lecture, 1 hour of recitation, 3 hours of laboratory each week. General analytic photogrammetry including interior and exterior orientation systems, intersection, space resection and orientation. Correction of photo coordinates for film deformations, lens distortions, atmospheric refraction and earth curvature. Introduction to photogrammetric plotters including the completion of a topographic mapping project. Planning photogrammetric projects, establishing product specifications, cost models, optimal components of photogrammetric systems, design of optimum procedures for the photogrammetric project. Spring. Mr. Brock.

Prerequisite: FEG 363 or equivalent.

474. Geodesy **(4)**

Three hours of lecture, 3 hours of laboratory. An introduction to Geodesy, including ellipsoidal geodesy, the direct and inverse problems, spherical triangles, conformal maps,

astronomic methods of position determination, time, gravity field of earth. Fall. Mr. Bender.

Prerequisite: Calculus through MAT 328 and FEG 371 or equivalent.

477. Survey Systems Design (3)

Three hours of lecture and discussion. A study of the development and present status of Land Surveys, including the U.S. Public Land System, plane coordinate system, land use and resource systems such as New York's LUNR system. The impact of survey upon land use. The design of future systems. Spring. Mr. Bender.

486. Cartographic Surveying (3)

One hour of lecture and 6 hours of field or laboratory exercise each week. Lecture topics will include earth ellipsoid, state plane coordinates, position and azimuth determination, parametric equations of ellipsoid, data reducation techniques, field techniques and specifications and design of control surveys. A topographic mapping project will be planned and the necessary ground control established. Fall. Staff.

Prerequisite: FEG 371 and FEG 363 or equivalent.

489. Forest Engineering Planning (4)

Three hours of lecture and 3 hours of laboratory. A synthesis of the fundamental areas of forest engineering in the planning of the physical development of the forest resources. Specific design studies will be made emphasizing the interrelationship of man, forest resources and their multiple services. These studies will lead to the development and application of planning to simulated realistic conditions. Spring. Staff.

497. Undergraduate Seminar (1)

Literature surveys and seminars on topics of Forest Engineering interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring. Staff.

498. Research Problem in Forest Engineering (1-3)

Independent research in topics in Forest Engineering for the highly motivated undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring. Staff.

Prerequisite: Consent of instructor.

563. Photogrammetry I (3)

Two hours of lecture and discussion, 3 hours of laboratory and discussion. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. Fall and Spring. Mr. Brock.

Prerequisite: FEG 271 (or FEG 301 concurrent) or equivalent.

FEN—ENTOMOLOGY (FOREST ENTOMOLOGY)

300. Principles of Forest Entomology (2)

Elements of insect classification, living requirements, and control manipulations that are prerequisite, with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, 3 hours of laboratory field work. Spring. Mr. Allen.

350. Elements of Forest Entomology (3)

Two hours of lecture, 3 hours of laboratory/field work. General classification of insects, morphology, physiology, ecology behavior, and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall. Mr. Simeone.

Prerequisites: FBO 100 and FZO 100.

402. Forest and Shade Tree Entomology (3)
Two hours of lecture, 3 hours of laboratory/field trip. Important forest and shade tree insects; detection, evaluation, prevention and control of their damage; their relation to silviculture and management of forests and shade trees. Spring. Mr. Lanier.
Prerequisite: FEN 350 or FEN 300.

404. Wood Deterioration by Insects (3)
Three hours of lecture, discussion and demonstration. Biology, identification, ecology of insect and wood interrelations; prevention of injury, and control of insects injurious to forest products and wood in use. Spring. Mr. Simeone.
Prerequisite: FEN 350, FEN 300 or consent of the instructor.

432. Insects and Site Planning (1)
Three hours of lecture per week for 4 weeks. An introduction to insect pests of shade trees, other woody ornamentals, wood structures and man; cultural methods for dealing with insect problems. (No credit for students who have already taken FEN 300, FEN 350, or who are Biology majors.) Fall. Mr. Allen and Staff.

450. Forest and Aquatic Insects (2)
The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer (4-week period). Cranberry Lake Field Biology Station. Mr. Lanier.
Prerequisites: Background in botany, zoology, systematics and ecology.

451. Pest Management—Theory and Practice (2)
Two hours of lecture for 9 weeks; then one lecture hour and one 3-hour laboratory for 4 weeks. A review of the history and governmental policy of pest management, as well as basic instruction in theory and practicum. Spring.

452. Principles of Chemical Control (3)
Two hours of lecture; one 3-hour laboratory. A study of the chemistry, toxicology, handling, and application of chemicals used to manage pest populations. A primer for the State Pesticide Application examinations. Fall.
Prerequisite: FEN 451

490. Medical Entomology (3)
Two hours of lecture, 3 hours of lab. Study of arthropods affecting man, domestic animals and wildlife with emphasis on their biology, control, and relationship to vertebrate disease. Spring. Mr. Morris.
Prerequisite: A beginning course in biology, entomology, zoology or consent of instructor.

560. Environmental Toxicology of Insecticides (2)
Two hours of lecture. Basis of action of insecticides in living systems, behavior of insecticides and microtoxicants in environment, interaction of insecticides and biological systems. Fall. Mr. Nakatsugawa.
Prerequisite: FBL 330 or equivalent course in physiology or biochemistry.

580. Insect Morphology (3)
Two hours of lecture, 3 hours of laboratory. A comparative study of the external morphology of insects emphasizing evolutionary trends, especially modifications of homologous structures. Topics of special importance include intersegmental relationships, feeding, sensory mechanisms, locomotion and reproduction. Spring. Mr. Kurczewski.
Prerequisite: FEN 350.

FZO—ZOOLOGY (FOREST ZOOLOGY)

100. General Zoology (4)
Prerequisite to all other courses in Forest Zoology. An autotutorial course with 2 hours of lecture and recitation, 4 hours in the learning center. A brief survey of major phyla with

emphasis on morphology, taxonomy, evolution and ecology followed by an introduction to the processes of maintenance, perpetuation and adaptation by animal species. The importance of other animals to man and the ecosystem is emphasized. Spring. Mr. Van Druff.

200. Wildlife Conservation (3)
Two hours of lecture, 1 hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not designed for students concentrating in the area of Forest Wildlife Management. Fall. Mr. Payne.
Prerequisite: One semester of biological science.

313. Biology of Birds and Mammals (3)
A course surveying the taxonomy, anatomical-behavioral-physiological adaptations and natural history of birds and mammals. Techniques for the field study of a vertebrate species will be discussed. Fall. Mr. Van Druff.

352. Wildlife Ecology (3)
Two hours of lecture, 3 hours of laboratory. A study of the principles governing forest and range wildlife and of the biological mechanisms involved. Spring.
Prerequisite: FBL 320 or permission of instructor.

381. Vertebrate Anatomy, Histology and Physiology I (4)
Three hours lecture, 3 hours laboratory. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on the skeletal, muscle, nerve and endocrine systems. Fall. Mr. Hartenstein.
Prerequisite: General zoology or general biology.

382. Vertebrate Anatomy, Histology and Physiology II (3)
Three hours lecture. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on digestion, metabolism, nutrition, circulation, respiration, excretion and body defense and destructive systems. Spring. Mr. Hartenstein.
Prerequisite: FZO 381 or some other course in anatomy.

383. Vertebrate Anatomy, Histology and Physiology III. (1)
Three hours laboratory. Macroanatomy, microanatomy and physiology of the digestive, metabolic, respiratory, circulatory, urogenital and immunological systems of vertebrates. Spring. Mr. Hartenstein.
Prerequisite: FZO 381, Vertebrate Anatomy, Histology and Physiology I or FZO 382, Vertebrate Anatomy, Histology and Physiology II.

411. Invertebrate Zoology (3)
Two hours of lecture, 3 hours of laboratory. Structure, classification and evolution of invertebrates. Emphasis on role of specific invertebrates in their natural habitat. Spring. Mr. Mitchell.

416. Ichthyology (3)
Two hours of lecture, 3 hours of laboratory. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring. Mr. Werner.

423. Microcommunity Ecology (2)
Note: SUNY Albany, No. BIO 423.
Two full days a week for 4 weeks. Study of terrestrial invertebrate microcommunities; descriptive and comparative assay of microhabitats incorporating experimental and field techniques. Summer Session I, Cranberry Lake Biological Station. Mr. Dindal, College of Environmental Science and Forestry.
Prerequisites: General biology, general ecology; invertebrate zoology is recommended.

424. Vertebrate Ecology **(2)**
Note: SUNY Albany No. BIO 425.
Two full days a week for 4 weeks. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics, and ecological role of vertebrates; standard field and laboratory techniques. Summer Session II, Cranberry Lake Biological Station. Staff, SUNYA.
Prerequisite: 12 hours of biology.

440. Fishery Biology **(3)**
Two hours of lecture, 3 hours of laboratory. Principles and techniques of handling fisheries resources in freshwater environments. Fall. Alternate even years. Mr. Ringler.
Prerequisites: FZO 525 and FZO 416 or permission of instructor.

456. Wildlife Ecology and Management I **(3)**
Two hours of lecture, 3 hours of lab. A study of the ecological principles governing wild animal populations and the relationship of these to manipulation of said populations. Spring. Mr. Chambers.
Pre- or corequisites: FBL 320 and LIB 300.

457. Wildlife Ecology and Management II **(3)**
Two hours of lecture, 3 hours of lab occasional day-long field trips. A study of wildlife management techniques, management schemes and programs. Fall. Mr. Chambers.
Prerequisites: FZO 456.

470. Principles of Animal Behavior **(3)**
Three hours of lecture per week. A study of the basic principles of animal behavior, stressing exogenous and endogenous mechanisms of control. Fall. Mr. Price.
Prerequisite: General zoology.

475. Behavioral Ecology **(2)**
Cranberry Lake Biological Station. Session I. Half time for 4 weeks. Study of the behavioral adaptations of animals to their environment. Emphasis will be placed on animal orientation and social behavior. Habitat selection and interspecific interactions will also be considered. Mr. Price.
Prerequisites: General biology and general ecology.
Note: Credit may not be received for both FZO 475 and FZO 470.

520. Terrestrial Community Ecology **(3)**
Two hours of lecture, 3 hours of laboratory. Relations of terrestrial animals to their physical, chemical and biological environment. Emphasis on community principles, succession and terrestrial adaptations. Fall. Mr. Dindal.
Prerequisite: A course in basic ecology.

525a. Physical and Chemical Limnology **(1)**
Modular format, 2 hours of lecture/week for first 7 weeks of fall semester. An introduction to the physics and chemistry of inland waters with particular emphasis on lakes. Fall. Mr. Werner.
Prerequisites: Junior standing, an introductory physics course and an introductory chemistry course.

525b. Introduction to Biological Limnology **(1)**
Modular format. Two hours of lecture/week for last 7 weeks of fall semester. An introduction to the biology of inland waters. Particular emphasis is placed on the aquatic environment as a habitat and the effect of changes in this environment on the structure and function of the biological communities contained therein. Fall. Mr. Werner.
Prerequisites: FZO 525a.

525c. Limnology Laboratory (1)
One laboratory or field trip per week. An introduction to limnology techniques and the taxonomy of aquatic organisms. Field trips to local aquatic habitats. FZO 525a and FZO 525b must be taken concurrently or previously. Fall. Mr. Werner.

GFO—GENERAL FORESTRY

032. Orientation (0)
One hour of lecture and discussion per week designed to introduce the freshman student to the College and its academic and social environs. Fall. Mr. Payne and Staff.

GRA—GRAPHICS (LANDSCAPE ARCHITECTURE)

(See also courses listed under EIN and LSA.)

181. Graphics I (2)
Six hours of studio per week. Two 3-hour drafting room periods. Elements of perspective, isometric, oblique and orthographic projection. Practical applications of these principles in machine and architectural drawing, including piping, electrical and plant layouts. Spring.

182. Art Media I (1)
Three hours of studio per week. Studios, group instruction and demonstrations, individual critiques, sketching and drawing from model, from still life and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Fall.

183. Art Media II (1)
Three hours of studio per week. Studio assignments, group instruction, and demonstrations, individual critiques, sketching and drawing from model, from still life and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Spring.

280. Technical Drawing (1)
One 3-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in freehand and instrument drawing. Fall.

284. Art Media III (1)
Three hours of studio per week. Studios, field trips, group instruction, criticism and demonstration, painting in oil, water color and acrylics. A studio painting course in oil, watercolor or acrylics to familiarize and develop color media skills and painting expressiveness. Fall.
Prerequisite: GRA 182 or 183 or permission of instructor.

285. Art Media IV (1)
Three hours of studio per week. Laboratory-Studios, field trips, group instruction, criticism and demonstration; painting, sculpture and other three-dimensional media. A studio course in various three-dimensional art forms and painting. Emphasis on individual experimentation and self-expression. Spatial relationships will be studied through the use of the third dimension, both from standpoint of "enclosure" and "setting." Spring.
Prerequisite: GRA 182 or 183 or permission of instructor.

482. Advanced Media (1-3)
Three hours of studio per week. Discussions, demonstrations, critiques and individual study. Study oriented toward perception and self-expression, use and possibilities of various media, as selected by student and instructor. Fall and Spring.
Prerequisite: Prior art media training or experience and permission of instructor.

LIB—LIBRARY (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSE)

300. Library Research **(1)**

Two hours of lecture or discussion, 1 hour lab per week in the library, during the first 5 weeks of the semester. Introduction for students at all levels to basic library materials and the research process leading to preparation of a bibliography. Fall and Spring. Staff.

LSA—LANDSCAPE ARCHITECTURE

(See also courses listed under EIN and GRA.)

310. Elements of Landscape Architecture and Environmental Design for Architecture Students **(2)**

Two hours of lectures, discussions and assigned readings per week. A successive presentation of a landscape architectural philosophy toward the physical environment and environmental design. Presentation of operational systems involved in the physical environment from technical, functional and symbolic points of view. Fall.

Prerequisite: Enrollment in School of Architecture or permission of instructor.

311. Elements of Landscape Architectural Practice for Architecture Students **(2)**

Two hours of lectures, problems and assigned readings per week. An introduction to the design elements of Landscape Architecture in contemporary application and practice. Spring.

Prerequisites: LSA 310; enrollment in School of Architecture or permission of instructor.

320. Introduction to Landscape Architecture and Design Theory **(2)**

Two hours of lecture per week. Lecture and class discussion, notebooks, reports, assigned text reading and assigned reserve shelf reading, research reading, weekly quizzes and exams, slides, movies and field trips. Course describes the field of Landscape Architecture, its philosophy, design theory and interdisciplinary relationships. Fall.

Prerequisite: 3rd year status or permission of instructor.

326. Landscape Design Studio I **(4)**

Nine hours of laboratory and 1 hour of lecture per week. Lectures, studio problems, criticism, quizzes, exams, reports, composing and rendering two- and three-dimensional techniques used to simulate the physical environment. Course presents a theory of abstract design and offers studio time in which to apply theory to graphic problems. Topics presented are the mechanics and terminology of design and the simulation of natural and man-made environments. Fall.

327. Landscape Design Studio II **(4)**

One hour of lecture, 9 hours of studio per week. Studio assignments, drafting, readings, discussions and field trips. An introduction to the visual-mental concepts basic to landscape architectural design. Various abstract and realistic problems to graphically illustrate elements of the physical environment and their effect upon man. Special attention to the spatial context of these elements and spatial sequences characteristic of the natural and man-made environments. Spring. (Student field trip expense $125—$150.)

Prerequisites: LSA 326, 320 or permission of instructor.

343. Structural Materials and Elements **(3)**

Three hours of lectures, problems and assigned reading per week. Study of the physical properties of materials and structural elements commonly used in landscape architecture. Topics include elementary statics and strength of materials, wood, metal, plastics, concrete, masonry, retaining walls, dams, foundations. Spring.

345. Elements of Site Engineering **(3)**

Two hours of lectures and 3 hours of studio per week. Lectures, problems, drafting, modeling and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles, layout plans, and earthwork quantity computation.

Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring.
Prerequisites: FEG 271 and EIN 211.

422. Landscape Design Studio III (4)
Twelve hours of studio per week. Studio problems, research, drafting and field trips. The processes and methods of design considerations of variances upon the natural physical environment, ranging from broad regional areas to specific site concerns. Fall.
Prerequisites: LSA 320, 326 and 327 or permission of instructor.

423. Landscape Design Studio IV (4)
Twelve hours of studio per week. Studio problems, research and drafting. Interaction of cultural influences with the physical environment, with attention focusing on the resulting forms. Observations and illustrations of people and places as inputs into the design process. Spring.
Prerequisite: LSA 422 or permission of instructor.

425. Orientation for Experiential Studio (3)
Three hours lecture and recitation. Investigation and documentation of an area of specialty, discussion, readings and research. Fall and Spring.
Prerequisite: Permission of instructor.

432. Plant Materials Culture (1)
Three lectures per week for 5 weeks. Grasses, arboriculture, propagation, transplanting, planting plans and specifications. Fall.
Prerequisite: Permission of instructor.

440. Site Development Systems (3)
Three hours of lectures, problems and assigned reading per week. Study of various engineering systems as they relate to the design and development of land. Topics include pedestrian ways, utilities (water, solid waste, sewage, electric, gas), road location and design, shore protection, swimming pools. Fall.
Prerequisite: Surveying.

490. Social Behavior and the Designed Environment (3)
Three hours of class per week. Lectures, readings, discussion and project. An examination of the concepts of individual and social behavior in relation to the physical design of the environment focusing on perceptual and cognitive evaluations as determinant of spatial meaning. Fall and Spring.

495. Selected Readings in Environmental Studies (1-3)
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.
Prerequisite: Permission of instructor.

498. Introductory Research Problem (1-3)
Guided study of a selection of problems relating to landscape architecture and environmental design. Emphasis on study procedure and methods employed. Fall and Spring. Staff. Enrollment at periodic intervals throughout the semester.
Prerequisite: Permission of instructor.

522. Landscape Design Studio VI (4)
Twelve hours of studio per week. Studio problems, research, drafting and field trips. Concentration on complex urban problems. Concern for social and psychological

considerations of the individual and large groups of people, their interaction and resultant forms of the environment. Spring.
Prerequisite: Permission of instructor.

524. Experiential Landscape Studio Design **(16)**
48 hours per week. The articulation of the study proposal established in LSA 425, as approved by faculty, through research, readings, field study with graphic and written documentation, and group discussion. Academic study in an off-campus location in an area of landscape architectural significance, as described and delineated in a student-prepared proposal approved by the faculty. Not available for Graduate Credit. Fall or Spring.
Prerequisites: LSA 425 or equivalent and LSA 423 or permission of instructor.

525. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Investigation of a problem in landscape architecture as proposed by the student and conducted in conjunction with faculty advisor. Spring.
Prerequisite: Permission of instructor.

527. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Studio problems, research, reports, and field trips. Concentration on regional landscape problems, the techniques of their analysis and derivation of their significance to the practice of landscape design. Spring.
Prerequisite: Permission of instructor.

529. The Major Elements of Environmental Design **(3)**
Lectures, readings, discussions and studios. The course presents an introductory survey of environmental design methods and associated skills and techniques. While studio work is part of the course, no design background is required. Fall.

530. Herbaceous Plant Materials **(2)**
Two hours of lectures, study problems, assigned readings and field trips per week. Identification, understanding and design use of non-woody plants. Fall.
Prerequisite: Permission of instructor.

532. Woody Plant Materials **(3)**
Three hours of lecture per week. Field study, lectures, slide presentations and readings. An elective course providing opportunity for extension of basic knowledge in the identification and design of woody plant materials in professional practice. Fall or Spring.
Prerequisites: LSA 533 and LSA 432 or permission of instructor.

533. Plant Materials **(3)**
Field trips and discussion. Ornamental woody plant identification. Observation and sketches of outstanding examples of planting design. Three weeks. Summer Session.
Prerequisite: Permission of instructor.

542. Highway Location and Design **(3)**
Two hours of lecture, 3 hours of studio per week. Lectures, assigned reading, studio projects, field trips. Environmental, engineering and human factors which determine highway location and design, particularly as they relate to landscape architectural concerns. Location, alignment, geometric design, drainage, roadbed construction, pavements, roadside development. Fall or Spring.
Prerequisites: LSA 343 and 440 or permission of instructor.

545. Professional Practice Studio II **(2)**
Three hours of studio, 1 hour of recitation per week. Studio problems, research, discussion and recitation sessions on the processes and methods of office practice. Emphasis on all aspects of site-development. Spring.
Prerequisite: Permission of instructor.

547. Principles of Professional Practice (2)
Two hours of lecture per week. Lectures, assigned readings, reports, cost estimates, specifications, contracts, professional ethics, registration laws, professional practice. Spring.
Prerequisite: Upperclass standing.

562. Architecture (3)
Two hours of lecture, 3 hours studio. Discussion and investigation of the principles of architectural design and procedures of architectural practice. Functional building systems coupled with site and program considerations as to their relative impacts on architectural form. Spring.
Prerequisite: Permission of instructor.

595. Selected Reading in Landscape Architecture (1-3)
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.
Prerequisite: 5th year status or permission of instructor.

597. Landscape Architecture Seminar (3)
Three hours of seminar per week. Discussion of current social, political, cultural and technological problems as to their relationship to the physical environment. Fall and Spring.
Prerequisite: Permission of instructor.

598. Research Problem (1-3)
Independent study of selected areas of environmental interest. Emphasis on a self-disciplined study, development of procedures and techniques to be employed in environmental design and planning. Engagement with specific sites and problems as proposed for study by individual communities. Fall and Spring. Enrollment at periodic intervals throughout the semester.
Prerequisite: Permission of instructor.

MAT—MATHEMATICS (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES)

115. Plane Trigonometry (3)
Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle complex numbers, logarithms, and accuracy of computed results. Fall or Spring. Mr. Green.

116. College Algebra (3)
Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. Fall or Spring. Mr. Green.

PSE—PAPER SCIENCE AND ENGINEERING

300. Introduction to Papermaking (3)
Three hours of lecture. Historical and commercial consideration of the paper industry. Technology of papermaking with emphasis on stock furnish, stock preparation, and paper machine operation. Introductory discussions of papermaking materials and formation and reactions of a fibrous web. Fall. Mr. Bambacht.

301. Pulp and Paper Processes (3)
Three hours of lecture. Technological consideration of pulping and bleaching of woody raw material. Includes consideration of wood procurement and preparation, pulping and bleaching processes, pollution abatement, and other ancillary operations. Spring. Mr. Gorbatsevich.
Prerequisites: FCH 475 and 476, CHE 332, PSE 300, (or concurrent).

302. Pulp and Paper Processes Laboratory (1)
One 3-hour laboratory. Study and practice in the techniques of laboratory procedures normally encountered in the pulp and paper industry. Laboratory exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring. Messrs. Bambacht and Gorbatsevich.
Prerequisite: PSE 301 (or concurrent).

304. Mill Experience (2)
Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Staff.

305. Mill Inspection Report (1)
Inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are borne by the student. Spring. Staff.
Prerequisites or concurrent: PSE 301, 302 and 370.

370. Principles of Mass and Energy Balance (3)
Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Fall. Mr. Gorbatsevich.
Prerequisites or concurrent: MAT 227, Physics, CHE 346.

461. Pulping Technology (4)
Two hours of lecture and 6 hours of laboratory. Discussion of pulping and bleaching processes: Effect of chemical and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall. Mr. Gorbatsevich.
Prerequisites: PSE 301, CHE 346 and CHE 356.
Note: A student may not enroll in or receive credit for both PSE 461 and PSE 661.

465. Paper Properties (5)
Three hours of lecture, 6 hours of laboratory and discussion. Evaluation and study of the physical, optical and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results and the ultimate properties desired in the finished paper. Fall. Mr. Bambacht.
Prerequisites: PSE 301, PSE 302.
Note: A student may not enroll in or receive credit for both PSE 465 and PSE 665.

466. Paper Coating and Converting (3)
Two hours of lecture and 3 hours of laboratory. Evaluation and study of various coating materials and processes used by the paper industry. Introduction to polymers and their use in converting operations. Study of materials and equipment used in converting operations, fundamentals and parameters which control their use, effects on final properties of papers. Spring. Mr. Bambacht.
Prerequisites: PSE 465
Note: A student may not enroll in or receive credit for both PSE 466 and PSE 666.

468. Papermaking Processes (3)

One hour of lecture, 6 hours of laboratory. Laboratory study of the papermaking process, with emphasis on operation of the semicommercial Fourdrinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished product and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring. Messrs. Bambacht, Gorbatsevich and Stenuf.

Prerequisites: PSE 461 and PSE 465.

491. Paper Science and Engineering Project I (1)

Student makes a systematic survey of all available literature on the problem assigned him and incorporates it in a formal, typewritten report. An essential part of this report is a detailed outline of a research project (PSE 492) which the student proposes to undertake during the next semester. Fall. Staff.

Prerequisites: PSE 300 and 301.

492. Paper Science and Engineering Project II (3)

The analysis of a problem, the synthesis of a solution, and the basic design of the facilities needed to solve the problem. Laboratory research, field work, and consulting as needed in addition to the literature survey completed in PSE 491. Progress reports and a final report and seminar-style presentation. Spring. Staff.

Prerequisite: PSE 491.

496. Special Topics (1-3)

Lectures, conferences and discussions. Specialized topics in chemistry, chemical engineering and physics as well as topics pertaining to management as related to the pulp, paper, paperboard and allied industries. Spring. Staff.

498. Research Problem (1-4)

The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique. The information obtained from the literature survey, along with the data developed as a result of the investigation, is to be presented as a technical report. Spring. Staff.

Prerequisites: PSE 461 and PSE 465.

575. Unit Operations I: Fluid Mechanics and Heat Transfer (3)

Three hours of lecture and 4 hours of recitation per week for the first 9 weeks of the semester. The study of momentum and heat transfer. Pipeline and duct design, pump and blower selection, flow measurement, open channel flow, heat transfer by conduction, convection, radiation, including equipment design and selection. Fall. Mr. Stenuf.

Prerequisites: PSE 370 or equivalents.

576. Unit Operations II: Process Control and Mass Transfer (2)

Two hours of lecture and 4 hours of recitation per week for the last 6 weeks of the semester. The study and application of measuring means, remote signal transmission, and control elements. Response to signals, lag, dynamic error, cycling and other phenomena of process control are discussed in relation to the standard modes of control, including two-position, single-speed floating, proportional, proportional-speed floating, proportional-reset, proportional-reset-rate, cascade control, relation of the process variables to open and closed loop computer applications.

The fundamentals of mass transfer, humidification and air conditioning as applied to industry and as found in the environment—climate and weather conditions. Fall. Mr. Stenuf.

Prerequisite: PSE 575.

578. Unit Operations III: Mass Transfer (3)
Three hours of lecture and 4 hours of recitation per week for the first 9 weeks of the semester. The study of mass transfer and application to the design and operation of equipment for drying, gas absorption, distillation and extraction. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.
Prerequisite: PSE 576.

579. Unit Operations IV: Recovery Processes Operations (2)
Three hours of lecture and 4 hours of recitation per week for the last 6 weeks of the semester. The study of industrial recovery processes operations including evaporation, filtration, sedimentation, centrifugation, small particle technology and fluidization, and reverse osmosis. Each operation is treated as a practical unit complete with application of heat transfer, fluid flow, thermodynamics and instrumentation. Spring. Mr. Stenuf.
Prerequisite: PSE 576.

RMP—RESOURCE MANAGEMENT AND POLICY

588. The Law of Natural Resource Administration (3)
Three hours of lecture and discussion. An introduction to the law concerning the procedures, powers and judicial review of public agencies responsible for the management of natural resources. Topics will include the extent of an agency's rulemaking power and the rights of aggrieved parties to appeal from agency decisions. Spring. Mr. Horn.
Prerequisite: ERM 460 or equivalent course in public administration.

SCE—SCHOOL OF CONTINUING EDUCATION

530. (FEN) Pest Identification, Biology and Management (3)
A study of the life history and management practices for pests common to the home, landscape, and recreational areas. Suggested for pest control personnel and teachers of primary and secondary science areas. Not open to College of Environmental Science and Forestry students. Summer
Prerequisite: One course in biology.

SIL—SILVICULTURE

553. Energy Exchange at the Earth's Surface (3)
Two hours lecture and 3 hours of laboratory. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphere. Primary emphasis on the turbulent transfer of heat, momentum and water vapor and the expression of these fluxes in the microclimate. Spring. Mr. Herrington.
Prerequisite: ERM 452, physics and calculus.

WPE—WOOD PRODUCTS ENGINEERING

300. Properties of Wood for Designers (2)
Two hours of lecture. An introduction to the basic structure and properties of wood for the designer. Discussion of the effects of wood structure and properties on practical woodworking techniques. Fall and Spring. Mr. Kyanka.

320. Polymeric Adhesives and Coatings (2)
Two hours of lecture a week. An introduction to organic adhesives and coatings for the purpose of being able to specify proper materials for particular applications. Knowledge acquired will allow the individual to understand product literature and specifications. Wood product systems are discussed in detail, but the principles involved are easily transferred to other substrate systems. A knowledge of chemistry is not required. Spring. Mr. L. Smith.
Prerequisites: Junior standing.

321. Adhesives and Coatings Laboratory (1)
Three hours of laboratory a week. Laboratory experiments to identify materials, methods of application and methods of evaluation of adhesives and coatings normally used in the wood industry. Spring. Mr. L. Smith.
Prerequisites: WPE 320 (may be concurrent) or permission of instructor.

322. Mechanical Processing (3)
Two hours of lecture, 3 hours of laboratory. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall. Mr. Moore.

326. Fluid Treatments (2)
Two hours of lecture. An introduction to wood-moisture relationships, wood permeability and pressure treatments, thermal conductivity, water-vapor movement and drying, and fire retardancy. The flow of fluids, heat and water vapor are treated as analogous phenomena and are related to the cellular structure of wood. Unsteady-state flow of gases, heat and water vapor are introduced. Spring. Mr. Siau.
Prerequisites: Junior status.

327. Fluid Treatments Laboratory (1)
Three hours of laboratory a week. Laboratory studies in relative humidity measurement, wood-moisture relationships, the relationship between permeability and treatability, wood-preservative treatments, wood drying and flame testing. Spring. Mr. Siau.
Prerequisites: Junior status, concurrently with WPE 326.

362. Timber Mechanics (4)
Three hours of lecture and 3 hours of laboratory second semester. Mechanical properties of wood and elements of structures. Lectures, problems, and use of timber-testing equipment. Spring. Mr. Kyanka.
Prerequisites: Calculus, physics.

386. Elementary Wood Technology (2)
One hour of lecture, 3 hours of laboratory. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U.S. timber by gross feature. Spring. Mr. de Zeeuw and Staff.

387. Wood Structure and Properties (2)
Two hours of lecture. Structure of wood and its relation to physical properties and uses. The normal variability of wood, abnormal growth, defects, deterioration of wood and their influence on properties and uses. Fall. Mr. de Zeeuw.
Prerequisite: FBO 100 or consent of instructor.

388. Wood and Fiber Identification Laboratory (2)
Six hours of laboratory. Wood and papermaking fiber identification using both gross and microscopic features. Fall. Mr. de Zeeuw.
Prerequisite: WPE 387 (may be concurrent).

389. Wood Identification Laboratory (1)
Three hours of laboratory. Identification of principal commercial timbers of United States on gross characteristics. Spring. Mr. de Zeeuw.
Prerequisite: WPE 387.

390. Field Trip (2)
Two weeks supervised study and reporting of representative wood products industries. Spring. Staff. Required of all students in WPE. Estimated individual expenses are $100—$150 while on the trip.

400. Introduction to Forest Products (2)
Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. Fall.

404. Design of Wood Structural Elements (3)
Lectures plus laboratory exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall. Mr. Kyanka.
Prerequisite: WPE 362.

422. Composite Materials (3)
Two hours of lecture, 3 hours of laboratory. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites, and extruded and molded products. Fall. Mr. R. Moore.
Prerequisites: WPE 320 and WPE 326. Concurrent or prior registration in WPE 362 or 302.

442. Light Construction (3)
Two hours of lecture, 2 hours of discussion, problems and practice. Elements of light frame construction, blue print reading, and estimating. Fall and Spring. Mr. G. Smith.

444. Materials Marketing (3)
Three hours of lecture and discussion. Marketing functions, agencies and management in the wood products and related industries. Principles of salesmanship and their application. Spring. Mr. G. Smith.

450. Construction Equipment (3)
Three hours lecture. Principles of selection, operation and maintenance of construction equipment. Primary types of site preparation, handling and assembly devices and their efficient utilization will be examined. Spring. Mr. Kyanka.
Prerequisite: Senior standing.

454. Construction Management (3)
Two hours lecture, 3 hours of laboratory. Conception, management and control of the construction processes with emphasis on specifications, costs, legal boundaries, erection planning and control, inspection and supervision. Spring. Mr. Whitt.
Prerequisite: Senior standing.

470. Production Systems I: Analysis (3)
Two hours of lecture, 3 hours of laboratory. Elements of system engineering. Analysis of performance characteristics of integrated production systems. Analysis of long-range vs. short-range system planning. A comprehensive lab problem is commenced which deals with the analysis prerequisite to the establishment of a manufacturing plant in a wood-processing industry. Fall. Mr. Whitt.
Prerequisites: Senior status and INE 548, APM 491, and concurrent registration in INE 575 or equivalent.

472. Production Systems II: Synthesis (3)
Two hours of lecture and 3 hours of laboratory. Organization for production. Manufacturing engineering and production planning and control. Plant layout and materials handling. A comprehensive problem of production system synthesis is carried out in a succession of lab exercises oriented toward a wood-processing industry. Spring. Mr. Whitt.
Prerequisite: WPE 470 or equivalent.

497. Senior Seminar for Wood Products Engineering Majors (2)
Discussion and assigned reports in current problems and new developments in wood products engineering. Fall. Staff.

498. Research or Design Problem **(1-3)**
Conferences, library, laboratory, and/or field research on a specific problem in wood products engineering. Typewritten report (original and one copy) required. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

596. Special Topics **(1-3)**
Lecture, conferences, discussions and laboratory. Special topics in Wood Products Engineering including techniques in scientific photography, microscopy, laboratory instrumentation, and computer applications as well as other topics of departmental interest. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

SYRACUSE UNIVERSITY COURSES REQUIRED IN COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY CURRICULA

ACC—ACCOUNTING

204. Financial Accounting Systems **(3)**
Fundamentals of financial accounting systems are described and applied to business organizations. Topics include: the recording process, income determination, asset valuation, financial statements, funds statements, ratio analysis and use of financial accounting information for decisionmaking.

252. Introduction to Managerial Accounting **(3)**
Financial information for internal managerial decisions and decisionmaking are discussed. Topics include: introduction to capital budgeting, methods of increasing equities, management of working capital, operating budgets, cost analysis, product costing, variance analysis, and financial control systems.
Prerequisite: ACC 204 or equivalent.

ARC—ARCHITECTURE

294. Introduction to Architecture **(3)**
A continuation of ARC 293 which is a survey of the background and influences relating to architecture.

LPP—LAW AND PUBLIC POLICY

355. Introduction to the Legal System **(3)**
The law as an instrument of social control. An understanding of peoples' rights and duties is developed through a study of basic legal concepts, procedures and reasoning.
Prerequisite: Junior standing or permission of instructor.

557. The Law of Commercial Transactions **(3)**
The legal aspects of commercial transactions are studied, with special attention given to contracts, the sale of goods, the use of commercial paper, the treatment of security, and the protection of consumers.
Prerequisite: LPP 355 or permission of instructor.

CHE—CHEMISTRY

106, 116. General Chemistry Lecture **(3)**
Fundamental principles and laws underlying chemical action; states of matter, atomic and molecular structure, chemical bonding, stoichiometry, properties of solutions, chemical equilibrium and introduction to thermodynamics. CHE 107 and 117 or 129 and 139 must be taken concurrently.

107, 117. General Chemistry Laboratory **(1)**
Open to students in CHE 109 and 119 or CHE 106 and 116. An experimental study of basic principles and techniques of chemistry. The states of matter, determination of formulas and molecular weights, simple volumetric and gravimetric analysis, heats of reaction. Studies of equilibrium, rates of reactions and qualitative analysis.

332. Quantitative Analysis **(2)**
The fundamentals of gravimetric and volumetric analysis. Two lectures per week. CHE 333 must be taken concurrently; it is recommended that CHE 326 also be taken concurrently.
Prerequisite: CHE 285.

333. Quantitative Analysis Laboratory **(1)**
Laboratory to accompany CHE 332. Must be taken for 1 credit by all chemistry majors.

346. Physical Chemistry I **(3)**
The properties of gases, liquids and solids. Elementary thermodynamics and chemical equilibrium. Three lectures per week.
Prerequisites: One year of college physics and differential calculus.

356. Physical Chemistry II **(3)**
Solutions, electrochemistry, kinetics and elementary statistical thermodynamics. Three lectures per week.
Prerequisite: CHE 346.

357. Physical Chemistry Lab **(1)**
Experimental techniques of physical chemistry and error analysis. Measurement of molecular weights, reaction rates, heats of reaction, equilibrium constants, spectroscopy. One or two laboratory periods. CHE 346 and 356 are either prerequisites or corequisites.

434. Instrumental Methods **(2)**
The theory and application of instrumental techniques to the solution of chemical problems. Two lectures per week. CHE 435 must be taken concurrently.
Prerequisites: CHE 332, 333, and 356.

435. Instrumental Methods Laboratory **(1)**
Laboratory to accompany CHE 434. Must be taken for 1 credit by all chemistry majors.

CIE—CIVIL ENGINEERING

325. Mechanics of Deformable Bodies **(3)**
Theories of stress, deformation and stability of elastic and non-elastic bodies subjected to various force systems.
Prerequisites: MEE 225 and MAT 398 (the latter may be taken concurrently).

326. Engineering Materials **(3)**
Study of the atomic, molecular and crystalline structures of solid engineering materials. The explanation and interpretation of physical, mechanical and electrical properties of materials based on these structures. Two 1-hour lectures and one 2-hour laboratory per week.
Prerequisite: CIE 325 or permission of instructor.

327. Principles of Fluid Mechanics **(4)**
Dimensional analysis; hydrostatics; equations of motion; Bernoulli's equation; Euler's momentum theorem; one-dimensional analysis; velocity potential; stream function; laminar viscous flow; Reynolds' stresses; isentropic flow.
Prerequisites: MAT 398, MEE 226.

437. Soil Mechanics and Foundations I (3)
Study of the formation and composition of soil. Concepts of soil mechanics, including hydraulic and mechanical properties. Two lectures and one laboratory per week.
Prerequisites: CIE 325, 327.

ECE—ELECTRICAL AND COMPUTER ENGINEERING

221. Electrical Science I (3)
Introduction to electric and magnetic field and circuit concepts; resistance and diode circuits; network reduction using techniques like Thevenin's theorem; elements of transient and steady-state circuit analysis.
Prerequisites: MAT 295, 296, PHY 103, 104.

222. Electrical Science II (3)
Mathematical description of electric and magnetic fields; elements of electromechanical conversion; analysis and design of simple electronic circuits, with emphasis on semiconductor diodes and transistors.

FIN—FINANCE

355. Money and Banking (3)
Introduction to general principles of money and banking, including organization and control of the banking system, commercial bank functions and operations, organization and operation of the Federal Reserve System, and monetary theory and policy.
Prerequisite: ECO 205.

GOL—GEOLOGY

101. General Geology (3)
Introduction to chemical, physical and biological processes and principles affecting the history and development of the earth. Lectures, laboratory and field trips.

105. Earth Science (3)
An introduction to earth science providing an integrated approach to the study of the solid earth, continental surfaces, atmosphere and oceans. Lectures, no laboratory, no prerequisite, not for geology majors.

IOR—INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH

548. Engineering Economic Analysis (3)
Deals with the economic factors of engineering decisions: the "will it pay?" aspect of engineering. Study of comparisons between old and alternative proposed economic plans from an engineering economy viewpoint involving consideration of management, materials, design, machine selection.
Prerequisite: Junior standing.

575. Industrial Methods and Systems Engineering (3)
Study of man-machine relationships, workplace design, process selection with emphasis on production subsystems, and automation. Special topics include measurement of human and machine activity, flow analysis, line balancing, feedback systems and control theory.
Prerequisites: INE 525 and 332, or equivalent.

MAR—MARKETING MANAGEMENT

355. Marketing and Society (3)
An analytical study of marketing as a major business function and a social process. Introduces analysis of market forces; marketing opportunities; determination of price,

product, distribution, promotion and organization policies required to control and fulfill planned marketing programs.

MAT—MATHEMATICS

015. Plane Trigonometry (3)
Prerequisites: One year plane geometry and 1½ years algebra.

016. College Algebra (3)
Prerequisite: One year of plane geometry and 1½ years algebra.

125. Elementary Analytic Geometry (3)
A study of geometry by algebraic means with emphasis on representation of lines, conics and other curves by equations; polar coordinates; parametric equations; solid analytic geometry.
Prerequisites: MAT 015 and 016 or equivalent.

226. Differential Calculus (3)
Limits; derivatives of algebraic and transcendental functions; applications to maxima and minima problems, curve tracing and rates of change; differentials.
Prerequisite: MAT 125.

227. Integral Calculus (3)
Law of the mean, definite and indefinite integrals, techniques of integration, geometric and physical applications.
Prerequisite: MAT 226.

328. Topics in Calculus (3)
Improper integrals, indeterminate forms, infinite series and expansion of functions, partial differentiation with applications, multiple integrals.
Prerequisite: MAT 227.

585. Higher Mathematics for Engineers I (3)
Solution of ordinary differential equations, including series solution; vector algebra and calculus, line and surface integrals, integral theorems; expansion in Fourier series.
Prerequisite: MAT 328 or 398.

MEE—MECHANICAL AND AEROSPACE ENGINEERING

225. Statics and Dynamics (4)
Fundamental concepts; vector algebra, forces, moments, equivalent systems; free body diagrams. Statics and dynamics of particles. Energy and momentum methods.

351. Fundamentals of Thermodynamics I (3)
Basic concepts and methods in engineering thermodynamics. The laws of thermodynamics and their implications in mechanical, chemical, electrical and magnetic systems. Properties of solids, liquids and gases, including perfect gases and mixtures thereof.

PHY—PHYSICS

103 and 104. General Physics (4)
Basic course dealing with the fundamental principles of physics. Lectures with demonstrations, discussion, recitations and laboratory. The first semester covers the fields of mechanics, heat and sound; the second semester, electricity and light.
Prerequisite: Course in trigonometry, or trigonometry as a parallel course.

211/212. General Physics for Science Students, I, II **(4)**
An advanced level introductory course that makes use of calculus methods. First semester: mechanics, heat and sound. Second semester: electricity and magnetism, light and some atomic physics. Lectures, recitations, and laboratory.
Corequisite: MAT 295 or equivalent.

361. Introduction to Modern Physics **(3)**
Recent developments, including atomic theory, quantum theory, electronic structure of atoms and molecules, radioactivity and structure of the nucleus.
Prerequisites: PHY 103 and 104 or equivalent.

SPC—PUBLIC SPEAKING

215. Public Speaking **(3)**
Application of the principles of informing, interesting and motivating an audience; emphasis upon selection, organization and development of ideas. Students deliver, listen to and criticize expository and persuasive speeches. No prerequisite.

Summer Attendance

A wide array of courses at the undergraduate and graduate levels is available to College of Environmental Science and Forestry students in the Syracuse University summer sessions. Research problems, theses, and special courses regularly available at the College may also be taken during the summer sessions. Syracuse University courses taken must be an integral part of the student's planned program and *be approved by his faculty advisor.*

Transfer students are advised to review their special course needs with the Office of Admissions and to consider summer attendance where completions of background courses in mathematics, chemistry, economics, or general education subjects are necessary for fall semester entry in full standing. Information on courses available on the Syracuse campus, session dates, and registration procedures are available upon request from the Office of Student Affairs or the Office of Graduate and Instructional Affairs at the College. Summer session tuition charges at the College for New York State residents are $21.50 for undergraduate lower level students, $26.75 for undergraduate upper level students, and $40.00 for graduate level students per credit. Tuition charges for non-residents of New York State are correspondingly $35.75, $43.50, and $50.00 per credit.

SUMMER FIELD PROGRAMS

Program in Field Forestry

Charles Lathrop Pack Demonstration Forest
Warrensburg Campus
Warrensburg, New York

A five-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted twice each summer at the Pack Demonstration Forest near Warrensburg, New

York. These sessions are coordinated with the Syracuse University summer sessions, permitting students to attend an on-campus session and a field session in the same summer. The courses presented in the field forestry program are listed in both the forest biology and resources management curricula sections. Room, board, and fee charges approximating $175 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the junior year. *Transfer students* planning to enroll in either the resources management or forest biology curriculum should write to the Director, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the field forestry program is required of students in resource management prior to the fall term of their junior year. Students in forest biology are also required to attend either this program or the program at Cranberry Lake Biological Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

Program in Environmental Biology

Cranberry Lake Biological Station
Charles Lathrop Pack Demonstration Forest
Cranberry Lake Campus
Cranberry Lake, New York

The Summer Program in Environmental Biology provides graduate students and undergraduate biology majors with the opportunity to continue their studies and research at a lake-and-forest field station in the summer. Qualified students from other institutions are welcome and are encouraged to attend.

Cranberry Lake and its environs are ideally suited for an advanced biology summer program. The surrounding topography is rolling hill and lake country dotted with numerous small ponds, closed bogs, and stream drainages. The lake itself is the third largest body of water in the Adirondacks. Because eighty percent of the shoreline is in State ownership, the lake remains relatively unspoiled by recreational developments and is free of pollution problems. Much of the original forest cover in the region was harvested years ago; today a rich variety of community types occupy those sites as the vegetation reverts again to the natural forest condition. The remaining virgin forests also provide the student with many examples of stable forests, each type reflecting the particular environmental conditions controlling forest development. A wealth of wildlife parallels the variety of cover types over the region. The area is centrally located providing easy access to a wide range of additional ecosystems ranging from bog to alpine types.

Facilities include four classroom-laboratories; dining facilities capable of serving 150; faculty quarters and cabins; an administration building; 12 cabins housing 6-8 students each; a recreation hall; and several smaller, supporting buildings.

The eight-week program extends from late June into mid-August and is divided into two four-week sessions. Courses are taught in blocks of two-day units, permitting concentrated study without hourly interruptions. These courses are designed to emphasize and effectively utilize the unique nature of this Adirondack setting and include the ecology of plants, invertebrate and vertebrate animals, in such diverse offerings as aquatic ecology, bryophyte ecology, insect ecology, vertebrate ecology, micro-community ecology, ornithology, forest communities, ecological measurements, forest pathology and limnology. The offerings vary from year to year, and interested students should contact the Director, Cranberry Lake Biological Station, State University of New York College of Environmental Science and Forestry, Syracuse, New York 13210 for additional information.

Forest Technician Program

THE PROGRAM

In 1912, some 1800 acres of land in the Adirondack Mountains were donated as a site for the development of a Ranger School by the College. Since that time, the forest technician program has trained more than 2,600 graduates, most of whom are now working in a variety of nationwide forest activities, and has earned the School a national reputation for excellence.

The 2-year curriculum trains students as forest technicians. The degree of Associate in Applied Science in Forest Technology (A.A.S.) is awarded upon the successful completion of the curriculum. The objectives of the curriculum are to provide students with a knowledge of the field practices of forestry as related to forestry managerial needs; the ability to work and communicate effectively with professional and paraprofessional forestry personnel; and an understanding of the sciences and practices of forestry with some emphasis on ecological applications.

Graduates are generally classified as forest technicians or forestry aides in initial employment positions. Forestry agencies and wood-using industries employ forest technicians as an important part of their forest management teams, usually as the "men on the ground" who plan and execute the field practice of forestry.

Since this curriculum is structured as a terminal, 2-year program at the paraprofessional level, students interested in a professional degree in forestry are advised to enroll initially in one of the College's 4-year undergraduate programs.

The freshman year of the forest technology curriculum consists primarily of general studies' courses which may be taken on the Syracuse Campus or at accredited community and junior colleges and agricultural and technical institutes.

The second year of the curriculum is taken at the College's Ranger School on the Wanakena Campus. Presented in a varied forest environment, the curriculum's emphasis is on practical field training and on the relationships between forest technology and managerial needs. Fifty percent of the studies is devoted to field exercises, most of which are held in the School's forest. This rolling belt of managed forest, containing both hardwood and coniferous species, covers an area some 3½ miles long with widths varying from 6/10 to 2¼ miles. On two sides the forest

is bounded by State Forest Preserve Lands. The forest is also adjacent to an area of several square miles of virgin timber within the Adirondack Forest Preserve. This excellent forest backdrop for the technology program provides a most diverse laboratory for instructional purposes.

Since the Ranger School is situated within a forest environment, some applicants to the forest technology program may mistakenly believe that the program is one of forest lore and wilderness survival. It is, therefore, strongly emphasized that the forest technology curriculum demands high quality academic achievement. Students cannot complete the program without concentrated and consistent study. Courses are offered in eight-week modules. Classes are scheduled from 8 a.m. to 5 p.m., Monday through Friday, with classroom and laboratory or field time equally divided. The intensity of the program normally requires a minimum of 70 hours a week of evening and weekend study, daily classes, and laboratory/field exercises. Several short trips, at no additional expense to the student, are made during the year in connection with courses in logging, forest recreation, forest mensuration and silviculture. A longer trip of seven days' duration emphasizing regional forestry practice is sponsored during the spring semester of the second year. Students must bear their proportionate share of the cost of this field trip which consists primarily of plane fare, lodging and meal expenses.

LIFE AT WANAKENA

The Wanakena Campus of the College of Environmental Science and Forestry is located on the banks of the Oswegatchie River near the picturesque hamlet of Wanakena. Approximately 65 miles northeast of Watertown, New York, and 35 miles west of Tupper Lake, New York, the School's buildings and its surrounding forest border on Cranberry Lake.

The main School building consists of a central service unit with dormitory wings on either side. The central unit contains classrooms, laboratories, library, a student lounge, faculty offices, the library, a kitchen, dining room and 47 student rooms, each housing two students.

Faculty living quarters are nearby on the campus. Other buildings include a maintenance shop, garages, a sugar house and storage buildings.

The close proximity of faculty offices and student quarters and the intensive field-work pattern enables students to consult easily and frequently with the faculty. The School considers this traditional close student-faculty association to be of major benefit in its training program.

A small library of approximately 1,500 volumes consists of highly specialized materials required for the teaching and study programs of the School.

Students taking the second year of the forest technology curriculum at the Wanakena Campus are required to live in the School's dormitories. An exception may be made for married students who may bring their families and rent their own private accommodations in the vicinity of the Wanakena Campus. Such accommodations are not plentiful. It is

recommended that each married student arrange rental arrangements well in advance of the registration date.

The Wanakena Campus does not maintain an infirmary, nor does it have on its staff a physician or nurse. There are two physicians and a dentist available in the immediate area as well as an excellent Community Hospital in nearby Star Lake, New York. In emergency situations, the School transports the sick or injured student to the local physician of his choice or to the hospital. Furthermore, there is no student accident or sickness insurance plan available through the Wanakena Campus, so that it is strongly suggested that the student consider such coverage before reporting to the Campus.

Because of the comparatively isolated location of the Wanakena Campus, a stock of books and supplies used in connection with the second year of the program is maintained on campus for sale to students.

During the first year of the program, College-enrolled students will be guided by the rules and regulations that govern their attendance at the Syracuse Campus. During the Second year of the program, students will be guided by the general rules and regulations for all College students and an additional set of Wanakena Campus "house rules" that supplement the College's general rules and regulations.

ADMISSION

Admission Requirements

Admission requirements for entrance into the forest technology curriculum are generally the same as for the other curricula of the College of Environmental Science and Forestry. Minimum requirements are 16 Carnegie high school units along this pattern: English, 4; history (social science), 2; science, 2 (one must be chemistry or physics); mathematics, 3 (including trigonometry or Math 11); and electives. Mechanical drawing and typing are strongly suggested electives.

An applicant must submit the test results of any one of the following: New York State Regents Scholarship Examination, College Entrance Examination Board (CEEB), Scholastic Aptitude Test (SAT), or American College Test (ACT).

The Director of Admissions may waive some of the above requirements under special circumstances.

In addition to the above-listed requirements, the following requirements must be met by all applicants:

1. The applicant must be strongly motivated toward a career as a forest technician.
2. The applicant must be aware of and willing to accept the work requirements of this field-forestry program and its strenuous physical demands.
3. The applicant's parents (if the applicant is under 21 years of age) must be fully aware of the field nature of the study program, its rigorous study-work regime and supporting academic facilities.
4. A full medical examination report must be submitted.

Admission Procedures

The decision to admit any student to the Forest Technician Program rests solely with the College of Environmental Science and Forestry. Most openings in the program are filled by students who received conditional acceptances while still seniors in high school, contingent on successful completion of the first year of college. Remaining openings are filled by transfer students who have already attended college. Therefore, it is suggested that the potential forest technician student apply while still a high school senior. Transfer admission at a later date is still possible for those not conditionally accepted in high school.

There are two procedures:

1. Seniors in high school who wish to spend the first year of the forest technician program on the Syracuse Campus should submit the regular freshman application (S-1) with supplemental forms to the College, using Curriculum Code 620 (Forest Technology).
2. Seniors in high school who wish to attend the first year of studies at another college (e.g., a community college), and the second year on the Wanakena Campus should: a.) Submit a regular freshman application (S-1) with supplemental forms to the College of Environmental Science and Forestry, using Curriculum Code 620 (Forest Technology). On one of the supplemental forms the student can indicate what school has been chosen for the first year. b.) Submit a regular application to the school selected for the first year of studies, using Curriculum Code 620.

Transfer Students

Students with previous college experience, or students who are currently enrolled at another college, may apply for transfer. However, courses transferred for credit can be applied only to the freshman year course of studies, and they must be appropriate to these courses and comparable in subject matter, content, and level. All second year courses must be taken at the Wanakena Campus, and therefore a student cannot transfer any previously earned credit toward the second year. Transfer applicants must submit a recent official copy of the college transcript and a list of courses they anticipate completing prior to enrollment.

Students spending the first year of studies at some other college must complete the following courses or their equivalents before they will be permitted to enroll in the Wanakena Campus portion of the program.

English	*6 semester hours*
Math (College Algebra and Trigonometry)	*6 semester hours*
General Biology (or Botany—course should be plant-oriented)	*6-8 semester hours*
Economics	*3 semester hours*
Electives (Recommended: Public Speaking, Technical Report Writing, Geology)	*9 semester hours*
	30-32 semester hours

EXPENSES

Costs of the first year will vary with the specific institution attended.

Estimated costs of the second-year program on the Wanakena Campus are as follows:

	Tuition	*Board & Room*	*Books & Supplies*
New York Resident	$ 650	Approx. $1200	Approx. $275
Nonresident	$1,075	Approx. $1200	Approx. $275

An additional estimated expense of $150.00 will likely be incurred to cover the cost of laundry and clothing. The cost of the 5-day regional forestry practice trip during the spring semester is estimated at approximately $200. There is also a $10.00 graduation fee and a $10 student activity fee.

FINANCIAL ASSISTANCE

Financial aid is available upon acceptance to the College of Environmental Science and Forestry. There are three basic loans: scholarships or grants, part-time employment and long-term loans.

More detailed information on these financial aid opportunities can be found on pages 31—35 of this bulletin and in the *Undergraduate Financial Aid Bulletin*.

The student must file an application with the Office of Financial Aid at the Syracuse Campus and submit a *Parents' Confidential Statement* to the College Scholarship Service, Princeton, New Jersey 08540.

PLACEMENT

The School assists in placement of graduates. The reputation of the College's Ranger School usually results in graduates being able to find employment readily. Employment is common with local, state and federal forestry and land resource agencies, private forestry enterprises and surveying firms. Positions most frequently filled by recent graduates include: state forest ranger, state forest technician, forestry aide, industrial forest district supervisor, timber inventory specialist, timber sales supervisor, forest surveyor, forest engineering aide, forest protection technician, forest research technician and forest equipment salesman.

FOREST TECHNOLOGY CURRICULUM
(Associate in Applied Science Degree)

			Credit Hours
Freshman Year			
(Syracuse Campus or preferably taken at a two-year college)			
First Semester	[1]FBO 100	General Botany	4
	[2]English		3
	[3]Math		3
	[4]Electives		4
	GFO 032	Orientation	0
			14
Second Semester	[1]FZO 100	General Zoology	4
	[2]English		3
	[3]Math		3
	ERM 204	Introduction to Economics for Forestry	3
	[4]Elective		3
			16
Senior Year			
(Wanakena Campus)			
First Semester	FTC 200	Dendrology I	2
	FTC 202	Plane Surveying I	4
	FTC 204	Forest Mensuration and Statistics I	3½
	FTC 206	Forest Ecology	3
	FTC 208	Forest Installations	3
	FTC 209	Forest Roads	2
	FTC 213	Forest Protection I	2
	FTC 223	Graphics	1
			20½
Second Semester	FTC 201	Dendrology II	½
	FTC 203	Plane Surveying II	3
	FTC 205	Forest Mensuration and Statistics II	2
	FTC 207	Aerial Photogrammetry	2
	FTC 211	Silviculture	2
	FTC 212	General Forestry	1
	FTC 214	Personnel Management	1½
	FTC 215	Timber Harvesting	2
	FTC 216	Wood Technology	1½
	FTC 217	Forest Management	2
	FTC 218	Forest Recreation	1½
	FTC 219	Elements of Wildlife Ecology	1½
	FTC 221	Water Resource Management	2
	FTC 225	Regional Forestry Practices	1
	FTC 227	Forest Protection II	2
			25½

[1]Courses selected may be in general biology but at least one course in introductory botany is preferred.

[2]Freshman English or equivalent.

[3]Competency in plane trigonometry and college algebra is required. If demonstrated, credits become electives.

[4]Courses related to Technical Report Writing and Speech are strongly recommended. Additional electives in biology and geology also should be seriously considered.

[5]Students are expected to complete the one-day orientation session to be given at the Wanakena Campus in late May, prior to the Fall registration.

A total of 76 credit hours is required. Upon satisfactory completion, an Associate Science (A.A.S.) degree in Forest Technology will be awarded.

FOREST TECHNOLOGY

200. Dendrology I (2)

32 hours of lecture and 42 hours of field time. A study of the distinguishing characteristics, growth features, distribution, associates and importance of the major tree species of North America.

Seasonal field identification and on-the-spot discussion of habitats, associates, and the place in succession of the predominant forest trees and shrubs as found in the Adirondack area of the Northeast, plus a limited number of introduced species. Fall. Mr. Coufal.

201. Dendrology II (½)

20 hours of field time. A continuation of Dendrology I, with special emphasis on identification of plants in their winter form. Also special coverage of trees likely to be encountered in the south during the regional forestry practice trip. Spring. Mr. Coufal.

Prerequisite: FTC 200.

202. Plane Surveying I (4)

50 hours of lecture and 110 hours of field time. An introduction to the theory and practice of plane surveying. Emphasis is on individual skill development through small crew projects handling typical surveying equipment in typical field situations. Lecture topics include theory of measurements and errors, mathematics for ordinary surveying, field problems, and the production and preparation of maps. Field projects include traversing with both foresters' and engineers' tools, and the actual production of several maps. Fall. Mr. Sterbenz.

203. Plane Surveying II (3)

18 hours of lecture and 86 hours of field time. A continuation of F. Tech 202 with emphasis on small field projects including leveling, boundary surveying, triangulation, and circular curves. Classroom work develops the mathematical principles behind the solution of field problems. Several maps are prepared. A day trip is scheduled to the County Court House to examine a typical system of filing and recording property boundary information. Other topics include the Survey of the Public Lands and surveying as a profession. The use of the computer in problem solving is included. Spring. Mr. Sterbenz.

Prerequisites: FTC 202; FTC 223.

204. Forest Mensuration and Statistics I (3½)

70 hours of lecture and 36 hours of field time. A classroom and field study of the basic principles and skills required for the measurement of standing trees and their products. Volume tables, their use and construction are studied. Sampling designs are statistically approached from the standpoint of sampling errors and necessary sampling intensity. Cruise reports are required in which the student presents cruise results in tabular form. Fall. Mr. Martin.

205. Forest Mensuration and Statistics II (2)

2 hours of lecture and 56 hours of field and laboratory time. A field problem of practical nature utilizing methods for collecting, analyzing and presenting data dealing with timber volumes. Spring. Mr. Martin.

Prerequisite: FTC 204.

206. Forest Ecology (3)

42 hours of lecture and 50 hours of field time. Study of weather and weather data collection; students manning a forest weather station. Study of weather and soil factors as to how they affect trees and forests, plus the interactions within the forest community and with the environment. Introduction to cover type mapping. Final field problem and report on detailed measurement and analysis of a belt transect. Fall. Mr. Remele.

207. Aerial Photogrammetry **(2)**

20 hours of lecture and 36 hours of laboratory. Development of the ability to interpret important ground features by viewing aerial photos singly and in pairs, using stereoscopic techniques and equipment. Scale problems and the making of reliable horizontal and vertical measurements. Radial line plot control for the transfer of detail to base maps. Forest type mapping and forest mensuration using photos. Spring. Mr. Remele.

208. Forest Installations **(3)**

40 hours of lecture and 60 hours of laboratory or field time. This course provides the student with the technical competence necessary to use, plan, construct and maintain such typical forest improvements as telephone lines, radio systems, trails and light frame structures. Fall. Mr. Miller.

209. Forest Roads **(2)**

22 hours of lecture and 38 hours of laboratory or field time. This course provides the student with the technical competence necessary to administer, locate and design the construction and maintenance of a typical forest gravel road. Fall. Mr. Miller.

Prerequisite: FTC 202.

211. Silviculture **(2)**

46 hours of lecture and 32 hours of field and laboratory time. Orientation regarding the place, terminology, and methods of silviculture. Coverage of the most generally used techniques for establishing and manipulating the more important forest types in the Northeast for ecological and economical satisfaction. Field demonstration and practice in planting, thinning, pruning, timber marking and chemical silviculture. Spring. Mr. Remele.

Prerequisite: FTC 206.

212. General Forestry **(1)**

14 hours of lecture. This course provides the student with an understanding of the nature of their employment opportunities, how and where to apply for employment, and a review of the history of forest technician education with special emphasis on the Ranger School. Spring. Mr. Castagnozzi.

213. Forest Protection I **(2)**

38 hours of lecture and 27 hours of field and laboratory time. A study of the insect and disease agents that damage trees and their role in the total forest community. The course covers identification of local forest insects and disease-causing organisms, study of the major pest groups of other forest regions, and control measures including the effects of pesticides on the environment. Field trips cover local pests and the damage caused, while laboratory work covers major groups of pests likely to be encountered elsewhere. Fall. Mr. Coufal.

214. Personnel Management **(1½)**

26 hours of lecture. A study of company and agency organization groups including selection of and placement of personnel, training of personnel and performance evaluations, planning for and administering crew responsibilities, human relations in the working situation and special personnel problems of the forest technician and forester are covered.

Techniques of foremanship are applied in various field exercises in other courses, along with the study of safety hazards, accident prevention, accident classification and accident reporting. Spring. Mr. Miller.

215. Timber Harvesting **(2)**

21 hours of lecture and 35 hours of field time. This course acquaints the student with the basic harvesting methods and techniques, with emphasis on the Northeast, along with the knowledge of how and where harvesting fits in with other forest uses. Students gain technical competence in timber sale contract administration and basic timber appraising. Spring. Mr. Miller.

216. Wood Technology **(1½)**

17 hours of lecture and 20 hours of laboratory. Study of the development of various cell and tissue structures within trees, the gross structural features of wood, and the part these features play in the physiological processes of living trees. Physical properties of wood are studied with special emphasis given to those gross features which identify species. Attention is given to wood quality, defects of wood, and those special features which make certain species desirable for specific uses.

In the laboratory a variety of samples from the more commercially important lumber trees of North America are identified by the use of a gross feature key and 10X magnification. Spring. Mr. Martin.

217. Forest Management **(2)**

24 hours of lecture and 12 hours of field or laboratory time. The relation of silviculture to management. Subdivisions and classification of forest properties. Determination of growing stock and growth. The forms of managed forests and methods by which forests are brought to a regulated condition. Field and lab work in preparation for a report giving recommendations for management of a portion of the School Forest. Spring. Mr. Remele.

Prerequisite: FTC 206.

218. Forest Recreation **(1½)**

20 hours of lecture and 32 hours of laboratory or field time. This course acquaints the student with the forest recreational resources—its present and future needs. Principles of recreation development and management are discussed with special emphasis placed on the technical aspects. Spring. Mr. Miller.

219. Elements of Wildlife Ecology **(1½)**

36 hours of lecture and 4 hours of field time. A study of the principles of wildlife ecology with fundamentals related to the actions of the preservationist, conservationist, and particularly those of the forest manager. Spring. Mr. Martin.

Prerequisite: A course in biology or its equivalent.

221. Water Resource Management **(2)**

30 hours of lecture and 40 hours of field time. A comprehensive study of the concepts of the hydrologic cycle and quantification of its components. Particular stress on basic water measurements, erosion sedimentation and protection of the soil-water resource. Spring. Mr. Suhr.

Prerequisites: FTC 202, FTC 206, FTC 207.

223. Graphics **(1)**

16 hours of lecture. An introduction to lettering and drafting with emphasis on the skills needed by the forest or surveying technician. Individual skill development is achieved through many projects. The theory behind each aspect of the project is covered in lecture and each student is then expected to complete the project on his/her own time. Several lettering plates are produced in addition to precision drawing for the production of maps.

The use of drafting machines is explained and demonstrated for the students. Fall. Mr. Suhr.

225. Regional Forestry Practices **(1)**

40 hours of field time. A 7-day field trip to provide concentrated and varied field observation. It is conducted during the Spring semester to give the student first-hand observation of the current forestry practices in various parts of the United States. Spring. Staff.

227. Forest Protection II **(2)**

27 hours of lecture and 27 hours of field and laboratory time. The basic principles of forest fire behavior, fire danger and fire danger rating, forest fire prevention and control, and prescribed burning are covered. Fire suppression techniques are demonstrated and practiced. Spring. Mr. Suhr.

Prerequisite: FTC 213.

State University of New York

STATE UNIVERSITY OF NEW YORK

Chancellor of the University ..... ERNEST L. BOYER, A.B., M.A., Ph.D., Litt. D., L.H.D., LL.D., P.S.D., D.Sc.

Secretary of the University ..... MARTHA J. DOWNEY, B.S., M.A.

BOARD OF TRUSTEES

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DARWIN R. WALES, B.A., LL.B. ..... Binghamton

The State University of New York, now in its 28th year of service, is the largest, centrally managed, multi-level system of public higher education in the nation.

Since its founding in 1948, through consolidation of 29 State-supported but unaffiliated campuses, the University has grown in response to need until its services are now felt educationally, physically and culturally, the length and breadth of New York State.

The University's 64 geographically dispersed campuses bring educational opportunity within commuting distance of virtually all New York citizens. In many communities, the SUNY campuses are cultural

centers of the area and a significant contributor to the local economy.

In academic 1975-76, nearly 355,000 students are studying in its classrooms or pursuing study at home, at their own pace, through such innovative institutions as Empire State College, a campus without walls. More than 100,000 students are 24 years of age or older, reflecting SUNY's ability to adjust to meet the needs of more mature students.

During its relatively brief existence, it has graduated more than 600,000 alumni, the majority of whom are pursuing their careers in villages, towns and cities across the State.

Chancellor Ernest L. Boyer, in a recent report to the University's Trustees, emphasized the diverse role of SUNY when he said:

"The State University welcomes not only the future architects, business executives, engineers, surgeons and literary critics, but also future dairy farmers and medical technicians, accountants and social workers, foresters and automobile mechanics. And through work in film, electronics, pollution control, data processing, police science, urban studies and similar fields, the University seeks to educate persons for tomorrow's roles as well as those of today."

To provide such opportunity on a continuing basis, the University is uniquely organized into a system comprised of:

Four University centers (two of which, Buffalo and Stony Brook, include health science centers); two medical centers; 13 colleges of arts and science, a non-residential college; three specialized colleges, six agricultural and technical colleges; five statutory colleges administered in cooperation with Cornell and Alfred Universities; and 30 locally-sponsored community colleges.

In addition to baccalaureate studies, 12 of the senior campuses offer graduate study at the doctoral level, and 22 at the master's level.

The two-year colleges offer associate degree opportunities in arts and science in a wide range of technical areas. They also provide transfer programs within the University for students wishing to continue to the baccalaureate degree.

Ten Educational Opportunity Centers serve the educationally deprived by upgrading occupational skills for more gainful employment and identifying students with college potential to prepare them for enrollment in the State's public and private colleges.

Overall, at its EOC's, two-year colleges, four-year campuses and university and medical centers, the University offers 3,500 academic programs.

State University is governed by a Board of Trustees, appointed by the Governor, which determines the policies to be followed by the 34 State-supported campuses.

The 30 community colleges operating under the program of State University have their own local board of trustees. The State contributes one-third to 40 percent of their operating costs and one-half of their capital costs.

The State University motto is "Let Each Become All He Is Capable of Being."

STATE UNIVERSITY OF NEW YORK

Office of the Chancellor, 99 Washington Avenue, Albany, New York 12210

UNIVERSITY CENTERS

State University at Albany
State University at Binghamton
State University at Buffalo
State University at Stony Brook

MEDICAL CENTERS

Downstate Medical Center at Brooklyn
Upstate Medical Center at Syracuse

COLLEGES OF ARTS AND SCIENCE

College at Brockport
College at Buffalo
College at Cortland
Empire State College
College at Fredonia
College at Geneseo
College at New Paltz
College at Old Westbury
College at Oneonta
College at Oswego
College at Plattsburgh
College at Potsdam
College at Purchase
College at Utica/Rome

SPECIALIZED COLLEGES

College of Environmental Science and Forestry at Syracuse
Maritime College at Fort Schuyler (Bronx)
College of Optometry at New York City

AGRICULTURAL AND TECHNICAL COLLEGES (Two-Year)

Alfred
Canton
Cobleskill
Delhi
Farmingdale
Morrisville

STATUTORY COLLEGES

College of Ceramics at Alfred University
College of Agriculture and Life Sciences at Cornell University
College of Human Ecology at Cornell University
College of Veterinary Science at Cornell University
School of Industrial and Labor Relations at Cornell University

COMMUNITY COLLEGES

(Locally-sponsored two-year colleges under the program of State University)

Adirondack Community College at Glens Falls
Broome Community College at Binghamton
Cayuga County Community College at Auburn
Clinton Community College at Plattsburgh
Columbia-Greene Community College at Hudson
Community College of the Finger Lakes at Canandaigua
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie Community College at Buffalo
Fashion Institute of Technology at New York City
Fulton-Montgomery Community College at Johnstown
Genesee Community College at Batavia
Herkimer County Community College at Herkimer
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
Niagara County Community College at Sanborn
North Country Community College at Saranac Lake
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Rockland Community College at Suffern
Schenectady County Community College at Schenectady
Suffolk County Community College at Selden
Sullivan County Community College at Loch Sheldrake
Tompkins-Cortland Community College at Dryden
Ulster County Community College at Stone Ridge
Westchester Community College at Valhalla

College of Environmental Science and Forestry

ESF BOARD OF TRUSTEES

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State University of New York ..... Albany
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CHRISTOPHER A. MILITSCHER,
Representative of Student Association ..... Syracuse
EWALD B. NYQUIST, *Commissioner,*
Department of Education ..... Albany
OGDEN R. REID, *Commissioner*
Department of Environmental Conservation ..... Albany

COLLEGE ADMINISTRATION

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Assistant to the President ..... C. PETER CLUTE
Assistant to the President for Community Relations ..... ROLLA W. COCHRAN

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Assistant Vice President for Research Programs ..... DONALD F. BEHREND
Assistant Vice President for Academic Programs ..... WILLIAM E. GRAVES

Executive Director, Institute of Environmental Program Affairs ..... DONALD F. BEHREND
Coordinator of Sponsored Programs ..... J. DONALD MABIE

Vice President for Student Affairs ..... HARRISON H. PAYNE
Director of Admissions ..... ROBERT L. FRIEDMAN
Financial Aids Coordinator ..... JOHN R. REEVES
Registrar ..... DONALD F. GREEN
Director of Student Counseling ..... ALAN D. FINNEGAN
Coordinator of Career Services ..... WILLIAM F. SHELDON
Adjunct Foreign Student Counselor ..... VIRGINIA T. TORELLI

Vice President for Administration and Services ..... DAVID G. ANDERSON
Director of Business and Fiscal Affairs ..... HARRY J. CORR
Librarian ..... DONALD F. WEBSTER
Coordinator of Educational Communications ..... DAVID L. HANSELMAN
Director of Computer Services ..... CHARLES N. LEE
Director of Personnel (Acting) ..... STEPHEN H. MONTGOMERY
Director of Physical Plant ..... THEODORE J. KOCHANEK
Coordinator of Facilities ..... CHARLES N. LaFORTY
Director of Campus Safety and Security ..... JOHN F. LITCHER
Associate for Institutional Research ..... RHONDDA K. CASSETTA
Director of Analytical and Technical Services ..... JOHN A. MEYER
Affirmative Action Officer ..... ALTON W. ZANDERS

Dean, School of Biology, Chemistry and Ecology ..... STUART W. TANENBAUM
Dean, School of Continuing Education ..... JOHN M. YAVORSKY
Dean, School of Environmental and Resource Engineering ..... ROBERT V. JELINEK
Dean, School of Environmental and Resource Management ..... CHARLES C. LARSON
Dean, School of Landscape Architecture ..... BRADFORD G. SEARS
Director, School of Forest Technology ..... DANIEL M. CASTAGNOZZI
Director, Graduate Program in Environmental Science ..... ROBERT D. HENNIGAN
Director, Adirondack Ecological Center ..... WILLIAM C. TIERSON
Director, Applied Forestry Research Institute ..... RAYMOND L. MARLER
Director, Empire State Paper Research Institute ..... BENGT LEOPOLD
Director, State University Polymer Research Center ..... MICHAEL M. SZWARC
Director, Ultrastructure Studies Center ..... WILFRED A. CÔTÉ, JR.
Director, Tropical Timber Information Center ..... ROBERT W. DAVIDSON
Director, Cellulose Research Institute ..... TORE E. TIMELL
Project Leader, U.S. Forest Service Cooperative Research Unit ..... J. ALAN WAGAR

COLLEGE FACULTY AND PROFESSIONAL STAFF

This listing represents an official record of the State University of New York College of Environmental Science and Forestry faculty and professional staff for 1976. It is designed for use in 1976-77. Any changes should be filed with the Office of Personnel.

The date in parentheses after each name denotes the first year of service, two or more dates, the term of service. An asterisk (*) indicates graduate faculty.

MAURICE M. ALEXANDER (1949)*, *Professor and Chairman*, Department of Forest Zoology; B.S., State University of New York College of Forestry, 1940; M.S., University of Connecticut, 1942; Ph.D., State University of New York College of Forestry, 1950

DOUGLAS C. ALLEN (1968)*, *Associate Professor*, Department of Forest Entomology; B.S., University of Maine, 1962; M.S., 1965; Ph.D., University of Michigan, 1968

IRA H. AMES (1972), *Adjunct Assistant Professor*, Department of Botany and Pathology; B.A., Brooklyn College, 1959; M.S., New York University, 1962; Ph.D., 1966

THOMAS E. AMIDON, (1975), *Instructor*, Department of Paper Science and Engineering; B.S., College of Environmental Science and Forestry, 1968; M.S., 1974; Ph.D., 1975

DAVID G. ANDERSON (1959), *Vice President for Administration and Services; Associate Professor*; A.A.S., State University of New York College of Forestry (Ranger School), 1950; B.S., State University of New York College of Forestry, 1953; M.S., University of Utah, 1958

ROBERT E. ANTHONY (1953), *Technical Specialist*, Department of Botany and Pathology; A.A.S., State University of New York Agricultural and Technical College at Morrisville, 1952

GEORGE R. ARMSTRONG (1950)*, *Professor*, Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1949; M.S., 1959; Ph.D., 1965

ROBERT W. ARSENEAU (1972), *Programmer/Analyst*, Computer Center; A.A.S., Mohawk Valley Community College, 1967

DEBORAH A. AUGER (1975), *Intern*, Office of Academic Programs; B.A., University of Rhode Island, 1971

JAMES P. BAMBACHT (1967)*, *Assistant Professor*, Department of Paper Science and Engineering; A. B., Kalamazoo College, 1954; M.S., The Institute of Paper Chemistry, 1956; Ph.D., State University of New York College of Environmental Science and Forestry, 1973

C. ELLISON BECK (1970), *Technical Specialist*, Analytical and Technical Services, Office of the Vice President for Administration and Services

DONALD F. BEHREND (1960-67) (1968)*, *Assistant Vice President for Research Programs; Executive Director of the Institute of Environmental Program Affairs; Senior Research Associate*; B.S., University of Connecticut, 1958; M.S., 1960; Ph.D., State University of New York College of Forestry, 1966

ROBERT M. L. BELLANDI (1974), *Research Assistant*, Institute of Environmental Program Affairs; B.S., Montana State University, 1972; M.R.P., Syracuse University, 1973

LEE U. BENDER (1970)*, *Associate Professor*, Department of Forest Engineering; State University of New York College of Forestry (Ranger School), 1953; B.S., State University of New York College of Forestry, 1959; M.S., 1960; Ph.D., Ohio State University, 1971

DAVID J. BENNETT (1973), *Research Assistant*, Empire State Paper Research Institute; B.S., State University of New York College of Forestry, 1968; M.S., Syracuse University, 1971

JOHN D. BENNETT (1960)*, *Associate Professor*, Department of Managerial Science and Policy; B.A., Ohio Wesleyan University, 1954; Ph.D., Syracuse University, 1968; *Chancellor's Award for Excellence in Teaching* (1973)

CAMILLO BENZO, (1975), *Adjunct Associate Professor*, Department of Forest Zoology; B.A., Utica College of Syracuse University, 1964; Ph.D., University of Pennsylvania, 1969

JOHN V. BERGLUND (1965)*, *Associate Professor*, Department of Silviculture and Forest Influences; B.S. Pennsylvania State University, 1962; M.S., 1964; Ph.D., State University of New York College of Forestry, 1968

WILLIAM H. BETTINGER (1972), *Technical Specialist*, Analytical and Technical Services, Office of the Vice President for Administration and Services

DONALD H. BICKELHAUPT (1969), *Technical Assistant*, Department of Silviculture and Forest Influences; B.S., State University of New York College of Forestry, 1969

PETER E. BLACK (1965)*, *Professor*, Department of Silviculture and Forest Influences; B.S., University of Michigan, 1956; M.F., 1958; Ph.D., Colorado State University, 1961; *Executive Chairman of the Faculty* (1974-76)

J. T. C. BOHM, (1974), *Visiting Scientist*, Empire State Paper Research Institute; Ph.D., Agricultural University, Wageningen, The Netherlands, 1974

WILLIAM R. BORGSTEDE (1971), *Technical Assistant*, Department of Forest Zoology; A.A.S., Miner Institute, 1966; A.A.S., State University of New York College at Delhi, 1970; B.S., State University of New York College of Environmental Science and Forestry, 1975

JEROME BREZNER (1961)*, *Professor*, Department of Forest Entomology; A.B., University of Rochester, 1952; A.M., University of Missouri, 1956; Ph.D., 1959

ROBERT H. BROCK, JR. (1967)*, *Professor*, Department of Forest Engineering; B.S., State University of New York College of Forestry, 1958; M.S., 1959; Ph.D., Cornell University, 1971

RANIER H. BROCKE (1969)*, *Senior Research Associate*, Adirondack Ecological Center; B.S., Michigan State University, 1955; M.S., 1957; Ph.D., 1970

ALTON F. BROWN (1963), *Research Assistant*, Empire State Paper Research Institute

KENNETH F. BURNS (1970), *Technical Assistant*, Applied Forestry Research Institute; A.A.S., Paul Smith's College, 1969

HARRY W. BURRY (1962), *Associate Public Service Officer*, Applied Forestry Research Institute; *Associate Professor*; B.S., State University of New York College of Forestry, 1941; M.F., 1964

PAUL M. CALUWE (1969)*, *Senior Research Associate*, Department of Chemistry; M.S., University of Louvain, 1964; Ph.D., 1967

ROBERT CAMERON (1974), *Research Assistant*, Adirondack Ecological Center; State University of New York College of Environmental Science and Forestry (Ranger School), 1973

ROBERT W. CAMPBELL (1972)*, *Adjunct Associate Professor*, Department of Entomology; B.S., State University of New York College of Forestry, 1953; M.F., University of Michigan, 1959; Ph.D., 1961

WILBUR H. CAMPBELL (1975), *Assistant Professor*, Department of Chemistry; A.A., Santa Ana College, 1965; B.A., Pomona College, 1967; Ph.D., University of Wisconsin, 1972

HUGH O. CANHAM (1966)*, *Assistant Professor*, Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1960; M.S., 1962; Ph.D., 1971

JOANNE CAPONE, (1975), *Intern*, Office of Research Programs, Institute of Environmental Program Affairs; B.A., Rosary Hill, 1972

DIANNE M. CAPRITTA (1967), *Associate Librarian*, F. Franklin Moon Library; B.S., University of Illinois, 1965; M.S.L.S., Syracuse University, 1967

RHONDDA K. CASSETTA (1967), *Associate for Institutional Research*, Office of the Vice President for Administration and Services; A.B., Elmira College, 1933

DANIEL M. CASTAGNOZZI (1956), *Professor and Director*, School of Forest Technology; State University of New York College of Forestry (Ranger School), 1950; B.S.F., University of Michigan, 1952; M.F., State University of New York College of Forestry, 1957

ROBERT E. CHAMBERS (1967)*, *Associate Professor*, Department of Forest Zoology; B.S., Pennsylvania State University, 1954; M.S., 1956; Ph.D., Ohio State University, 1972

WALLACE CHRISTENSEN, (1975), *Adjunct Professor*, Department of Managerial Science and Policy; State University of New York College of Forestry (Ranger School), 1946; B.S.F., University of Michigan, 1949; M.F., State University of New York College of Forestry, 1954; Ph.D., 1957

WILLIAM M. CHRISTIAN (1974), *Technical Assistant*, Department of Security and Safety

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JOHN L. MORRISON (1946-1971), *Professor Emeritus*; A.B., University of Nebraska, 1933; A.M., 1935; Ph.D., University of California, 1941

FREDERIC W. O'NEIL (1937-1974), *Professor Emeritus*; B.S., New York State College of Forestry, 1933; M.S., 1935

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LOUIS E. WISE (1919-1932), *Professor Emeritus*; B.A., Columbia University, 1907; Ph.D., 1911

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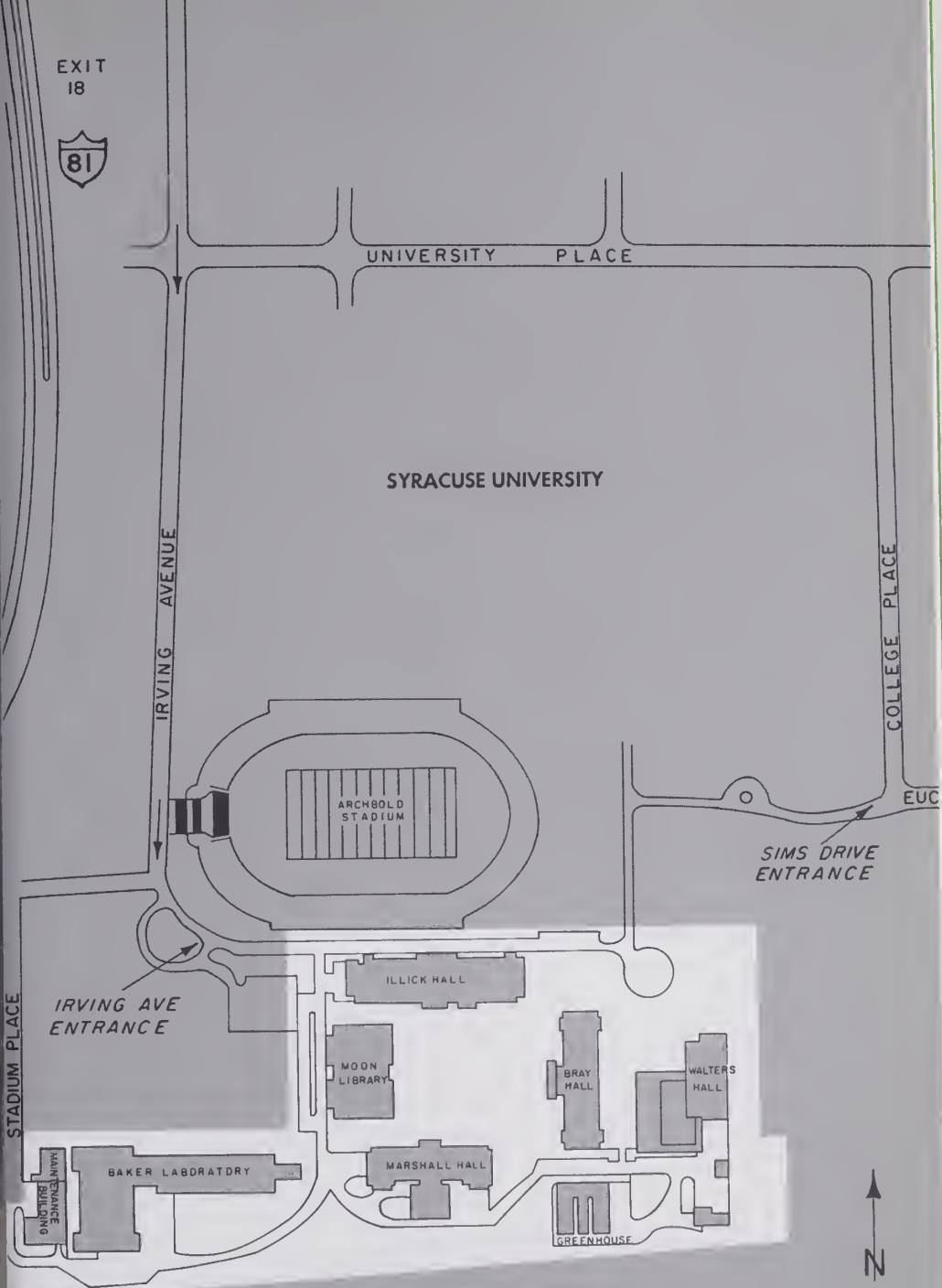

COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

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environmental science and forestry

Undergraduate Studies 1977-78

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State University of New York

COLLEGE OF

ENVIRONMENTAL SCIENCE AND FORESTRY

1977-78
Undergraduate Studies Bulletin

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Academic Calendar

SYRACUSE CAMPUS

FALL 1977

Registration	September 7-8	Wednesday-Thursday
First Day of Classes	September 9	Friday
Yom Kippur (no classes)	September 22	Thursday
Thanksgiving Vacation	November 23-27	Wednesday-Sunday
Last Day of Classes	December 16	Friday
Exam Period	December 19-23	Monday-Friday

SPRING 1978

Registration	January 16-17	Monday-Tuesday
First Day of Classes	January 18	Wednesday
Spring Recess	March 11-19	Saturday-Sunday
Last Day of Classes	May 2	Tuesday
Reading Day	May 3	Wednesday
Exam Period	May 4-10	Thursday-Wednesday
Commencement	May 13	Saturday

FOREST TECHNICIAN PROGRAM—WANAKENA CAMPUS

FALL 1977

Students Arrive	August 25-26	Thursday-Friday
Classes Begin	August 29	Monday
Thanksgiving Recess	November 19-27	Saturday-Sunday
Semester Ends	December 23	Friday
Intersession	December 24 January 15	Saturday-Sunday

SPRING 1978

Classes Begin	January 16	Monday
Spring Recess		
a. One half of class	February 18-25	Saturday-Saturday
b. Other half of class	February 26-March 5	Sunday-Sunday
Semester Ends	May 26	Friday
Graduation	May 27	Saturday


STATE UNIVERSITY
OF NEW YO
COLLEGE OF
ENVIRONMENTAL
SCIENCE AND FORES

ESF: What's In A Name?

1911. Governor John A. Dix signed a bill establishing the New York State College of Forestry at Syracuse University.

1948. Legislative action incorporated in State University of New York all state-supported higher education. Thus, the State University College of Forestry at Syracuse University.

1972. By special legislative act, the College was renamed the State University of New York College of Environmental Science and Forestry.

Why, in the first place, all the name changes? And, secondly, what difference do they make? What, really, is in our name?

ESTABLISHING A TRADITION

While a professional forestry education in this country is almost entirely a development of the twentieth century, its primary roots can be traced back as early as 1862 when Congress passed the Morrill Act establishing a system of land-grant colleges.

The growing importance of forests in America's economy was reflected in the 1870 Census, when, for the first time, information on forest resources was included. Several attempts to establish a national school of forestry were made; while none was approved, the movement shows that there was considerable demand for professionally trained foresters.

By 1900 there was a spirit of reform in the country—the same spirit that produced the early muckrakers also produced a generation interested in the conservation, preservation and careful management of precious natural resources. Between 1903 and 1914, 21 schools of forestry were established.

The first college of forestry in this country to offer a full, four-year undergraduate program was established in 1898 at Cornell University. Under the leadership of Bernard E. Fernow, students were introduced to critical field experience in their junior and senior years at the college's 30,000-acre forest in the Adirondacks. There, Fernow taught many experimental management practices, including clear-cutting and surface-burning. These techniques have always been controversial, and they aroused criticism by the wealthy summer residents in adjacent areas of the Adirondacks. After only five years of operation, the Cornell College of Forestry was closed in 1903 when the State Legislature, yielding to the influential property owners, ended fiscal support.

The beginnings and early development of the New York State College of Forestry were largely due to James R. Day, Chancellor of Syracuse University, and community leaders who were attuned to the growing national sentiment favoring forest conservation and who sensed the

need for a professional school of forestry. The legislative act which created the College instructed that the institution "conduct such special research in State-wide investigations in forestry as will throw light upon and help in the solution of forestry problems. . ." and that it be "the institution for educational work in forestry in the State."

From the very first years of its existence under the first dean, Hugh P. Baker, the College responded to the broad needs of environmental professionalism. While other schools and colleges of forestry became more specialized, the College at Syracuse broadened to include the essentials of environmental science: design, engineering and the life sciences, as well as resource management.

BROADENING THE BASE

With the formation of the State University of New York in 1948, coordination and systematization came to higher education in the state. The University, according to its charter, was to "supplement, not supplant, the great network of private colleges and universities." The College of Forestry which, from its beginning had been state-supported and governed by a Board of Trustees made up of eight members appointed by the Governor and four *ex-officio* members, was recognized as a specialized college within the State University system.

Stemming from Chancellor Day's early sponsorship of the College, Syracuse University and ESF have long been engaged in numerous fruitful devices of institutional cooperation. This relationship is probably the most outstanding example in this country of collaboration between public and private institutions of higher education. Even as a part of State University, the College maintains this unique position. The major character of the relationship stems from the fact that for more than 60 years the College purchased from Syracuse University the major portion of its lower division instruction, thus allowing the College to more fully develop its professional senior division and graduate level instruction.

Other cooperative areas are living centers and dining facilities, athletic programs, the use of the University's infirmary and health counseling services, the bookstore facilities, the University library system and participation in numerous social activities including the elaborate religious, dramatic and cultural benefits of a large university.

ESF TODAY

The third phase in the evolvement of the College's name came in 1972 when it was rechartered as the State University of New York College of Environmental Science and Forestry. Thus, the name reflects more deeply the traditional grounding and concern of forestry in the environment; it illuminates more clearly the capabilities of its program.

The College of Environmental Science and Forestry is continuing to move toward a plan, conceived more than 10 years ago, to achieve complete upper division/graduate status. The number of freshmen is being gradually reduced until the time when all entering students will be juniors. Students wishing to embark upon a career in the environmental

sciences and forestry will enroll for two years at a junior college or four-year institution, studying an ESF prescribed math/science program and transfer to this college as a junior. The move to upper division/graduate college status marks another step in the College's long-standing commitment to educate professionals capable of facing the complex environmental problems of today and of the future.

For over 60 years, the full thrust of the State University of New York College of Environmental Science and Forestry has been focused on the environment on all of its six campuses and in each of its three mission areas—instruction, research and public service. The College has been, and continues to be, devoted to the advancement of environmental science and forestry.

The Mission: Instruction, Research, Public Service

INSTRUCTION

Professional Education

In the Fall of 1976, student enrollment reached 2,349. Of this number, 1,910 were undergraduates and 439 were graduate students. In addition, there were 25 students engaged in postdoctoral work.

At the baccalaureate level, the College offers professional study in seven four-year curricula: *biology; chemistry* (with options in biochemistry and natural products or natural and synthetic polymer chemistry); *forest engineering; paper science and engineering; wood products engineering* (with options in wood science, building construction, production systems engineering or materials marketing); *resource management*; and *landscape architecture.*

Each of these curricula leads to the bachelor of science degree. In the case of landscape architecture, an additional year of study results in a bachelor of landscape architecture degree; and in the forest engineering program, a fifth year leading to a bachelor's degree in civil engineering can be taken at Syracuse University or State University at Buffalo.

Several curricula allow students to minor in environmental studies, applied management, urban forestry, regional planning, world forestry, conservation education and communications, management science and forest resources science.

Graduate Education

The College awarded its first graduate degree in 1913. Today the College offers advanced degrees in 7 major program areas: *environmental and forest biology, chemistry, resource management and policy, silviculture and forest influences, environmental and resource engineering, landscape architecture, environmental science.*

Graduate study leads to the master of science degree, the master of landscape architecture degree, and the doctor of philosophy degree. A postdoctoral study program, closely related to the College's research effort, is also available.

Technical Education

At the paraprofessional level, the College has been training forest technicians since 1912 at its Wanakena Campus in the Adirondack Mountains. It is the oldest Ranger School in the United States.

In 1973, a two-year *forest technology* curriculum replaced the one-year certificate program. Graduates are awarded an associate in applied science degree. In the new curriculum, students take their first year of general education at an accredited junior college. The second year, with its emphasis on practical field training in the relationships between forest technology and managerial needs, is taken at Wanakena with its 2,800 acres of forested land. Graduates of this degree program in practical forestry are prepared for positions as forest rangers; federal, state and private industry forest technicians and forestry aides; company district forest supervisors; timber inventory specialists; timber sales supervisors; forest surveyors and engineering aides; and forest protection technicians.

Continuing Education

The philosophy that education is a lifelong pursuit is an ancient one and was written into the law creating the College. This concept is doubly important to the sciences and professions in this technological age when, with new knowledge bursting in all directions, major environmental

problems still remain to be resolved. The informational needs of New York's citizens also are undergoing change. The increasing urban character of our population, the changing pattern of agricultural and forest land ownership and use, the rise in level of education and sophistication in a more efficient society, and the increase in leisure time, travel mobility and need for recreational facilities and pursuits all contribute to a growing need for educational opportunities in environmental science and forestry for adult audiences.

The College has, over the years, succeeded in communicating knowledge on forest resources management, utilization and conservation to a variety of off-campus publics. The entire College faculty has contributed to these programs. To reinforce this commitment, the College established a School of Continuing Education upon which to base expanded educational opportunities at both the undergraduate and graduate course levels.

Conferences, symposia, seminars and short courses on various aspects of forestry and the related sciences are conducted at both the basic and applied levels. Audiences include forest owners, managers and operators; wood engineers and forest industries personnel; academic and scientific groups, conservation and recreation personnel from local and other public and private planning groups and citizen-action committees. Upon request, continuing education programs can be designed to meet specific needs of professional organizations, agencies and industry. Credit or noncredit courses, at campus or off-campus sites, can be arranged.

Expansion of "in-service" training courses, establishment of "environmental learning centers" on College forest properties and production of media materials for public information and education are examples of activities directed toward updating and upgrading professional clients and broadening the public's awareness and appreciation of New York's forest-lands and other natural resources.

For information on specific continuing education projects, inquiries should be sent to Dean, School of Continuing Education.

RESEARCH

The College's commitment to scientific inquiry stretches far back to its second year of existence. In 1912, Dean Hugh P. Baker initiated the first research project of the College by joining forces with the U.S. Forest Service in an industry study designed to show what kinds of firms were using wood in New York State and the species and quantities of lumber they used.

In the 1970's, the College's research program has attracted a worldwide clientele of industrial, governmental, professional and scientific groups, and through liaison with them, the program maintains its vigor and relevancy to the important environmental issues of the decade. Support from this clientele amounts to about $2.9 million a year.

Students and faculty from across the College contribute to the depth and diversity of the research program. Findings from these studies are

applied to a host of issues and problems through various demonstrations and information devices. Recent examples include studies of limestone quarry reclamation; the development of polymeric materials for artificial human organs; nonchemical control measures for insect pests, e.g., the gypsy moth; studies of the ecology of Antarctic birds; and new wood pulping processes leading to pollution-free water and air effluents.

The Institute of Environmental Program Affairs

The Institute of Environmental Program Affairs (IEPA), created at the College in 1972, is an umbrella-like structure that coordinates the overall research effort of the College with the efforts of other academic institutions, public agencies and private industries for a concerted attack on compelling and complex environmental problems. IEPA culminates the College's ongoing examination of its appropriate role as a leader in environmental education for the 1970's and beyond in face of urgent appeals for multidisciplinary approaches, for problem-oriented task forces by both faculty and students, and for the greater application of higher education to society's needs. Because it is a process, the Institute preserves the identity of each collaborator: institutions, faculty members and students come together for just as long as necessary to solve a problem, then return to other ongoing areas of interest. Recent projects have included: resource and environmental studies for the St. Lawrence Eastern Ontario Commission, and the Tug Hill and Catskill study commissions; a study of wetlands evaluation systems for the Adirondack Park Agency; development of environmental impact assessment guidelines for the New York State Department of Environmental Conservation; a study of selected environmental impacts of possible nuclear power developments in New York State for the Argonne National Laboratory; and studies of the St. Lawrence River ecosystems and impacts of oil spills and extension of the shipping season for the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service, respectively.

Applied Forestry Research Institute

Much of the research being conducted at universities and institutes, while of value to long-range scientific study and technological progress, is of limited, immediate application for forest practitioners. With this consideration, the Applied Forestry Research Institute (AFRI) was established in 1967 at the College with the cooperation of the New York State Department of Conservation. At the time of its founding, AFRI was charged with the task of carrying out research in the state that can be implemented at once by practicing foresters and forest resource managers.

The need for such research becomes more acute with time: the demands placed on the forest resource are ever increasing, and conservation groups are deeply concerned about the environmental impact of forestry's operations.

Research activities of AFRI include the environmental effects of forest practices, forest harvesting and forest products engineering, hardwood and conifer silviculture, forest pest and disease control, and multiple-use management planning.

Because of its location on ESF's main campus, AFRI has access to the College's extensive research equipment and instruments, including electron microscopes, plant growth chambers, photogrammetric facilities and computer center.

There is close cooperation with the College's highly competent teaching-research faculty who provide the latest information about basic research findings by disciplines as well as supporting technical information and techniques. This liaison allows for the exchange of views between the academician and the field practitioner.

AFRI is supervised by a director, and has a staff of six full-time research associates and two technical assistants.

Empire State Paper Research Institute

The Empire State Paper Research Institute (ESPRI), located on the main campus, is the only world-wide basic research organization in the pulp and paper field. It performs investigations in cooperation with the Empire State Paper Research Association (ESPRA), which is comprised of 62 pulp and paper companies in 11 countries. The Institute was established in 1945 when the members of ESPRA recognized the need for new scientific and technical knowledge and methods, and since then ESPRI has been able to maintain an efficient balance between the practical and theoretical bases of the pulp and paper industry.

Housed in the modern J. Henry Walters Hall with its own pilot paper mill, and staffed by scientists who are internationally recognized for their accomplishments, ESPRI provides a research base for long-range industry development. Its program has widened in scope to cover almost all aspects of pulping and papermaking, including additive retention, oxygen pulping and bleaching, effluent control, sheet drying and printability.

State University Polymer Center

In 1966 the College's polymer research institute was designated as the State University of New York Polymer Research Center in order to stimulate University-wide interest in polymer chemistry.

Scientists at the College have made many original contributions to the field of pure and applied polymer chemistry, including the development of living polymers, the study of anionic polymerization and electron-transfer initiation, and work on the permeation of gases and films through polymeric films.

College faculty members specializing in polymer chemistry have trained several hundred graduates and postdoctoral researchers, many of whom now hold leading positions in universities and industrial and governmental laboratories.

U.S. Forest Service Cooperative Research Unit

The Northeastern Forest Experiment Station of the U.S. Forest Service maintains a center for recreation research at the College. Forest Service personnel collaborate directly with faculty and students on research projects in this new area of resource management in order to develop improved methods for integrating recreation and other forest uses.

Among the many areas undertaken for investigation are the use of computer graphics for previewing the visual effects of timber harvesting throughout a rotation, and a project to obtain the reaction of managers and key interest groups to recreation management procedures that may become appropriate in the next decade.

Nelson Cortlandt Brown Laboratory for Ultrastructure Studies

This center, located in Baker Laboratory, is a teaching, research and service facility of the College. It is equipped to handle virtually every type of modern microscopy operation, including light, scanning electron and transmission electron. Among the major items of equipment are: an RCA EMU-3 transmission electron microscope; an RCA EMU-4, an ETEC autoscan scanning electron microscope, energy dispersive X-ray analyzer, several types of light microscopes, high vacuum evaporators and microtomy equipment.

The primary service of the center is teaching; course offerings include microtechnique, photomicrography, electron microscopy and interpretation of cellular ultrastructure. A second function of the center is to provide research on a service basis to faculty and students and to the community at large.

PUBLIC SERVICE

The College, throughout its 66-year history, has continued to respond to its specific legislative mission prescribing major responsibilities in the area of public service. Public education and information, technical advice and guidance to cooperating local, state and federal agencies and organizations, and technical assistance to the forest and wood-using industries constitute the principal formal public service activities. The Institute of Environmental Program Affairs (described in the Research section) coordinates the College's public service activities on the professional level.

While the list of public service contributions is lengthy, a few other examples include: the College's Film Library; the Tree Pest Service, which provides technical advice to private citizens and to governmental agencies; the participation of ESF faculty members in Central New York's Poison Control Center; and membership in PACE (Planning Approaches for Community Environments), a faculty-supervised student design and planning service to benefit community development. Altogether, the public service programs of the College reach approximately one million New York State residents each year.

The Campuses

The College has a multiple campus system with regional campuses and field stations located at Syracuse, Tully, Wanakena, Warrensburg, Cranberry Lake, Newcomb and Clayton. This system is composed of about one million square feet of facilities and 25,000 acres of land. Collectively, they represent the largest fully utilized campus in the world.

THE SYRACUSE CAMPUS

The main campus is in Syracuse, and lies on 12 acres adjacent to Syracuse University, in an area that traditionally has been known as "The Hill." Located here are the Schools of Biology, Chemistry and Ecology; Environmental and Resource Engineering; Environmental and Resource Management; Landscape Architecture; and Continuing Education. In addition, the main campus houses the Institute of Environmental Program Affairs, the Applied Forestry Research Institute, the Empire State Paper Research Institute, the State University Polymer Research Center, a cooperative research unit of the U.S. Forest Service, and an ultrastructure center.

Specialized facilities at the Syracuse campus include electron microscopes, plant growth chambers, air-conditioned greenhouses, an animal environmental simulating chamber, a bio-acoustical laboratory, a 1,000-curie cobalt-60 radiation source, radioisotope laboratory, computer center, and specialized instrumentation including nuclear magnetic resonance spectrometer, electron spin resonance spectrometer, mass spectrometer, ultracentrifuge, X-ray and infrared spectrophotometer. Photogrammatic and geodetic facilities of the forest engineering department include one of the most extensive arrays of equipment in the United States, with a Nistri TA-3 stereocomparator, Mann comparator, computerized Nistri photocartograph, and nine other varieties of plotters. The paper science and engineering laboratory has a semi-commercial paper mill with accessory equipment. The wood products engineering department has a complete strength-of-materials laboratory as well as a pilot scale plywood laboratory and a machining laboratory. The greenhouses and forest insectary are used to produce plant and insect material for classroom and laboratory. Extensive collections are available for study, including wood samples from all over the world, botanical materials, insects, birds, mammals and fishes.

The **F. Franklin Moon Library** contains more than 68,000 cataloged items. Over 800 journals and corresponding indices are currently received. The collections constitute an information center for forestry and environmental science programs in ecology, botany and pathology, biochemistry, chemical ecology, forest chemistry, polymer chemistry, economics, entomology, environmental studies, industrial pollution abatement, landscape architecture, environmental design, management, paper science and engineering, photogrammetry, silviculture, soil science, water resources, world forestry, wildlife biology, wood products engineering and zoology. These are supplemented by large collections in the environmental resource field. Additional strength is found in the comprehensiveness of abstract and indexing services relevant to the College's programs. The library also offers a selected and broad choice of general-interest reading material.

The collections of Syracuse University Libraries and State University Upstate Medical Center are within walking distance. They may be used by all members of the College of Environmental Science and Forestry. Arrangements often can be made to use industrial libraries in the Syracuse area. Other collections are accessible through the Inter-library loan privilege.

The library building, opened in 1968, can accommodate 132,000 volumes and can seat 575 persons. The main reading areas are in the center of the upper level surrounding open stacks, a current periodicals room, bibliographic center, individual study carrels and library staff offices. The archives, special collections, conference rooms, audio-tutorial center and informal study rooms are located on the lower level.

The audio-tutorial center provides facilities for study with nonbook materials. Slides and cassettes prepared as integral units of particular courses are held on reserve for use in the center. Materials are available

for review on weekends, evenings and times when other facilities are closed.

Leisure reading material is distributed throughout the total collection which represent the Robin Hood and Raymond F. Crossman collections, and contain books on national and world social problems, humanities, education and popular books concerned with the environment. The archives consist of historical items relevant to the College and forestry developments in New York State. The special collections room contains rare and valuable books and folios.

Reference service, orientation and bibliographic instruction (Library Research 300) are provided by the librarians. Study guides, user aids and other such publications are prepared and distributed by the librarians as needed.

The **Educational Communications** unit directly supports the program areas of the College through development and application of media materials and methods for the classroom, for the presentation of research findings and for public service endeavors. These include television programming, slide/tape and motion picture production. Other services to the College community include engineering, A-V equipment distribution, and maintenance and support functions. The Educational Communications staff also participates directly and actively in instructional programs in environmental communication at both the undergraduate and graduate levels as well as through the School of Continuing Education.

The College's **Computer Center** has a Control Data 3200 computer system utilized in its academic and research programs, and to a moderate extent, for its administrative data processing needs. The instructional work consists of courses which teach the use of computers and those which use the computer to assist in teaching applied subjects. The major use is in the graduate programs where students perform research in areas such as hydrology, transportation networks, forest and tree growth studies, genetics, disease and insect behavior and controls, land use, production and processing techniques, polymer and cellulose chemistry, cellular ultrastructure, photogrammetry and remote sensing, landscape architecture, and other supporting and related fields.

THE TULLY CAMPUS

Located about fifteen miles south of Syracuse is the Tully Campus composed of the Heiberg Memorial Forest, classrooms and research facilities.

Heiberg Memorial Forest has a diversity of terrain and forest growth and is utilized both as an extensive outdoor teaching laboratory and as a site for intensive research. Located there are plantings from known seed sources from many parts of this country and throughout the world.

THE WANAKENA CAMPUS

The Wanakena Campus is located on the Oswegatchie River, 65 miles northeast of Watertown, New York and 35 miles west of Tupper Lake,

New York. This campus, with its large instructional and demonstration forest, supports the College's **School of Forest Technology**, the oldest forest technician school in the country. It is on this campus that forest technicians are trained in an associate degree program.

THE WARRENSBURG CAMPUS

Each summer, the Warrensburg Campus hosts a program devoted to the field application of environmental principles and practices for students majoring in resource management and environmental biology. Formal continuing education courses also are held here for such groups as State foresters, mill owners and logging operators.

The Warrensburg Campus also contains the **Charles Lathrop Pack Demonstration Forest**, which, since 1927, has been under intensive management for the combined purpose of instruction, demonstration and research.

THE CRANBERRY LAKE CAMPUS

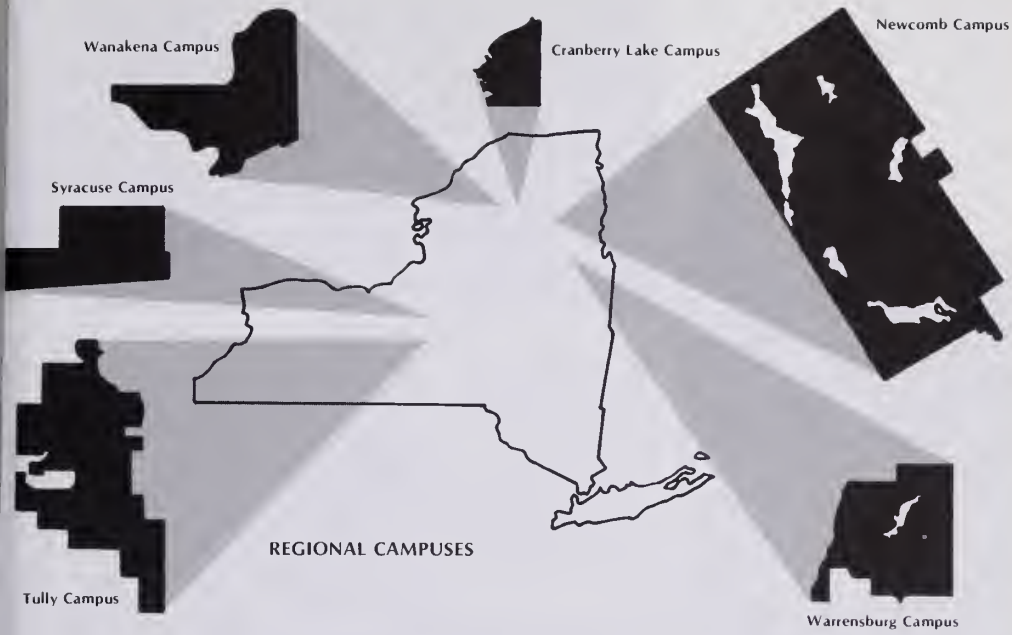
The Cranberry Lake Campus, accessible only by water, is the site of the College's biological station, where, every year, a cooperative program in environmental biology is sponsored jointly by the College and other institutions of higher education. Bounded by 150,000 acres of forest preserve, by Cranberry Lake, and by isolated forest bogs and beaver meadows, the extensive facilities are intensely utilized in a comprehensive curriculum of upper-level and graduate courses.

THE NEWCOMB CAMPUS

Located in the central Adirondack Mountains, Newcomb is the largest of the regional campuses and home to the **Adirondack Ecological Center** where extensive studies of animal biology and ecology are carried out. Located there also is the **Archer and Anna Huntington Wildlife Forest**.

THE FIELD STATIONS

In addition to its Regional Campus System, the College operates several field stations which directly support the programs of the institution. The 44-acre **Forest Experiment Station**, located only a few minutes drive from the main campus, is used to support main campus academic programs. Located at the Station are a large arboretum, tree nursery and experimental greenhouse facility. Adjacent to the Tully Campus is the College's **Genetic Field Station**. With its irrigation system and layout of level blocks, it is an excellent facility for developing hybrids, for grafting experiments, and for research in heritability. A magnificent island, the **Ellis International Laboratory**, is situated in the heart of the Thousand Islands-St. Lawrence River area off the village of Clayton. Accessible only by water, this laboratory, which is the College's most recent property acquisition, is an unusually appropriate site for the College-wide, cooperative and international environmental monitoring and research activities.



REGIONAL CAMPUSES


Larry's
PIZZA
SANDWICHES
TAKE OUT & DELIVERY
OUR SPECIALTY

The Syracuse Metropolitan Area

The College of Environmental Science and Forestry is located on one of several hills that overlooks Syracuse, a growing metropolitan area of nearly 500,000. Known as the "Salt City" because of the great salt industry which was centered here for more than seventy years, Syracuse is today a city of diversified industry and commerce. The area is a leader in the manufacture of china, quality shoes, air-conditioning equipment, medical diagnostic equipment and decorative home accessories.

The City of Syracuse offers students many cultural, recreational and educational opportunities, including a symphony orchestra, several museums, live theater and historical points of interest.

Called the "Crossroads of New York State," Syracuse is one of the few cities in the nation situated at the crossing point of two major superhighways. It is located at the intersection of the 500-mile east-west New York State Thruway and the north-south Penn-Can Highway. Driving time from New York City, Philadelphia and Boston is about five hours; from Buffalo and Albany about three hours. The city is served also by a modern international airport and major bus and rail lines.

Admission

ADMISSION CRITERIA

The College of Environmental Science and Forestry, since its founding, has continually practiced open and competitive admissions regardless of race, color, sex, religion, national origin, handicap, or age. Pursuant to Title IX of the Education Amendments of 1972 and accompanying regulations, no person shall be denied the benefits of, or be subjected to discrimination under any academic, extra-curricular, research, occupational training or other educational program or activity operated by this institution.

Admission to the College of Environmental Science and Forestry is based on academic qualifications after careful analysis of information provided by the applicant's high school or other scholastic records and standardized tests.

Minimum requirements are at least 16 units along this pattern: English, 4 units; history (social studies), 2 units; science, 2 units (with at least 1 in chemistry or physics); mathematics (through trigonometry), 3 units; and electives, 5 or more units. Recommended electives are mechanical drawing and a foreign language.

The College of Environmental Science and Forestry is moving to full upper division, senior college status. It is gradually decreasing the size of the freshman class, is not taking sophomore transfers and is greatly increasing the number of junior transfer students. As a result of these changes and the increased interest of high school graduates in environmental programs over the past few years, admission into the freshman class has become extremely competitive.

Students wishing to ultimately attend the College of Environmental Science and Forestry as junior transfers may do so by entering a two-year college or any other college of their choice, pursuing a program parallel to their intended curriculum.

WHEN TO APPLY

A candidate for freshman admission usually begins the application process in the fall of the senior year of high school. Review of candidates begins in January and the date for final decision on most freshman applications is May 1. Freshman applicants begin to receive notification of admission after February 15. Freshmen are not usually admitted to the College for the spring semester.

FRESHMAN APPLICATION PROCEDURE

1. To apply for admission, residents of New York State should request the proper forms from their local high school guidance office. Nonresidents should request the forms directly from ESF's Office of Admissions. Revised admission forms are available in September for entry the following year.

2. All freshman applicants must submit the results of at least one of the following tests: the New York State Regents Scholarship (administered only in early October in most high schools in New York); the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB); or the American College Test (ACT). The Director of Admissions has the authority to waive this requirement in certain cases.

3. While a personal interview is *not* required for admission, it may be helpful in college planning. An interview with an admissions officer can be arranged by contacting the Office of Admissions.

4. *Application deadline for freshman admission is February 1.*

CAMPUS VISITS

The College of Environmental Science and Forestry welcomes visits by students and their parents. The Office of Admissions is located in Room 110 Bray Hall. The office is open for interviews Monday through Friday from 9 a.m. until 4 p.m.

ENTRANCE WITH ADVANCED STANDING

Secondary school students may earn college credit toward the B.S. or B.L.A. degree before enrolling as freshmen at the College. This enables students to carry enriched course loads, and may be accomplished in two ways:

1. Courses in mathematics or English, for instance, given by a nearby college may be open to recommended high school seniors. After a course has been successfully completed, an official transcript or other appropriate document should be sent to the College by the institution along with a catalog description of the course or courses.

2. College-level courses are given by some high schools in the Advanced Placement Program of the College Entrance Examination Board to recognize and develop academic talent. Such courses as biology, mathematics, chemistry, English and foreign languages offer opportunity for degree credit at this College. Advance placement credit will be awarded for grades of B or higher. Faculty members to whom the student's final examination papers are sent after they have been graded may want to add further comment.

COLLEGE PROFICIENCY EXAMINATIONS

The New York State College Proficiency Examination Program is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking

structured correspondence lessons. College credit is generally awarded for a grade of C or better. The College also accepts the College Level Examination program (CLEP) of the College Entrance Examination Board. These examinations are open to all who make application.

The College approves of the CPE and CLEP programs in general and will evaluate the performance of participants.

Application for credit should be made to the Office of Student Affairs. Application for deviation from the prescribed policy may be made to the Undergraduate Academic Affairs Committee.

TRANSFER STUDENTS

As ESF moves toward upper division/graduate status, it wishes to encourage transfers at the junior level. Students who are currently enrolled at another institution of higher education or who have previous college experience may apply for transfer. Any student who has been academically dismissed must wait at least one semester before applying to this College.

Application forms should be obtained directly from the College by writing to the Director of Admissions, Attn: Transfer. This material will arrive after 4 - 5 weeks. Revised application forms are available in September for admission the following year.

Students with two years of college can generally arrange their programs to allow transfer to the College of Environmental Science and Forestry with junior standing. Courses transferred for credit must be appropriate to the student's curriculum choice and successfully completed with a passing grade of D or better. (It should be noted, however, that students who transfer courses in which a grade of D has been earned must be aware of possible deficiencies when that material is used in more advanced courses.)

Furthermore, courses to be transferred as required courses in a curriculum must be comparable in content. Course credit hours are transferred, but grades and grade points are not.

In applying to the College for transfer, it is the student's responsibility to submit a recent official transcript from the college he or she is currently attending and similar documents from all colleges previously attended. No official transfer credit will be awarded until all final transcripts are received. Catalogs from each college may also be required.

Application deadline for transfer students is May 1.

DUAL ENROLLMENT PROGRAMS

In an effort to broaden educational opportunities in environmental science and forestry, the College of Environmental Science and Forestry has entered into a number of dual enrollment programs with institutions around New York State. To date, dual enrollment programs have been established with privately-owned Syracuse University, and with four locally-sponsored community colleges under the program of State University: Columbia-Greene Community College at Hudson; Her-

kimer County Community College at Herkimer; Monroe Community College at Rochester; and Nassau Community College at Garden City.

Dually-enrolled students who successfully complete prescribed math/science programs at any of these institutions will have guaranteed acceptance on the junior level to all of ESF's career programs in forestry, the forest products areas, forestry's supporting science and engineering fields and landscape architecture.

INTERNATIONAL STUDENTS

The College accepts international students on the undergraduate level if they can satisfy all regular admissions requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country, if at all possible, and apply to the College as graduate students. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. If an international student wishes to apply as an undergraduate, he must:

1. meet the secondary school requirements for entrance;
2. show that he is proficient in the English language through acceptable results of the Test of English as a Foreign Language (TOEFL) and/or College Entrance Examination Board Achievement Test in English;
3. provide competitive scores on the CEEB's Scholastic Aptitude Test in the verbal and math areas; and,
4. produce evidence that he can meet all financial obligations.

Undergraduate foreign students must file official State University of New York admissions forms. These may be obtained by writing to the Director of Admissions at the College. No fee is required for processing the application. *If the foreign student is accepted, adequate health and accident insurance must be obtained before the student will be allowed to register at the College.*

International students who are currently enrolled at an American college may apply for transfer to the College. They must meet all entrance requirements plus those of a transfer student as listed above. Permission to transfer must be obtained from the U.S. Immigration and Naturalization Service district office having jurisdiction over the college in which the student is currently enrolled.

HEALTH EXAMINATION REPORT

Each new student is required to submit a history and physical examination report on a form that will be sent after the initial acceptance notice.

Student Expenses

APPLICATION FEE

When a student applies for admission to any of the State University of New York units, he pays to the University a nonrefundable application fee of $10 for the first application and $5 for each of the next three applications. Students who apply for transfer from other units of the State University of New York pay no fee.

ADVANCED PAYMENT FEE

New and transfer students pay a fee of $50, which is credited to the student's first semester tuition. This payment should be sent to the Business Office, SUNY College of Environmental Science and Forestry, Syracuse, New York 13210, accompanied by the form provided by the Office of Admissions. The payment is required within 30 days after the date of acceptance and no later than May 1; it is refundable up to May 1.

TUITION AND FEES

The tuition and fee structure of the College of Environmental Science and Forestry includes library, health, infirmary, physical education facilities, ROTC, special testing, and other services, as well as an assessment for student activities and charges for expendable supplies and equipment.

Tuition is $750 per academic year for freshmen and sophomores who are residents of New York State. Tuition is $900 for juniors and seniors.

Tuition for nonresident freshmen and sophomores is $1,200 per academic year; nonresident juniors and seniors pay $1,500.

STUDENT ACTIVITY FEES

In addition to tuition, the student body has voted to assess each student $18 per year to cover the cost of student activities. ESF students also pay yearly Syracuse University fees to cover the costs of the many student activities they participate in; these fees are $24.75 for full-time students and $14.50 for part-time students. An optional yearly fee of $3 supports Syracuse University's Public Interest Research Group (PIRG).

TERMS OF PAYMENT

A check or money order for tuition and fees should be made payable to *State University of New York College of Environmental Science and Forestry.* This payment is required by the last day of the registration period and can be paid at the College's Business Office either prior to registration or during registration. *A fee of $10 is charged for registering later than the established dates.*

HOUSING AND BOARD COSTS

Depending on the room, housing costs at Syracuse University range from $800 to $1,000 for an academic year. Most rooms accommodate two students and are furnished with beds, mattresses, desks, chairs, study lamps and dressers. A commercial linen service is available for those who order it.

A variety of options on board offerings are available for all students. Costs range from $790 to $1,000 for an academic year.

Housing and board rates are subject to change, and inquiries about them should be addressed to Office of Residential Life, Syracuse University, Syracuse, New York 13210.

Payment for housing and board is made directly to Syracuse University.

COMMENCEMENT FEE

A commencement fee of $10 is required at the beginning of the semester in which the degree is expected.

OTHER COSTS

Students majoring in Resource Management attend a 5-week Summer Session in Field Forestry at the Warrensburg Campus between the sophomore and junior years. The basic cost is approximately $250 plus travel and personal expenses.

Forest Biology majors attend either the Summer Session in Field Forestry or the Summer Session in Environmental Biology at the Cranberry Lake Biological Station. Cost for the 8-week session is approximately $400.

An extended field trip of up to 3 weeks costs approximately $200 for *Wood Products Engineering students.*

Field trips for *Landscape Architecture students* range between $125 and $150. In addition, students enrolled in the 5-year Landscape Architecture program are required to spend one semester off campus. This is

a self-described and student-budgeted program. Costs do not necessarily exceed those of a semester on campus, but additional costs are often incurred depending upon the location chosen.

The cost of books and supplies is approximately $175 a year. Additional costs for personal expenses, recreation, clothes and travel depend on the individual, and they may range from $400 to $600 a year.

REFUNDS

The following policies apply to tuition liability and refunds for students canceling their registration.

A student who is given permission to cancel registration is liable for payment of tuition in accordance with the following schedule:

Liability During	*Semester*
1st week	0
2nd week	30%
3rd week	50%
4th week	70%
5th week	100%

Application for refund must be made within one year after the end of term for which the tuition was paid to State University. The first day of class session is considered the first day of the semester and Saturday of the week in which this first session occurs is considered the end of the first week for refund purposes. It is interpreted that a student who does not attend any class sessions after Saturday of the first week and who notifies the College of his intent to cancel registration on or before the second Saturday following the first day of classes will be considered to have canceled his registration during the first week.

There is no tuition or fee liability established for a student who withdraws to enter military service prior to the end of an academic term for those courses in which the student does not receive academic credit.

A student who is dismissed for academic or disciplinary reasons prior to the end of an academic term is liable for all tuition and fees due for that term.

A student who cancels registration at a unit of the State University and within the same term registers at another unit of the State University is entitled to full credit for tuition and fees paid for that term.

Notwithstanding any other provisions for refund, when a student has withdrawn through circumstances beyond the student's control, under conditions in which the denial of refund would cause undue hardship, the Chief Administrative Officer of the unit may, at his discretion, determine that no liability for tuition has been incurred by the student provided the student has not completed more than one half of the term and has not received or will not receive academic credit for the term. Such action, including the reason for withdrawal, must be in writing.

Financial Assistance

The College of Environmental Science and Forestry offers three basic forms of student financial assistance: scholarships or grants, part-time employment and long-term loans. These programs are coordinated to supplement parental support, summer work, savings, and assistance from other sources. Since the source of funds for these programs, the guidelines for determining the recipients, the procedures for applying, and the method of disbursement of funds vary greatly from one program to another, the individual is encouraged to contact the Office of Financial Aid to discuss specific questions.

Aware of the many problems of financing higher education and meeting day-to-day living expenses, financial aid advisors are always available to discuss individual student problems.

HOW TO APPLY

Each year students interested in receiving financial assistance must apply, or reapply. Two forms are necessary for the application process.

1. The candidate must complete a College financial aid application form and return it to the Office of Financial Aid. A student will also receive a Financial Aid Bulletin which more specifically details application procedures.

2. The parents or legal guardians of an incoming freshman must complete the Parents' Confidential Statement (which is available from high school guidance counselors, or from the College) and forward it to the College Scholarship Service, Box 176, Princeton, New Jersey 08540, where it is analyzed and sent to the College. Transfers (whether dependent or independent students) should complete the Financial Aid Form which is available in two-year college financial aid offices, or from the College.

3. Students who are currently enrolled at the College (dependent and independent) should complete the Financial Aid Form available in Room 111 Bray Hall.

4. Applicants need not wait for notification of acceptance to the College before applying for financial aid. Applications will be accepted after March 15; it should be noted, however, that available funds may already be committed to other students.
5. Students are invited to discuss with the professionals in the Financial Aid Office any problems in financing their education. *Applications for aid should be completed by March 15.*

SELECTION OF RECIPIENTS

In making award decisions, consideration is given primarily to comparative financial need; however, scholastic standing, character, and potential contribution to the College community are also factors in making certain awards.

SCHOLARSHIP AND GRANT PROGRAMS

Supplemental Educational Opportunity Grants (SEOG)

The College is the recipient of funds authorized under Title IV-A of the Higher Education Act of 1965, as amended. These funds enable the College to award grants to students who have high financial need. Grants range from $200 to $1,500 per year and must be matched by other awards.

Forestry Educational Opportunity Grant Program (FEOP)

Students accepted into the FEOP may receive partial tuition waivers and grants to help meet the cost of their education. Students must come from a socio-economically disadvantaged background to be eligible for this program. Interested students should apply to the program in their admissions application, and for the corresponding financial assistance from the Office of Financial Aid.

Basic Educational Opportunity Grants (BEOG)

The BEOG Program was authorized in the Education Amendments of 1972. Grants are available to eligible full-time and half-time students. The amount of the award can vary from $200 to $1,400 depending on the following:

1. The amount of funds made available by the Federal government.
2. The amount determined by an entitlement computation formula.
3. The cost of the student's education as allowed by the program.

Applications are available from high school guidance offices or any college office of financial aid. Students should submit the Student Eligibility Report (SER) as soon as it is received from Iowa City.

Tuition Waivers for International Students

Tuition waivers may be granted each year to qualified students from foreign countries. Interested students should contact the Vice President for Student Affairs or the Director of Admissions.

Regents Programs

Additional information and applications for the following Regents programs are available from:

New York Higher Education Services Corporation
Tower Building
Empire State Plaza
Albany, New York 12255

REGENTS COLLEGE SCHOLARSHIPS (RC)

High school seniors who are New York State residents may qualify by taking the Regents Scholarship Examination.

TUITION ASSISTANCE PROGRAM (TAP)

These awards are available to New York State residents who are enrolled in full-time degree programs. Based on income, minimum awards begin at $100.

REGENTS WAR SERVICE SCHOLARSHIPS (WS)

Veterans are eligible to take a competitive examination administered during the summer.

REGENTS GRANTS FOR CHILDREN OF DECEASED OR DISABLED VETERANS

These grants are awarded to children of parents who served during specific periods of war or national emergency and who died as a result of such service, or suffered a disability of at least 50 percent. The award entitles a New York State resident to $450 per year.

Vocational Rehabilitation Grants

Financial assistance and program counseling are provided by New York State through the Office of Vocational Rehabilitation for students who qualify.

Veterans' Benefits

The Veterans' Readjustment Benefits Act of 1966 as amended enables veterans to obtain financial aid for their college education.

Additional information and counseling are available from the Office of Veterans' Affairs at the College. Local veterans' administration offices, or the State Regional Office, 111 West Huron Street, Buffalo, New York 14202, can provide information and application forms.

Social Security Benefits

The 1965 Amendments to the Social Security Act extended the age limit for a child's benefits from 18 to 22, providing the child is a full-time student. Local Social Security offices have additional information.

EMPLOYMENT OPPORTUNITIES

College Work-Study Program (CW-SP)

The College participates in the Federal College Work-Study Program. This program provides part-time jobs during the academic year and full-time positions during the summer to students who need financial assistance to attend college.

Other Employment

The College coordinates and maintains lists of part-time and summer employment opportunities. Interested students should contact the Coordinator of Career Services for additional information.

LOANS

National Direct Student Loans (NDSL)

These loans are available to students with financial need who are enrolled at least half-time. An aggregate of $5,000 is the maximum an undergraduate can borrow, and $10,000 is the aggregate a graduate student can borrow. Repayment and 3 percent interest begin 9 months after leaving college. Deferment and cancellation benefits are available for certain situations.

Insured Student Loans

This program is administered by the New York Higher Education Services Corporation (NYHESC) for New York State residents. These loans are available from a bank or other lending agent to students who are registered at least half-time. Undergraduates can borrow an aggregate of $7,500 for their undergraduate studies, and a graduate student can borrow an aggregate of $15,000. Repayment and 7 percent interest begin 9 months after leaving college (an additional 1 percent interest is paid at the time the loan is received). Applications are available at local banks or at the Office of Financial Aid.

Emergency Loans

The College is able to provide registered students interest-free, short-term loans. These loans are available because of the interest and support of the following donors: Alumni Association Short-term Loan Fund, Karl T. Frederick Memorial Fund, C. Ives Gehring Memorial Fund, Milton Hick Memorial Fund, James D. Judson Memorial Fund, David B. Schorer Memorial Fund and Edward Vail Emergency Fund.

Students should contact the Office of Financial Aid when need arises for a short-term loan.

Private Scholarships and Grants

The College administers a number of programs which have been established by private individuals, companies, organizations and foundations. These scholarship and grant programs have varying eligibility requirements and are awarded to students according to their respective guidelines. The following is a list of the programs: Alumni Memorial Awards, Alumni Educational Grants, Allied Paper Salesmen's Association, Inc., Harold L. Austin Memorial Scholarship, Nelson Cortlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Award, Jack L. Krall Memorial Scholarship Fund, Federated Garden Clubs of New York State, Inc., and Heiberg Memorial Fund.

Other opportunities include: Joseph S. Illick Memorial Fund, Friedrich U. Klaehn Memorial Scholarship in Silviculture, C.E. Libby Award, New York State College of Forestry Foundation, Inc., Portia Farrell Morgan Scholarship, Frank B. Myers Memorial Award, Charles Lathrop Pack Awards, Society of Plastics Engineers, Central New York Section Award, Phyllis Roskin Memorial Award, Ernest Sondheimer Scholarship Award, and Student Association Grants.

Syracuse Pulp and Paper Foundation, Inc. Scholarships

Scholarships from this foundation are awarded to students majoring in paper science and engineering. The scholarship amount is $100 more than the recipient's annual tuition charge. Incoming freshmen and transfer students entering the program should request a Pulp and Paper Scholarship application from the Office of Financial Aid. It is necessary to reapply each year for the scholarship.

State University Supplemental Tuition Assistance (SUSTA)

New York State residents who have a family net taxable income of $2,000 or less are eligible for assistance to pay the balance of the tuition not covered by the Tuition Assistance Program Award. Applications for this program are available at the time of registration.

Partial Tuition Waivers

In the Spring of 1972, the State University of New York Board of Trustees established a program of tuition waivers for New York State residents. The program reduces the cost of tuition for many students whose family taxable income is $12,000 or less. The amount of the waiver is based on the tuition charge and the amount of income reported on the Regents application. Students eligible for Regents awards will be asked to file the additional application after the Regents application has been processed. New York State residents who are not eligible for the benefits from Regents programs should write to the Office of Financial Aid for the appropriate application.

Student Life

HOUSING

The College of Environmental Science and Forestry does not operate its own residence facilities or food service. Students enter into a Room and Board Agreement with Syracuse University, which is adjacent to the State-operated College.

Residence in a Syracuse University living center or in an approved fraternity or sorority house (upperclasses only) is required of all single freshman and sophomore students under 21 years of age.

Permission may be granted by the Syracuse University Office of Residential Life allowing the student to live with blood relatives if the parents are willing to transfer all responsibility for the student to the relative. Any exceptions to this requirement are listed in the room and board agreements.

Students have a choice of living centers at Syracuse University—large halls, apartment houses, cottages, fraternities and sorority houses, or co-operative units. Graduate student resident advisors live on each floor or in each unit and are available for counseling, advisement, and referral services.

Syracuse University also has housing units available for married students and their families. While veterans are given preference, non-veterans too can usually find housing.

EXTRACURRICULAR ACTIVITIES

Students at the College of Environmental Science and Forestry have many extracurricular activities to choose from, both on campus and in the community.

At the College

ESF students elect class officers annually and the *Student Council* is the official representative body governing extracurricular affairs.

Among the departmental organizations which offer students an opportunity to broaden their knowledge and to meet other students with similar interests are: *Archery Club*, for those interested in field archery; *Bob*

Marshall Club, an organization of students concerned about the future of the Adirondack Mountains; the *Forestry Club*, the traditional sponsor of the Woodsmen's Team; *Botany Club*; *Mollet Club*, an organization of landscape architecture students; the *Papyrus Club*, organized by paper science and engineering students as a way to keep up with new developments in the industry; the *Wood Products Engineering Club*, a group that sponsors guest speakers and noted lecturers; and the *Zoology Club*, which sponsors lectures, films and field trips.

Other groups on campus include *Vox Silvae*, a debate team; *Saengerbund*, the College glee club; *Robin Hood*, the all-junior honor society; and *Alpha Xi Sigma*, senior honorary society. There are also student chapters of the *Wildlife Society*, the *Society of American Foresters*, and the *American Fisheries Society*.

The two major student publications at ESF are *The Knothole*, a weekly newspaper, and *The Empire Forester*, an annual pictorial review which has won many awards in past years.

ESF students support both a basketball club, and a basketball intramural league.

At Syracuse University

Students at the College of Environmental Science and Forestry have all the privileges of Syracuse University students; participation in student government, organizations, sports and other extracurricular activities is open to them.

Archbold Gymnasium on the Syracuse University campus is the center of athletics and physical education. It is equipped with regulation basketball courts, volleyball and badminton courts, and handball and squash courts. There is also a weight training room, pool, rowing tank and rifle range.

Manley Field House provides indoor practice facilities for many sports including football, track and lacrosse; it is the site of Syracuse University home basketball games.

Facilities at Skytop recreation area include ski tows and a ski jump, a lodge and 22 tennis courts.

The Women's Building offers instructional, social and recreational facilities that include swimming, basketball, bowling and tennis.

In the Syracuse Area

The City of Syracuse and its surrounding countryside offer many cultural, educational and recreational opportunities. The city has several fine museums including the Everson, with its outstanding collection of works by local, regional and international artists; a local repertory theater; several points of historical interest; a professional symphony orchestra; and a Civic Center which brings artists from around the world to Syracuse.

Eight parks lie within the city limits; numerous county and state parks, including Beaver Lake Nature Center and Montezuma Wildlife Reservation, are within a short drive.

In the summer, golf enthusiasts have 23 public courses to choose from; water sports fans travel to nearby Lake Ontario, Oneida Lake and the Finger Lakes. Winter sports, especially skiing and skating, abound in Central New York. Special annual events include the New York State Fair, the Scottish Games and Regatta Weekend.

COLLEGE SERVICES

Academic and Personal Counseling

The Office of Student Affairs is available throughout the students' college career as a place where they may seek, at any time, the advice of experienced counselors. This office should be the first contact when questions or personal problems arise. General advisement for international students is provided by the Office of International Forestry. The Registrar in the Student Affairs Office is available as needed to provide information and guidance on general academic and specific program requirements. In addition, the Coordinator of Financial Aid in the Student Affairs Office provides information on available scholarships, long-term State and Federal educational loans, work opportunities at the College and major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration, the student is assigned to a faculty advisor for assistance as needed in curriculum decision, program development and elective decisions. In curriculum selection, special advisors are assigned to provide academic advice as needed. Faculty in the major departments are also available for academic guidance. In addition, many classes are small, permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis as needed, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions as will be required in later and professional life.

Career Services

Every student sooner or later asks the question "How will I apply my education?" To help with the answers, the Office of Career Services offers counseling and guidance to all students as they make the transition from college to career or graduate school.

Objectives of the Office include: providing career, employment and educational information to all students and alumni; assisting individuals in career objectives and decisions; and providing the College with information for planning and operational purposes.

To provide these services, the Office conducts such activities as: sponsoring career seminars; maintaining listings of full-time, part-time and summer job opportunities; and making available a "career library," made up of specialized directories and reference sources, company literature and professional organization material. The Office of Career

Services also works in liaison with the placement efforts of the individual Schools at ESF, as well as the Office of Career Services at Syracuse University.

Veterans' Counseling

Veterans can receive personal counseling on social, financial or academic problems through the Office of Student Affairs. Information and application forms for V.A. Educational Benefits, Tutorial Assistance, Work-Study Allowance and the ESF Veterans' Tuition Deferral Plan are available upon request. A Veterans' Administration representative is available periodically for information pertaining to veterans' welfare and benefits while on campus.

Other Counseling

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at Saint Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with several full-time and part-time denominational chaplains and advisors. The program of Saint Thomas More Chapel is under the direction of a chaplain.

Extracurricular activities are under the guidance of a faculty committee, the members of which meet with students during planning sessions and offer their counsel when necessary.

Resident advisors are located in all University dormitories and are available for assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which the major work is taken.

Health and Medical Facilities

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service. They are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement per college year with ordinary medical care in the infirmary. Infirmary usage over 10 days will be at prevailing infirmary rates. Laboratory examinations, if necessary for treatment or diagnosis of common illness, are usually provided without cost. Most common legal drugs are provided without extra charge.

A student accident or sickness insurance plan, available at Fall registration, not only supplements the usual infirmary privileges, but is also a health protection during the summer months when students are not under the care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made

available to University students. *All international students are required to carry health and accident insurance.*

Military Service

Air Force and Army Reserve Officer Training Corps programs are available; however, a minimum of two years is required.

Hearing and Speech Center

The Gordon D. Hoople Hearing and Speech Center provides remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech and voice disorders. This service is without expense to students.

Psychological Services and Research Center

Students desiring an analysis of their aptitudes, abilities and interests may secure special testing programs at the Testing and Evaluation Service Center on the Syracuse University campus.

Reading and Language Arts Center

The Syracuse University School of Education, in cooperation with the College of Arts and Sciences and the Psychological Services and Research Center, maintains a reading and language arts center for research in the learning skills and for training teachers and specialists in reading and language arts. Representatives from the fields of medicine, speech and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

Alumni Association

The Alumni Office serves as the liaison between the College, the Alumni Association Board of Directors and more than 6,000 alumni. The Association supports educational programs through scholarships, publishes a quarterly newsletter and represents alumni concerns.

Undergraduate Rules and Regulations

The complete listing of guidelines for all undergraduate students attending ESF and residing on the Syracuse University campus is found in a separate publication, the *Student Handbook*, which is distributed at registration. Also distributed at registration are copies of "Rules and Regulations of Conduct and Behavior" which pertain to all members of the College community. It is the student's responsibility to be familiar with these regulations and abide by them.

Academic Life

STUDENTS AND FACULTY

Education in the classroom, laboratory and field is a cooperative endeavor between students and faculty and is an enriching experience for both. This two-way communication is traditional at the College, so much so that deans and department chairmen, with considerable administrative duties, still meet classes and consider it a privilege to do so.

Men and women are enrolled as students at the College, and in the Fall, 1976, numbered 2,349. Of these, 1,910 were undergraduates and 439 were graduate students. In addition, there were 25 students engaged in postdoctoral work. A growing number of students at the College transfer from community colleges and other institutions and international students are encouraged to apply for admission.

The teaching and research faculty number about 150. Selected professors are designated as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultation. Many of them serve as advisors to undergraduates, a practice which is particularly helpful to students seeking advanced degrees.

ORIENTATION

To ease the adjustment to college life, *all freshmen and new transfer students and their parents* are invited to attend one of several orientation sessions held during the summer. This is an opportunity for new students to meet classmates and members of the faculty and administration. It is also a good way to become acquainted with the College, its functions, operations and services. A special orientation session for international students is provided through a special counselor and advisor.

A weekly one-hour orientation course, *General Forestry 032*, is required throughout the first semester for all freshmen and transfer students. The purpose of this course is to introduce the new undergraduate student to the College standards, counseling services and general College policy.

ACADEMIC ADVISEMENT

Upon arrival at the College, each student is assigned to a faculty advisor who can provide the student with information and advice on courses and programs both at the College and at Syracuse University. The success of this program rests largely upon the student to take the initiative in seeking assistance.

ATTENDANCE

In general, undergraduates are expected but not required to attend all of their scheduled classes. Faculty members may make regular class attendance a course requirement.

DROPPING OR ADDING COURSES

Changes in schedule may be made with the approval of the student's advisor and curriculum director. Such changes take place within the *first three weeks* of the semester.

CHANGE OF CURRICULUM

A student is allowed without petition one change of curriculum after beginning the major work.

WITHDRAWALS

A student who finds it necessary to withdraw from the College must notify the Office of Student Affairs. If the student withdraws before the official drop date for the semester, the student's permanent record card will be marked "no credit for the semester." After that date, entries will be based on the instructor's report as "withdrew passing" or "withdrew failing."

GRADES AND GRADE POINTS

College academic records list credit hours, grades and grade points. Grade points indicate the quality of work done according to the following scale:

Grade	*Quality*	*Grade Points Per Credit Hour*
A	Excellent	4
B	Good	3
C	Average	2
D	Minimum passing	1
F	Failure	0

CREDIT HOUR LOAD

A normal schedule for a full-time student at the College is defined as 12 or more credit hours per semester up to and including 20 hours.

GRADE POINT AVERAGE

The student must obtain a C average (2.0) to be in academic good standing. The student's cumulative average is determined by dividing the number of credit hours carried into the total number of grade points earned for those hours.

COLLEGE HONOR LIST

Students who have carried a minimum of 12 credit hours of course work and who have achieved a minimum semester average of 3.0 are placed on the College Honor List for that semester.

PROBATION

A student whose cumulative or semester grade point average falls below 2.0 will, after review by the Undergraduate Academic Affairs Committee, either be placed on probation or academically dismissed.

FAILURES AND INCOMPLETES

A student who fails a required course must repeat it.

A student is allowed one semester in which to make up an incomplete. Failure to do so results in an F.

GRADUATION REQUIREMENTS

To meet the academic requirements for graduation, a student must:

1. be in residence at the College during the final year;
2. complete the total course requirements of the approved degree program;
3. have a minimum cumulative grade-point average of 2.00.

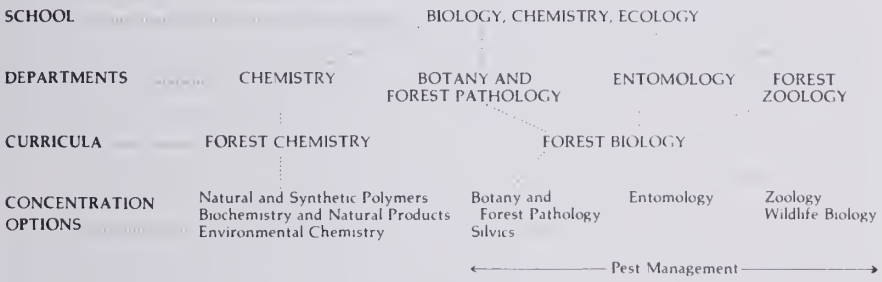
COMMENCEMENT HONORS

Commencement honors are awarded to those students who have attained one of the following academic averages: *cum laude,* 3.0; *magna cum laude,* 3.34; *summa cum laude,* 3.83.

Areas of Study

THE SCHOOL OF BIOLOGY, CHEMISTRY AND ECOLOGY

The School of Biology, Chemistry and Ecology offers two curricula which support the science and ecological areas of environmental science and forestry.



Forest Biology

The School's biology curriculum is designed to educate biologists and to provide them with the opportunity to become firmly grounded in the principles of forestry and environmental science. The program is directed at both those students planning graduate study in the biological sciences, as well as those students who will seek biologist positions in such areas as forestry research, disease and insect control, recreation, fish and wildlife biology and management.

The effective management and protection of forests and related natural resources are becoming increasingly dependent on the research contributions and professional guidance of biologists for solutions to a wide range of environmental problems.

Requirements

The curriculum is built around a core of required courses which provide the student with a general education, an introduction to forestry principles and a sound background in biology and the physical sciences. It is designed to achieve breadth in biology as well as depth in a selected area of concentration.

The flexibility of the curriculum allows for the development of a variety of programs within or across the several participating departments, according to the academic and professional goals of the student. All students are considered to be majoring in biology, and each student is assigned an advisor to aid in program decisions.

Attendance in a 5-week or more summer field program is required. Most students attend the College's program at the Warrensburg Campus. Several attend the College's program at the Cranberry Lake Biological Station or that of another approved university summer camp.

Areas of Concentration

Botany and Forest Pathology—This concentration prepares students for a wide variety of opportunities in the botanically-oriented professions. They range from graduate work leading to a master's or Ph.D. degree to botanically allied land management positions, to forest pathology and pest control positions with state and Federal governments, and to a variety of positions requiring an ecological expertise.

Entomology—The Entomology department offers basic courses on insect life, their functions in relation to man and his environment, and the elements for integrated pest management. Opportunities for employment in each of these and related fields exist in federal, state and private agencies as well as with industrial firms. Through selected coursework it is possible to fulfill civil service and industrial standards and to prepare for certification in pest control and pesticide application. Any student contemplating a career in entomology is advised to consult with the chairman of the Entomology department.

Silvics—This concentration grafts an appreciation of the manipulation of forest ecosystems for the benefit of man on to a strong biological base and prepares students for graduate study in silviculture or botany and positions in state and Federal government.

Wildlife Biology—A basic and applied program in fish and wildlife biology is provided for the student whose objectives are to develop some professional skills in the biology and management of these natural resources. However, full professional training normally requires some graduate study that can follow either the zoology or wildlife biology concentrations.

Zoology—This concentration provides a basic and broad program in zoology for the student whose objectives are to go on for graduate study or to develop some emphasis in such subject areas as physiology, soil invertebrate zoology, animal behavior or general ecology.

General requirements for federal and state biology positions are met by the curriculum. Position requirements in a broad range of special

biological fields related to natural resources also may be achieved by selection of electives. Requirements for federal and state forestry positions may be satisfied by choosing specified forestry subjects as electives.

Electives

Students in many concentration areas planning graduate study are urged to take two semesters of a language (as approved by their faculty advisor) as a part of their humanistic-social sciences elective requirement.

Students planning to meet special requirements for biology specialty positions in federal and state service should review the available Civil Service publications and become familiar with the specific course requirements to be met by elective choice.

Students planning to meet special requirements for Federal Civil Service positions in forestry at the GS-5 and GS-7 levels may do so by electing 10 credits in additional forestry courses and attending the Summer Session in Field Forestry at Warrensburg, New York. These special forestry requirements may be fulfilled by courses selected with the approval of the faculty advisor.

Transfer Students

The curriculum is arranged to facilitate transfer of students from the State University community colleges at the end of their freshman or sophomore years. Recommended core courses for students planning to transfer as entering juniors total 64 credits or an associate degree and include: biology (8 credits); general chemistry (8); organic chemistry (8); physics (8); mathematics through integral calculus (8); economics (3); English (6); and electives (14).

FOREST BIOLOGY CURRICULUM

Freshman Year			*Credit Hours*
First Semester	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	FBO 100	General Botany	4
	English		3
	[1]Math		3
	[2]Elective		3
	GFO 032	Orientation	0
			17
Second Semester	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	FZO 100	General Zoology	4
	English		3
	[1]Math		3
	[2]Elective		3
			17

Sophomore Year

			Credit Hours
First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	PHY 103	General Physics	4
	FBL 320	General Ecology	3
	[2]Electives		6
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	PHY 104	General Physics	4
	ERM 205	Introduction to Macroeconomics	3
	[2]Electives		6
			17

Summer Session Alternate A[3]

SUMMER SESSION IN FIELD FORESTRY. 5 weeks, 6 credit hours. This program is conducted in two separate sessions during the summer period at the College's Pack Demonstration Forest near Warrensburg, New York.

[3]See Note 3, page 51

ERM 300	Summer Session in Field Forestry	6
		6

Junior Year

First Semester	FBO 315	Dendrology I	2
	FEN 350	Elements of Forest Entomology	3
	FBL 330	Principles of General Physiology	3
	[2]Electives		6
			14
Second Semester	FBL 370	Principles of Genetics	3
	FBL 371	Principles of Genetics Lab	1
	APM 491	Introduction to Probability and Statistics	3
	GOL 105	Earth Science (3)	3
	or		
	ERM 345	Soils (3)	
	[2]Elective		2
			12

Summer Session Alternate B[4]

SUMMER SESSION IN ENVIRONMENTAL BIOLOGY. 8 weeks, 8 credits. Courses selected require approval of the student's advisor. Program conducted in June-August at the Cranberry Lake Biological Station, Pack Demonstration Forest, Cranberry Lake.

Summer Session Alternate C[4]

Attendance at other approved biological field stations may be arranged. The courses selected must have the prior approval of the student's advisor.

Senior Year		Credit Hours
First Semester	[2]Electives	15
		15
Second Semester	[2]Electives	15
		15

[1]Mathematics through integral calculus (MAT 227 or the equivalent) is required.
[2]In addition to the specified courses, students must meet the following requirements:
(a) 12 credit hours in a selected biology concentration (zoology or wildlife biology, botany and forest pathology, entomology, or silvics.)
(b) 6 credit hours in a second biological area.
(c) The courses selected in the concentration subjects should include at least one from each of three of the following broad areas of biology: physiology, classification, structure-development, and ecology.
(d) 3 credit hours in the Resource Management area.
(e) 9 credit hours in humanities and social sciences chosen with approval of faculty advisor.
(f) 27 credit hours in elective courses selected with approval of the faculty advisor.
[3]Students with a 2.5 academic average or better may substitute for this requirement 8 credit hours of courses at the Cranberry Lake Biological Station or minimum of 6 credit hours at other biological field stations. The courses selected must have the approval of the student's advisor. It is preferable that any substitute program be taken between the junior and senior years.

NOTE: 5 credits of additional forestry courses are recommended for those students not attending the summer session in Field Forestry.
A total of 131 credit hours is required.

Chemistry

The Department of Chemistry offers three areas of concentration, or options, leading to the Bachelor of Science degree: Environmental Chemistry, Biochemistry and Natural Products Chemistry, and Natural and Synthetic Polymer Chemistry. Students in all options, by selecting proper electives, may be certified on graduation as having completed an American Chemical Society approved curriculum. All options are excellent grounding for professional work at the B.S. level or for advanced graduate study.

For students planning to transfer as entering juniors, recommended core courses consist of 64 credits or an associate degree and include: biology (8 credits), general chemistry (8), organic chemistry (8), physics (8), mathematics through integral calculus (8), economics (3), English (6), electives (14).

The first two years of all curricula are identical, and for this reason students should postpone their choice until the beginning of the junior year.

CHEMISTRY CURRICULUM

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
			17

Sophomore Year

First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	English, Language or Communications		3
	[1]Math or Elective		3
	PHY 211	General Physics for Science Students I	4
	Elective		3
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	English, Language or Communications		3
	[1]Math or Elective		3
	PHY 212	General Physics for Science Students II	4
	ERM 204	Introduction to Economics for Forestry	3
			17

Biochemistry and Natural Products Chemistry Option

This option is designed for students who wish to approach problems in the life sciences with the tools and point of view of the chemist. In addition to a major concentration in the several branches of chemistry, the student obtains a solid grounding in the fundamentals of physics, mathematics and biology. Professional electives can provide a minor concentration in botany, ecology, entomology, zoology, or physiology. Collaborative efforts of chemists and biologists are providing new solutions to problems of environment, natural resources and health.

BIOCHEMISTRY AND NATURAL PRODUCTS CHEMISTRY OPTION

Junior Year

			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Math or Elective		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		2-3
	Elective		3
			16-17

Senior Year

First Semester	LIB 300	Library Research	1
	FCH 495	Introduction to Professional Chemistry	1
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	FCH 530	Biochemistry I	3
	FCH 531	Biochemistry Lab	2
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 497	Undergraduate Seminar	1
	FCH 532	Biochemistry II	3
	FCH 477	Wood Chemistry III	2
	Elective		3
	Elective		3
			17

[1]One course of mathematics or applied mathematics beyond MAT 227 or MAT 397, or equivalent, is required.

[2]A sequence of professional electives should be chosen in the junior year. In addition to the freshman biology courses, a student whose emphasis is in biochemistry must take 3 semester hours of genetics and at least another 3 semester hour biology course. A student whose emphasis is in natural products must take 3 semester hours of biology in addition to the freshman biology courses and an additional hour of organic chemistry laboratory (FCH 496) and a second hour of FCH 384.

[3]Introduction to Polymer Science, FCH 450 (3 credit hours) is suggested.

[4]Petition by student to Department for replacement of this requirement will be considered to allow time for special interest.

NOTE: A total of 133 credit hours is required.

ENVIRONMENTAL CHEMISTRY OPTION

Junior Year

			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Statistics		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	FCH 310	Environmental Chemistry	3
	Elective		3
			17

Senior Year

First Semester	LIB 300	Library Research	1
	FCH 495	Introduction to Professional Chemistry	1
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	FCH 610	Aquatic Chemistry	3
	[2]Professional Elective		2-3
	[3]Elective		3
	Elective		3
			16-17
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 410	Chemistry of Pollution	1-3
	FCH 497	Undergraduate Seminar	1
	FCH 477	Wood Chemistry III	2
	Electives		6
			15-17

[1]A statistics course beyond MAT 227 or MAT 397, or equivalent is required. APM 491 is recommended, but MAT 521 or MAT 525 is acceptable.
[2]A wide variety of courses offered by the departments of chemistry, botany, zoology, ecology, entomology, forest engineering and resource management is available to supplement the environmental chemistry concentration.
[3]Biochemistry I, FCH 530, (3 credit hours) is suggested.
[4]Petition by student to department for replacement of this requirement will be considered to allow time for special interest.

NOTE: A total of 133 credit hours is required.

Environmental Chemistry Option

The environmental chemistry option is designed for those students who wish to obtain a solid fundamental background in chemistry which will enable them to make a strong contribution towards the identification and solution of problems in the areas of pollution, air and water quality, analysis and basic research in environmental chemistry. A large number of professional electives, available through course offerings of other departments such as biology and engineering, provide the important interface with other disciplines necessary for a working understanding of the complex problems inherent in environmental studies.

Natural and Synthetic Polymer Chemistry Option

This option is designed for students interested in the structure and physical properties of man-made and natural materials, the giant molecules of wood, plastics, polysaccharides, proteins, rubbers and fibers. The recently discovered chemistry of these materials constitutes one-half the concern of the chemical industry and is the origin of a major revolution in our way of life and our understanding of nature. This special subject area is an advanced core of studies beyond the basic courses of the classical undergraduate chemistry curriculum.

NATURAL AND SYNTHETIC POLYMER CHEMISTRY OPTION

Junior Year			*Credit Hours*
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Math or Elective		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		2-3
	Elective		3
			16-17

Senior Year

			Credit Hours
First Semester	LIB 300	Library Research	1
	FCH 495	Introduction to Professional Chemistry	1
	FCH 450	Introduction to Polymer Science	3
	FCH 551	Polymer Techniques	2
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 552	Polymer Processing and Technology	3
	FCH 497	Undergraduate Seminar	1
	FCH 477	Wood Chemistry III	2
	Electives		6
			17

[1]One course of mathematics or applied mathematics beyond MAT 227 or MAT 397, or equivalent, is required.
[2]A sequence of two or more professional electives in related disciplines with a minimum of 5 credits should be chosen in the fall of the junior year from the College of ESF offerings. Wood Products Engineering and Paper Science and Engineering courses are recommended.
[3]Biochem I, FCH 530 (3 credit hours) is suggested.
[4]Petition by the student to Department for replacement of this requirement will be considered to allow time for special interest.

NOTE: A total of 133 credit hours is required.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE ENGINEERING

The School of Environmental and Resource Engineering offers programs leading to the bachelor of science degree in forest engineering, paper science and engineering, and wood products engineering. Programs for advanced degrees (M.S. and Ph.D.) are also offered, and are described in the *Graduate Studies Bulletin.*

Specific requirements for the B.S. degree are described with the individual programs below. In each curriculum the core of required courses is supplemented by optional courses selected with the consultation of a program advisor. Students may apply for admission as freshmen or as transfers from other colleges or universities. Applicants with associate degrees in engineering science, or science and mathematics, usually enter at the junior level. Graduates of two-year technology programs also may qualify for junior standing in a given curriculum if their previous studies include the appropriate courses, as indicated by the individual department listings below.

The curricula and research programs of the School are oriented toward multiple use of forest resources, wood products, paper and related fibrous materials. Environmental considerations are integrated into the appropriate courses. Among them are recovery and utilization of waste materials, pollution abatement, energy conservation and safety optimization. The principles and professional skills of engineering analysis and design are stressed in the relevant courses as well as through informal contact which is facilitated by the advantageous student/faculty ratio. As in all programs of the College, emphasis on responsible use of renewable natural resources for the benefit of society underlies the professional career training.

Forest Engineering

The primary objective of this curriculum is to prepare qualified engineering graduates to operate with professional competence within the context of forest and natural resources development. The curriculum is based on the natural and engineering sciences. It utilizes elements of traditional engineering disciplines and develops its unique aspects from interweaving engineering design with an understanding of the natural environment and its renewable resource base including water, soil, timber, wildlife and amenity values. Studies in the humanities and social and economic sciences are integrated throughout the curriculum to help achieve a broad and balanced perspective of professional practice in forest engineering.

In this program students are instructed in the planning, design and construction of systems and facilities to serve the improved utilization of the natural resource base indigenous to the forest environment. Instruction focuses on the engineering activities of: locating *and* quantifying natural resources, harvesting and transporting the primary resources of water and timber; and, designing structures and facilities and pollution abatement schemes in the planning and development of

sites and regions for multiple use. Because of the special importance of continual measurement and evaluation of the broad-scaled parameters which affect this resource base, the forest engineering program offers unique preparation for students aiming toward professional careers involving the conceptualization, design and maintenance of geographically referenced resource information systems. This preparation includes elements of surveying, geodesy, photogrammetry, remote sensing and resource information system design. Additional program emphases such as water resources, construction, etc., may be achieved through the wise use of nondesignated technical electives and designated design electives.

Qualified graduates in search of advanced degree education enjoy ready acceptance to engineering graduate schools throughout the country. Of course, a number of appropriate graduate programs are available at the College and at Syracuse University. In addition, graduates of the Forest Engineering curriculum may enter an established five-year program in either civil, industrial or mechanical engineering at Syracuse University. A bachelor of science degree in engineering will be awarded by Syracuse University upon completion of the requirements of the fifth year.

Prospective entrants to the program with associate degrees in engineering science, or science and mathematics, usually find transfer acceptance as juniors. Students looking forward to the broad educational opportunities offered by the forest engineering program are urged to obtain guidance on specific program requirements from the Admissions Office of the College as early as possible in their preparatory programs.

FOREST ENGINEERING CURRICULUM

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 295	Calculus I	3
	Elective	Humanities or Social Science	3
	GF 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	English		3
	MAT 296	Calculus II	3
	ERM 205	Introduction to Macroeconomics	3
	ERE 100	The Engineer and the Environment	1
			17

Sophomore Year

			Credit Hours
First Semester	MAT 397	Calculus III	3
	GRA 280	Technical Drawing	1
	ERM 206	Introduction to Microeconomics	3
	PHY 103	General Physics	4
	*Engineering Science Elective		3
	Elective	Humanities or Social Science	3
			17
Second Semester	MAT 398	Calculus IV	3
	APM 360	Introduction to Computer Programming	3
	PHY 104	General Physics	4
	MEE 225	Engineering Mechanics	4
	*Elective	Engineering Science, Humanities , or Social Science	3
			17

Junior Year

First Semester	FEG 300	Introduction to Engineering Design	1
	FEG 371	Surveying for Engineers	3
	FBO 315	Dendrology I	2
	APM 491	Introduction to Probability and Statistics	3
	MAT 585	Higher Math for Engineers and Scientists I	3
	CIE 327	Principles of Fluid Mechanics	4
			16
Second Semester	FEG 340	Hydrology	3
	FEG 350	Introduction to Remote Sensing	2
	FEB 363	Photogrammetry	3
	CIE 325	Mechanics of Deformable Bodies	3
	ERM 333	General Silviculture	3
	*Elective	Engineering Science, Humanities, or Social Science	3
			17

Senior Year

First Semester	FEG 410	Structures	4
	FEG 422	Production Systems Engineering	4
	ERM 477	Environmental and Resource Management	3
	CIE 437	Soil Mechanics and Foundations I	3
	Elective	Humanities, Social Science, or Technical	2-3
			16-17
Second Semester	FEG 437	Transportation Systems	4
	FEG 447	Hydrologic Controls	3
	FEG 489	Forest Engineering Planning	4
	**Elective in Engineering Design Sequence		3
	Elective	Humanities, Social Science, or Technical	3
			17

Optional Senior Year Emphasizing Surveying

			Credit Hours
First Semester	FEG 460	Measurement Errors and Adjustment Computations	3
	FEG 486	Cartographic Surveying	3
	CIE 437	Soil Mechanics and Foundations I	3
	**Elective	in Engineering Design Sequence	3
	Elective	Humanities, Social Science, or Technical	3
			15
Second Semester	FEG 437	Transportation Systems	4
	FEG 464	Photogrammetry II	4
	FEG 477	Survey Systems Design	3
	FEG 489	Forest Engineering Planning	4
	Elective	Humanities, Social Science, or Technical	3
			18

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1. At least 9 credit hours must be elected in social sciences or humanities. Upper division electives are recommended.
2. The electives marked by an asterisk are recommended for the semesters in which the following curriculum requirements can be met through coursework such as, but not limited to:

*At least 6 credit hours elected in engineering sciences—

(ECE 221) Electrical Science I
(MEE 323) Vibrations and Controls
(ERE 364) Engineering Materials
(MEE 351) Fundamentals of Thermodynamics
(ECE 222) Electrical Science II
(MEE 327) Advanced Dynamics
(CIE 326) Engineering Materials
(PSE 370) Principles of Mass and Energy Balance

**At least 3 credit hours elected in engineering design or synthesis as part of an advisor approved sequence which complements other required or elected coursework—

(FEG 410) Structures
(FEG 422) Production Systems Engineering
(FEG 447) Hydrologic Controls
(FEG 477) Survey Systems Design
(WPE 404) Design of Wood Structural Elements
(CIE 332) Structures II
(CIE 438) Soil Mechanics and Foundations II
(CIE 454) Treatment of Water and Waste Water
(WPE 472) Production Systems II: Synthesis
(MEE 472) Synthesis of Systems

NOTE: A total of 134 credit hours is required for the B.S. degree from ESF in this curriculum.

Paper Science and Engineering

The curriculum in Paper Science and Engineering is designed to provide a broad base of study and to prepare students for a variety of careers in the paper and related industries. Excellent opportunities are provided for men and women qualified to fill positions as research chemists, process engineers, technical service representatives, line management personnel, and many others.

The program provides education in the physical sciences, mathematics, and engineering, combined with a specific understanding of the chemistry and anatomy of wood, pulping of wood, chemistry and physics of paper and paper formation, and the chemical engineering of pulp and paper processing. Qualified graduates who wish to continue their formal education find excellent opportunities for graduate studies, either in specialized paper science curricula at the College or elsewhere, or in general science and engineering programs throughout the country.

Students having an associate degree in engineering science can complete their baccalaureate degree program in two years. Transfer students with other preparation also may enter with junior standing if they present 68 credits of acceptable courses including the following subjects:

English ..... 6 credits
General Chemistry ..... 8 credits
Organic Chemistry ..... 8 credits
General Physics ..... 8 credits
Mathematics ..... 9 credits
Economics ..... 6 credits

PAPER SCIENCE AND ENGINEERING CURRICULUM

Freshman Year			*Credit Hours*
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	EGR 126	Introduction to Computer Methods in Engineering	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	[1]Math		3
	Elective		3
	ERE 100	The Engineer and the Environment	1
			17

[1]Mathematics through MAT 227 or the equivalent, is required; it is recommended that students also complete MAT 585.

Sophomore Year *Credit Hours*

First Semester	[1]Math or Elective		3
	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	PHY 211	General Physics for Science Students I	4
	Elective		3
	ERM 206	Introduction to Microeconomics	3
			17
Second Semester	[1]Math or Elective		3
	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	PHY 212	General Physics for Science Students II	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	Elective		3
			17

Junior Year

First Semester	FCH 475	Wood Chemistry I	2
	FCH 476	Wood Chemistry II	2
	CHE 346	Physical Chemistry	3
	PSE 300	Introduction to Papermaking	3
	WPE 387	Wood Structure and Properties	2
	WPE 388	Wood and Fiber Identification Lab	1
	PSE 370	Principles of Mass and Energy Balance	3
	PSE 371	Fluid Mechanics	2
			18
Second Semester	PSE 372	Heat Transfer	2
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	PSE 301	Pulp and Paper Processes	3
	PSE 302	Pulp and Paper Processes Lab	1
	Elective		3
	[2]Engineering Elective		3
			16

SUMMER MILL EXPERIENCE: PSE 304—Mill Experience—2 credit hours. Twelve weeks' full-time pulp or paper mill employment approved by the Department between the junior and senior years.

Senior Year

First Semester	PSE 461	Pulping Technology	3
	PSE 465	Paper Properties	4
	PSE 473	Mass Transfer	3
	PSE 491	Paper Science and Engineering Project I	1
	ERE 440	Water Pollution Engineering	3
	GRA 280	Technical Drawing	1
			15
Second Semester	PSE 466	Paper Coating and Converting	3
	PSE 468	Papermaking Processes	3
	PSE 492	Paper Science and Engineering Project II	3
	ERM 465	Managerial Economics	3
	ERE 441	Air Pollution Engineering	3
			15

[1]Mathematics through MAT 227 or the equivalent, is required; it is recommended that students also complete MAT 585.

[2]To be selected from ERE 375 (Elementary Corrosion) and ERE 377 (Process Control) or equivalent level, advisor-approved engineering courses.

NOTE: A total of 134 credit hours is required.

Wood Products Engineering

The Department of Wood Products Engineering prepares students for a wide variety of professional occupations concerned with the use of wood as a primary building material. Four curriculum options are available: building construction, materials marketing, production systems engineering, and wood science.

As the only major construction material derived from a renewable natural resource, increasing attention is being focused on wood as an alternative for other materials which originate from and deplete non-renewable resources. Thus a principal aim of the departmental program is to teach students the fundamentals of efficient wood processing and distribution or final use, whether as a piece of furniture or a complete house.

Students transferring into Wood Products Engineering programs at the junior level must have the following subject background: (1) mathematics through differential calculus; (2) one semester of general physics; and (3) two years of college or an associate degree. It is recommended, but not required, that transfer students have: (1) mathematics through integral calculus; and (2) one semester of general chemistry. Transfer students with all of the above background receive transfer credit in a package plan, which means they are given full credit for the freshman and sophomore years, and can complete the requirements for the B.S. degree in four semesters. Transfer students having the minimum required background also receive transfer credit in a package plan with completion of the B.S. degree to be accomplished by judicious use of "elective" hours and alternate courses. In some cases it may require an additional semester or attendance in summer school.

Wood Science Option

The basic aim of the wood science option is to give students a sufficiently basic and broad scientific background so that they will be prepared to enter graduate school for advanced degrees and ultimately go into positions in research and/or development work in industry, government laboratories, or universities.

The wood science option has two major subdivisions: (1) The biological aspects of wood science in which the relationships between the pure biological sciences and the anatomy-property relationships of wood are brought out, and (2) The physical science aspects of wood science in which the basic physical sciences are used to help characterize the structure-property relationships in wood. Students may further broaden their background in either of these programs through the wise use of electives.

WOOD PRODUCTS ENGINEERING CURRICULUM
WOOD SCIENCE OPTION

			Credit Hours
Freshman Year			
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	Elective		3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
			16
Sophomore Year			
First Semester	FCH 221	Organic Chemistry I	3
	FCH 222	Organic Chemistry Lab I	1
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			17
Second Semester	FCH 223	Organic Chemistry II	3
	FCH 224	Organic Chemistry Lab II	1
	EGL 211	Technical Writing	3
	MAT 328	Topics in Calculus	3
	PHY 104	General Physics	4
	ERM 204	Introduction to Economics for Forestry	3
			17
Junior Year			
First Semester	CHE 346	Physical Chemistry	3
	WPE 322	Mechanical Processing	3
	FBO 315	Dendrology I	2
	APM 491	Introduction to Probability and Statistics	3
	Wood Anatomy Sub-option:		
	FBL 330	Principles of General Physiology	3
	or		
	Wood Physics Sub-option:		
	APM 360	Introduction to Computer Programming	
	WPE 387	Wood Structure and Properties	2
	WPE 388	Wood and Fiber Identification Laboratory	2
			18
Second Semester	CHE 356	Physical Chemistry	3
	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Lab	1
	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	[1]Electives		6
			15

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

[1]It is recommended that at least 9 credit hours of these electives be in the social sciences or humanities.

Senior Year

			Credit Hours
First Semester	WPE 422	Composite Materials	3
	Wood Anatomy Sub-option:		
	Elective	(3)	
	PHY 261	Introduction to Modern Physics (3)	6-7
	Wood Physics Sub-option:		
	MEE 225	Engineering Mechanics (4)	
	Elective	(3)	
	Elective		3
	[1]Elective		2-3
			15
Second Semester	ERE 362	Mechanics of Materials	3
	WPE 498	Research or Design Problem	3
	Wood Anatomy Sub-option:		
	WPE 688	Commercial Timbers of the World (3)	
	FBO 585	Plant Anatomy (3)	6
	Wood Physics Sub-option:		
	MEE 226	Engineering Mechanics (3)	
	FCH 520	Nuclear and Radiation Chemistry (2)	
	FCH 521	Nuclear Chemical Techniques (1)	
	[1]Elective		3
			15

NOTE: A total of 132 credit hours is required.

Building Construction Option

The current pressures for new housing and urban reconstruction have led to an option that develops a deep awareness of the effects of construction on the environment, as well as the efficient use of materials, particularly wood. There is an increasing demand for technically trained specialists in the construction industry and supporting fields who have the skills to use efficiently the wide variety of wood-based building materials, with consideration to their place in respect to other materials and to the purpose of the end product.

The specialty electives are designed to allow the opportunity for concentration areas related to the individual's career objectives. It is felt that the wide range of construction activities found in practice cannot be adequately serviced by a rigid program of study.

Suggested areas and available courses have been grouped below. Many courses are not mentioned, but most relevant material should be under the following areas:

Engineering	*Management*	*Environment*
Structural Analysis	Marketing	Urban Planning
Building Systems	Business Law	Solid Waste Disposal
Adv. Soil Mechanics	Accounting	Waste Water Treatment
Photogrammetry	Finance	Environmental Sanitation
Thermodynamics	Industrial Management	Land Use
Transportation	Operations Research	Landscape Architecture
Systems Analysis	Real Estate	

With careful planning and use of electives, students can obtain a B.S. degree in civil or mechanical engineering at Syracuse University with an additional year's work. Similar adjustments can be made to facilitate continuation in an MBA program.

WOOD PRODUCTS ENGINEERING CURRICULUM
BUILDING CONSTRUCTION OPTION

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	English		3
	[2]MAT 125	Elementary Analytic Geometry	3
	[1]Elective		3
	GFO 032	Orientation	0
			16
Second Semester	ERM 205	Introduction to Macroeconomics	3
	English		3
	[2]MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
	ERE 100	The Engineer and the Environment	1
	EST 100	Introduction to Environmental Studies	3
			15

Sophomore Year

First Semester	WPE 322	Mechanical Processing	3
	ERM 206	Introduction to Microeconomics	3
	[2]MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			16
Second Semester	EIN 211	General Geography	3
	APM 360	Introduction to Computer Programming	3
	PHY 104	General Physics	4
	[1]Elective		3
	[2]Elective		3
			16

Junior Year

			Credit Hours
First Semester	WPE 387	Wood Structure and Properties	2
	MEE 225	Engineering Mechanics	4
	APM 491	Introduction to Probability and Statistics	3
	FEG 371	Surveying for Engineers	3
	ACC 204	Financial Accounting Systems	3
			15
Second Semester	ERE 362	Mechanics of Materials	3
	ERE 364	Engineering Materials	3
	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	ACC 252	Introduction to Managerial Accounting	3
	[1]Elective		3
			15

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

Senior Year

First Semester	WPE 422	Composite Materials	3
	FEG 410	Structures	4
	CIE 437	Soil Mechanics and Foundations I	3
	OPM 365	Management of Operations	3
	[1]Elective		3
			16
Second Semester	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Laboratory	1
	WPE 450	Construction Equipment	3
	WPE 454	Construction Management	3
	FEG 342	Hydraulics in Construction	4
	[1]Elective		3
			16

[1]It is recommended that 12 credit hours of electives be taken in the social science-humanities areas. The remaining electives shall be selected from the following areas:
a. From another engineering discipline at the College of ESF or S.U.
b. General technical or management areas.
[2]Students wishing to pursue a fifth year in civil or mechanical engineering should take MAT 295, 296, 397, 398.

NOTE: A total of 127 credit hours is required.

Production Systems Engineering Option

The goal of this option is to provide an engineering background in the fields of process development, plant design, and production management of modern industries utilizing wood and related materials. Modern production plants are complex systems of machines, men, money and management integrated for production in highly competitive markets. Because the design and operation of such systems are essentially an engineering problem, this option provides a solid foundation in fundamental sciences and applied mathematics which are the basic tools

needed. Beyond the basics, students take courses in engineering and management sciences essential to the planning and development of production processes and to the design and operation of modern manufacturing facilities.

Production systems engineering students may arrange with their advisors to prepare for special program options leading to admission into a bachelor of science degree program at Syracuse University in either industrial or mechanical engineering. Seniors presenting acceptable Graduate Record Examination scores may be admitted to an M.S. program in industrial engineering at Syracuse University. With adequate planning such degrees can usually be obtained after one year's additional work.

WOOD PRODUCTS ENGINEERING CURRICULUM
PRODUCTION SYSTEMS ENGINEERING OPTION

Freshman Year

			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	English		3
	MAT 125	Elementary Analytic Geometry	3
	[1]Elective		3
	GFO 032	Orientation	0
			17
Second Semester	ERM 205	Introduction to Macroeconomics	3
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	English		3
	MAT 226	Differential Calculus	3
	GRA 181	Graphics I	2
			15

Sophomore Year

First Semester	ERM 206	Introduction to Microeconomics	3
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	[1]Elective		3
			16
Second Semester	APM 360	Introduction to Computer Programming	3
	EGL 211	Technical Writing	3
	MAT 328	Topics in Calculus	3
	PHY 104	General Physics	4
	[1]Elective		3
			16

Junior Year

			Credit Hours
First Semester	WPE 322	Mechanical Processing	3
	WPE 387	Wood Structure and Properties	2
	IOR 548	Engineering Economic Analysis	3
	APM 491	Introduction to Probability and Statistics	3
	MEE 225	Engineering Mechanics	4
	WPE 388	Wood and Fiber Identification Lab	2
			17
Second Semester	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Lab	1
	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Lab	1
	ERE 362	Mechanics of Materials	3
	ERM 461	Operation Cost Control	3
	MEE 351	Fundamentals of Thermodynamics	3
			15

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

SUMMER EXPERIENCE: 2 months' experience in an approved wood products or allied firm or laboratory is required. A written report, to be presented in WPE 497, is required. Usually fulfilled between the junior and senior years.

Senior Year

First Semester	WPE 422	Composite Materials	3
	WPE 470	Production Systems I: Analysis	3
	WPE 497	Senior Seminar for Wood Products Engineering Majors	2
	ELE 221	Electrical Science I	3
	IOR 575	Industrial Methods and Systems Engineering	3
	Technical Elective		3
			17
Second Semester	WPE 472	Production Systems II: Synthesis	3
	WPE 498	Research or Design Problem	3
	ELE 222	Electrical Science II	3
	[1]Electives		6
			15

[1]It is recommended that students elect at least 9 credit hours from the social sciences or the humanities.

NOTE: A total of 130 credit hours is required.

Materials Marketing Option

This option is designed to prepare students for professional careers in technical sales, and the management of distributive enterprise, in the wood products and allied industries. It brings together the essential elements of production, distribution, and consumption of the principal product of our only major renewable natural resource. The program

involves development of basic knowledge of the materials and their properties, their efficient processing and fabrication, and the effective use of these products. Because marketing channels vary widely in nature, size, and complexity to meet the equally varied needs of commercial, industrial, and consumer markets, preparation must also include the sound general business orientation required of any segment of the economy.

With careful planning, students electing the materials marketing option may obtain the degree of Master of Business Adminstration from Syracuse University with one year's additional work beyond the bachelor's degree.

WOOD PRODUCTS ENGINEERING CURRICULUM
MATERIALS MARKETING OPTION

			Credit Hours
Freshman Year			
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	English		3
	MAT 125	Elementary Analytic Geometry	3
	Elective		3
	GFO 032	Orientation	0
			16
Second Semester	EGL 215	Public Speaking	3
	CHE 116	General Chemistry	3
	English		3
	MAT 226	Differential Calculus	3
	ERE 100	The Engineer and the Environment	1
	Elective		2-3
			15-16
Sophomore Year			
First Semester	ACC 204	Financial Accounting Systems	3
	EGL 210	Advanced Composition and Literature	3
	MAT 227	Integral Calculus	3
	PHY 103	General Physics	4
	GRA 280	Technical Drawing	1
	Elective		2-3
			16-17
Second Semester	APM 360	Introduction to Computer Programming	3
	ACC 252	Introduction to Managerial Accounting	3
	EGL 211	Technical Writing	3
	PHY 104	General Physics	4
	Elective		3
			16

Junior Year

			Credit Hours
First Semester	APM 491	Introduction to Probability and Statistics	3
	ERM 206	Introduction to Microeconomics	3
	WPE 322	Mechanical Processing	3
	WPE 387	Wood Structure and Properties	2
	Elective		4-6
			15-17
Second Semester	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	WPE 389	Wood Identification Laboratory	1
	ERE 364	Engineering Materials	3
	ERM 205	Introduction to Macroeconomics	3
	LSA 343	Structural Materials and Elements	3
	Elective		3
			16

WPE 390: Field Trip, 2 credit hours. A 2-week field trip at the end of the junior year.

Senior Year

First Semester	WPE 422	Composite Materials	3
	WPE 442	Light Construction	3
	WPE 497	Senior Seminar for Wood Products Engineering Majors	2
	LPP 355	Introduction to the Legal System	3
	MAR 355	Marketing and Society	3
	Electives		2-3
			16-17
Second Semester	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Laboratory	1
	WPE 444	Materials Marketing	3
	ERM 404	Economics of Wood-Using Industries	3
	FIN 355	Money and Banking	3
	Elective		3
			15

NOTE: A total of 127 credit hours is required.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE MANAGEMENT

The School of Environmental and Resource Management prepares students for the critical role of managing forests and related resources and their associated environments for human benefit. Management in this sense embraces the integration of basic ecological and social principles into comprehensive programs of planning, manipulation and use of forest and open lands for the sustained production of timber, forage, water, wildlife and recreational values consistent with national needs and the protection and enhancement of environmental quality. It includes further the effective implementation of these programs via the administrative process in accordance with established policies and goals and in cooperation with individuals and organizations, both public and private.

Students completing the resource management curriculum are qualified for professional practice as foresters and environmental managers with public and private organizations or as private consultants serving a wide array of clients. The potential for a meaningful career in service to human welfare becomes significant when one recognizes the vast amount of land area covered by forests. Nearly 60 percent of New York State's land area is forested, while roughly one-third of both the United States and the world's land areas are comprised of forests. The goods and services that flow from this vast resource base are of critical and growing importance to the needs of modern society and influence in a major way the quality of the environment.

The program also offers opportunity for students to pursue special interests, to prepare for advanced study or to develop their capabilities for service in a variety of fields pertinent to renewable natural resources and the environment, but not specifically forestry oriented.

The Management Curriculum

Though it represents the oldest area of professional instruction in the College, this is a newly-revised curriculum which was implemented with the entering Freshman class in 1973. A core of required courses, totaling 99 semester hours, presents the basic principles and practices that underlie the purposeful management of forest and related resources for optimum production and use of any one or more of their potential products and services.

Extensive elective opportunities, totaling over one-fourth of the program, are available to help broaden the student's general education, to strengthen perceptions and integration of knowledge and to enable the student to enhance depth of understanding in areas of environmental and resource management of special interest or as a base for subsequent study at the graduate level. Areas of concentration provide meaningful sequences in terms of subject matter coverage. Such areas currently include *forest resource science, management science, environmental education and communications, urban forestry, world forestry,* and *applied resource management* within which emphasis may be focused on multiple-use forest management,

or on single-use values such as timber, forage, watershed, wildlife, recreation and aesthetics.

Additional areas of concentration may be developed in cooperation with other disciplinary units of the College. Moreover, students need not select a given area of concentration, but may choose elective courses in accordance with their respective interests and needs, the only restriction being that such selections have the approval of the student's faculty advisor.

A significant feature of the elective component of the curriculum is that the spring semester of the senior year consists wholly of electives and thus is available for a variety of independent or group study activities. These may be conducted in whole or in part on any one of the College's several campuses, or off campus at another institution, in cooperation with some resource management agency or firm, or in conjunction with an overseas academic program operated by the College. Proposals for off-campus study are subject to faculty review and are carried out with varying degrees of faculty guidance to ensure adherence to academic standards.

Considerable emphasis in the curriculum is placed on field instruction to provide students with intimate knowledge of how the forest ecosystem functions and how it is manipulated and used for a variety of owner objectives. Attendance at a 5-week, 6-credit hour Summer Session in Field Forestry is required following completion of the sophomore year. This session serves as the major avenue of entrance into the curriculum for transfer students.

Transfer Students

The curriculum in environmental and resource management is designed to facilitate the transfer of qualified students from liberal arts and science programs in community colleges and other institutions of higher learning. For students contemplating such transfer, it is required that they have completed at least 64 semester credit hours or an associate degree, and further that they have a minimum of 48 of these credits distributed among specific course areas as outlined below. Transfer students having the minimum level of credits as shown will enter the curriculum through the Summer Session in Field Forestry (ERM 300) or a comparable educational experience prior to their enrollment in the Fall semester of the junior year.

	Minimum Credit Hours
Biology (Botany and Zoology)	8
Chemistry (Quantitative and Qualitative)	8
General Physics	8
Mathematics, through integral calculus	6
Economics (macro- and microeconomics)	6
Introductory Sociology	3
Political Science (U.S. institutions)	3
English	6
	48
*Electives	16
Total credits	64

ENVIRONMENTAL AND RESOURCE MANAGEMENT CURRICULUM

Freshman Year			Credit Hours
First Semester	FBO 100	General Botany	4
	CHE 106	General Chemistry	3
	CHE 107	General Chemistry Lab	1
	[1]Communication Skills I		3
	[2]Math		3
	ERM 100	Introduction to Forestry and Environmental Management	3
	GFO 032	Orientation	0
			17
Second Semester	FZO 100	General Zoology	4
	CHE 116	General Chemistry	3
	CHE 117	General Chemistry Lab	1
	ERM 201	Social Sciences I—Sociocultural Processes	6
	[2]Math		3
			17
Sophomore Year			
First Semester	ERM 202	Social Sciences II: Economic Processes	6
	[1]Communication Skills II		3
	PHY 103	General Physics	4
	[3]Elective		3
			16
Second Semester	ERM 203	Social Sciences III: Political Processes	6
	PHY 104	General Physics	4
	[3]Electives		6
			16

SUMMER SESSION IN FIELD FORESTRY—5 weeks, 6 credit hours: Required of all students following the sophomore year and *prior to* registration for the junior year (including junior year transfer students who elect this curriculum).

ERM 300	Summer Session in Field Forestry	6

*The professional resource manager must have a basic understanding of the complex interrelationships that exist within forest ecosystems. It is equally important that such professionals have a knowledge of the social, cultural and historic influences that impinge upon the protection, development and use of forest land resources. Accordingly, prospective transfer students should choose elective courses that will serve to broaden and enhance their understanding in the social and political sciences, humanities and communication skills.

			Credit Hours
Junior Year			
First Semester	ERM 331	Introduction to the Physical Environment	6
	ERM 332	Silvics—Silviculture	8
	ERM 360	Principles of Management	3
			17
Second Semester	ERM 361	Management Models	3
	ERM 362	Forest Information Systems	4
	APM 491	Introduction to Probability and Statistics	3
	[3]Electives		6
			16
Senior Year			
First Semester	APM 492	Forest Biometrics	3
	ERM 400	The Social Environment of Resource Management	3
	ERM 470	Management of the Forest Enterprise	3
	[3]Electives		6
			15
Second Semester	[3]Electives		17
			17

[1]This requirement may be met by English 211 or 215 or by comparable courses designed to develop both the written and oral skills of students.
[2]Mathematics through Integral Calculus is required.
[3]Elective hour requirements are free to the extent that (a) they are in courses selected with the approval of a faculty advisor and (b) at least *nine* such elective hours are centered in forest biology and environmental and resource engineering, but with no less than one elective course in each of these broad fields.

NOTE: A total of 137 credit hours is required.

THE SCHOOL OF LANDSCAPE ARCHITECTURE

The School of Landscape Architecture offers a four-year program in Environmental Studies and a five-year professional program in Landscape Architecture.

Landscape Architecture

Education in the design professions today is witness to a great deal of concern for school objectives, programs and organization. The central issue relates to the force and pace of change that characterizes the work of the environmental designer and brings him into ever challenging situations. The present condition of cities, depletion of natural resources and pollution of air and water all pose severe and complex threats to society. Concurrently, a greater awareness and desire for environmental quality tax the resources and ingenuity of those in the design profession.

Several trends have emerged in recent years that suggest conditions for present and future educational programs. It is clear that an interdisciplinary approach to environmental problems is indicated and includes landscape architecture, architecture, engineering and planning, with specific attention to the biological and behavioral sciences. It is also clear that the educational purpose must relate more directly to the health and well-being of man and be designed for versatility rather than the narrow concerns of career orientation. Finally, that contemporary education should orient the student to systems thinking in his approach to knowledge, society and the individual.

In an effort to recognize and respond to the demands and responsibilities of the times, the following curriculum is offered in environmental studies and landscape architecture. The major characteristics of the programs are: an expansive frame of reference for landscape architects as major contributors to the solution of environmental problems, with a concurrent broad educational base for their professional training; provision for flexibility to accommodate shifts in educational goals, particularly within the design professions; articulation with the programs of the two-year colleges to permit ready transfer to professional programs; and professional training to adequately meet the educational standards of accrediting bodies, the American Society of Landscape Architects and the Division of Professional Education of the New York State Education Department.

The curriculum is based on three consecutive educational sequences: The *first two years* may be taken at this college or at any other school or college. Students may enter at the freshman, sophomore, or junior level depending upon acceptable transfer credit. Requirements for students planning to *transfer* as entering juniors are as follows: (a) Associate degree or acceptable transfer credit totaling a minimum of 62 semester credit hours or their equivalent; (b) Botany, 3 credits; and (c) the equivalent of college algebra and trigonometry plus high school chemistry or physics. A recommended course series prior to transfer would include English (composition) (4 credits); English (literature) (6); speech (3); biological sciences (6); social sciences (9); art media (2); geology (3);

geography (3); and humanities (6). This series is strongly recommended but not required, except as noted above. Deficiencies in these areas will be accommodated as possible during subsequent semesters and summer school sessions.

The *third and fourth years* are devoted to a broad spectrum of courses dealing with a variety of aspects of environment and man's relationship to it, synthesized through development of ability in both the functional and creative design processes. The successful completion of this 127-hour program qualifies the student to receive a bachelor of science degree with a major in environmental studies. The education is broad but with sufficient training to focus the student's concerns for the physical environment and its significance. At this point, students may pursue graduate study, or may apply to continue study toward the first professional landscape architectural degree.

The *fifth year* is comprised of three major components beginning with a short summer session course in plant materials. The fall semester is devoted to a unique program of off-campus study coupled with a concentration of professional course work in the final semester. The off-campus experiential studio is described and conducted by small groups of students with study topics correlated with locational opportunities throughout the world. Successful completion of this 33-hour program of 500 level course work leads to the degree of Bachelor of Landscape Architecture, the first professional degree. Study beyond this point is accommodated by the MLA programs.

LANDSCAPE ARCHITECTURE CURRICULUM

First Year			*Credit Hours*
First Semester	English		3
	FBO 100	General Botany	4
	Philosophy	Elective	3
	GRA 182	Art Media I	1
	EST 100	Introduction to Environmental Studies	3
	GFO 032	Orientation	0
			14
Second Semester	English		3
	FZO 100	General Zoology	4
	Economics	Elective	3
	GRA 183	Art Media II	1
	Anthropology	Elective	3
	Elective		3
			17

Second Year

			Credit Hours
First Semester	English		3
	GRA 284	Art Media III	1
	Psychology Elective		3
	Electives		8
			15
Second Semester	English		3
	Philosophy Elective		3
	Sociology Elective		3
	GRA 285	Art Media IV	1
	Electives		6
			16

Third Year

First Semester	LSA 320	Introduction to Landscape Architecture and Design Theory	2
	LSA 326	Landscape Design Studio I	4
	FBL 320	General Ecology	3
	FEG 271	Plane Surveying	3
	FBO 315	Dendrology I	2
	Elective		3
			17
Second Semester	LSA 327	Landscape Design Studio II	4
	LSA 343	Structural Materials and Elements	3
	LSA 345	Elements of Site Engineering	3
	APM 360	Introduction to Computer Programming	3
	EIN 311	General Geography	3
			16

Fourth Year

First Semester	FEN 432	Insects and Site Planning	1
	FBO 432	Diseases of Woody Ornamentals	1
	LSA 432	Plant Materials Culture	1
	LSA 422	Landscape Design Studio III	4
	LSA 440	Site Development Systems	3
	EIN 470	Art History	3
	EIN 411	Principles of Land Use	3
			16
Second Semester	[1]LSA 425	Orientation for Experiential Studio	3
	LSA 423	Landscape Design Studio IV	4
	EIN 471	History of Landscape Architecture	3
	ARC 294	Introduction to Architecture	3
	EIN 451	Fundamentals of City and Regional Planning	3
			16

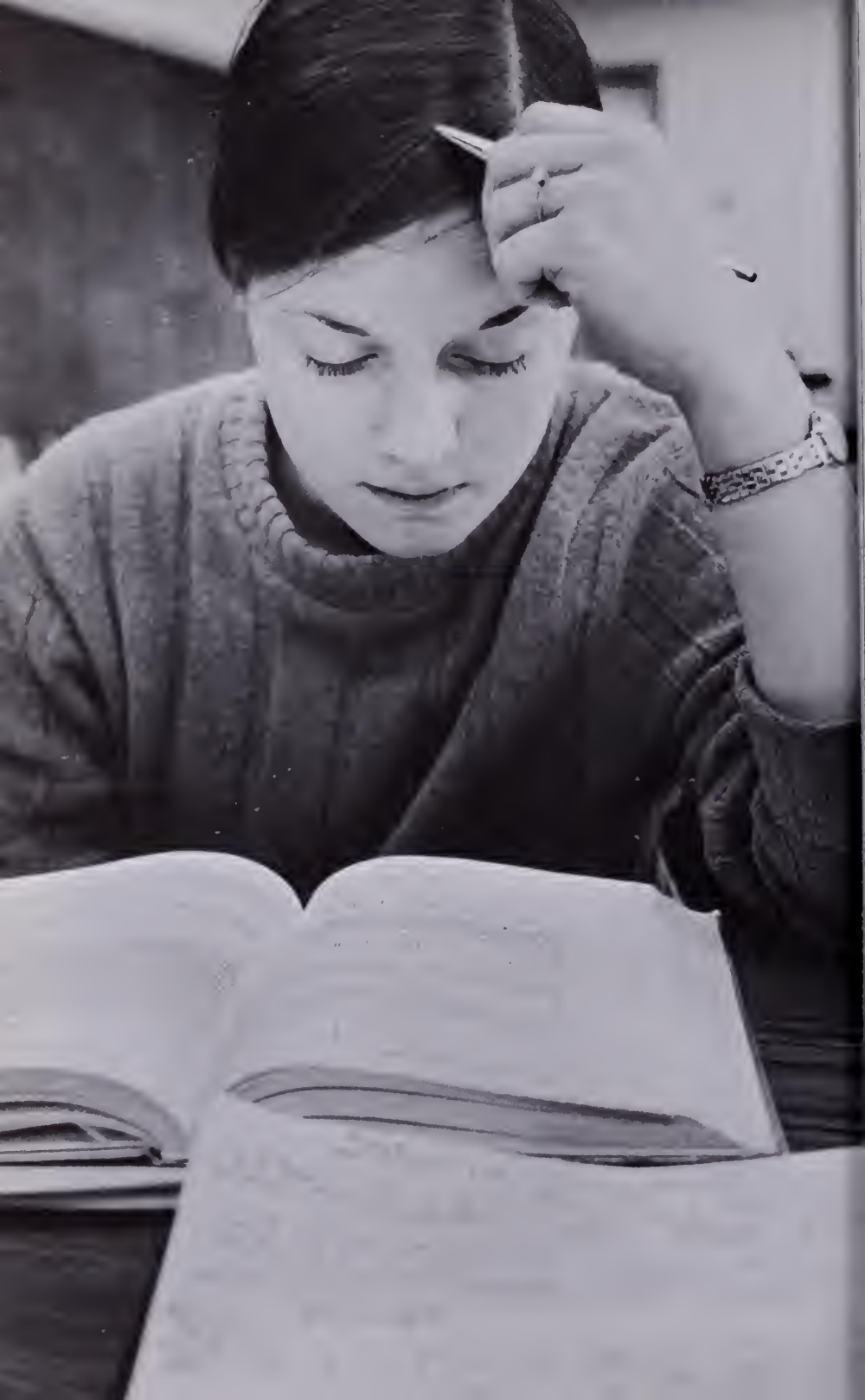
Summer Session

LSA 533: Plant Materials. Three-week course in Plant Materials. 3 credit hours.

Fifth Year			*Credit Hours*
First Semester	OFF-CAMPUS PROGRAM		
	LSA 524	Experiential Landscape Design Studio V	16
			16
Second Semester	LSA 522	Landscape Design Studio VI	
	or		
	LSA 525	Landscape Design Studio VI	4
	or		
	LSA 527	Landscape Design Studio VI	
	LSA 545	Professional Practice Studio II	2
	LSA 547	Principles of Professional Practice	2
	LSA 562	Architecture	3
	Elective		3
			14

[1]All students must have completed the equivalent of college algebra and trigonometry plus H.S. chemistry or physics and botany and 62 credit hours before entering third year.

NOTE: At the beginning of the 4th year students will state their degree intentions at Registration; applications for the BLA program will be accepted during Spring Registration. Approval of the SLA Faculty is necessary for admission to the BLA program. Students in the terminal B.S. program will substitute an elective for LSA 425.
The B.S. degree requires a total of 127 credit hours.
The BLS degree requires 33 hours of 500-level course work. A total of 160 credit hours is required.



Course Offerings

Undergraduate students at the College of Environmental Science and Forestry not only have the academic resources of their own institution, but also the resources of nearby Syracuse University and State University Upstate Medical Center.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at adjacent Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, English, business law, personnel relations and public address. The elective courses include most academic offerings of Syracuse University and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics and the arts. Descriptions of required Syracuse University Courses are included following College of Environmental Science and Forestry courses.

DESCRIPTION OF COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

Course Numbering System

Code Levels:

000-099	Noncredit courses
100-199	Freshman courses
200-299	Sophomore courses
300-499	Junior and Senior courses designed primarily to serve as an undergraduate elective and/or as a requirement in an undergraduate curriculum with the number appropriate to the level where the course appears as a requirement or is normally scheduled as an elective in the major program.

500-599 Graduate courses designed expressly for graduate students in areas supporting their specialization or interdisciplinary program, or for fifth year professional students with a baccalaureate degree (e.g. BLA students with B.S. in Environmental Studies), and available for undergraduate credit by selected upper division undergraduate students with superior academic records.

600-699 Graduate courses designed for beginning graduate students. Undergraduates are permitted admission only by petition with a well-documented justification approved by the undergraduate advisor and curriculum director and the instructor of the course. (See the *Graduate Studies Bulletin* for these courses.)

ESF COURSES—SYRACUSE CAMPUS

APM—APPLIED MATHEMATICS

360. Introduction to Computer Programming **(3)**

The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages or problem solving. The course will cover instruction in Fortran IV, and an Assembly language plus some discussion of PL/1, Algol, APL, and use of software operating systems. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring. Mr. C. N. Lee and Staff.

460. Information Processing Fundamentals **(3)**

Three hours of lecture per week. The course presents problem solving and analytical structures, and practice in their application by use of a digital computer. Selected portions from the two general processing categories of numerical analysis and information systems are presented for discussion and study. The purpose is to develop an awareness with some understanding and proficiency in automated problem-solving systems. Fall. Mr. C. N. Lee and Staff.

Prerequisites: Integral calculus and proficiency in computer programming.

491. Introduction to Probability and Statistics **(3)**

Two hours lecture, 3 hours laboratory. Elementary probability, theoretical and sampling distributions, hypothesis testing, statistical estimation, analysis of variance, regression and correlation, nonparametrics and sampling concepts. Fall and Spring. Staff.

Prerequisite: Two semesters of calculus.

492. Forest Biometrics **(3)**

Two hours lecture, 3 hours laboratory. Analysis of variance including nested and cross-classification. Matrix approach to multiple linear regression and weighted least squares. Nonlinear regression. Sampling methods and design. Applications to forestry problems. Fall.

Prerequisite: APM 491 or equivalent.

500. Introduction to Computer Programming for Graduate Students **(3)**

The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages for problem solving. The course includes a rather detailed study of Fortran IV, plus some discussion of an Assembly language and moderate study of Cobol and APL. To provide completeness, some attention is also afforded to techniques of representing information, managing files, error control, and to operating systems and job control. This course or a

demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring.

EGL—ENGLISH (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES

210. Advanced Composition and Literature (3)
Further development of reading and writing skills acquired in freshman English. Understanding of imaginative literature promoted through the study of selected works in American literature in their historical context. Practice in the principles and techniques of critical writing coordinated with reading assignments. Fall.

211. Technical Writing (3)
Instruction in the principles and techniques of technical writing in general; in the letter, memorandum and report, and in the special techniques of technical writing in particular. Course work includes lectures and discussions, reading assignments in the required text and supplementary materials, and numerous written assignments including a formal report presenting the results of an investigation. Spring.

215. Fundamentals of Public Speaking (3)
Study of and practice in the application of the principles of good oral communication in extemporaneous person-to-group format. Students participate in information and problem-solving group discussions and prepare, deliver, listen to and criticize information and persuasive talks. Fall.

400. American Writers and the Natural Environment (3)
The tracing of the changing concepts of the natural environment in American writings from the Puritans to the present. Fall.

EIN—ENVIRONMENTAL INFLUENCES (LANDSCAPE ARCHITECTURE)

(See also courses listed under GRA and LSA.)

311. General Geography (3)
Three hours of lectures, assigned readings, written reports per week. Discussion of basic geographic concepts and methods, explanation of the significance of man-land relationships as exemplified through the regional distribution and spatial patterns of natural and cultural features, description of geologic processes and other physical features such as soils, climates and natural vegetation. Not open to geography or geology majors. Spring.

411. Principles of Land Use and Planning (3)
Three hours of lecture, reports, assigned readings. Explanation of factors which influence the use, development and control of land. Discussion of government's role in land development and control. Consideration of unique values of land competition for the use of space, planning for better land use, introduction to planning concepts and techniques and other topics. Fall.

451. Fundamentals of City and Regional Planning (3)
Three hours of lectures, assigned readings, written reports per week. Discussion of the meaning and purposes of city and regional planning. Examination of the historical development of urban places. Explanation of the principal elements of the comprehensive planning process, including goal formulation and decisionmaking, social and advocacy planning, planning for community facilities and planning administration. Discussion of the methods and objectives of city and regional planning. Spring.
Prerequisite: Permission of instructor.

470. Art History (3)
Three hours of lecture per week. Informal lectures and class discussion will emphasize and review assigned text and other readings and handout notes. Slides will be shown regularly; notebooks, reports, quizzes and examinations. Evolutionary nature of the main

cultural periods of Western man and fine arts as man's selected environment will be the course emphasis. Fall

471. History of Landscape Architecture (3)
Three hours of lecture per week. Informal lectures and class discussion, notebooks, reports, assigned text and assigned reserve shelf reading, optional text and handout notes, weekly quizzes and exams. Slides. Historical study and style analysis of Western man's efforts to design his environment and his changing attitudes and relationships to environment. Also, non-Western coverage where significant or influential on Western Man. Study of historical personalities as well as periods that are of environmental concern up into the modern period. Spring.
Prerequisites: EIN 470 or equivalent history of arts course.

ERE—ENGINEERING (ENVIRONMENTAL AND RESOURCE ENGINEERING)

100. The Engineer and the Environment (1)
One hour of lecture per week. Introduction to engineering practice in relation to environmental considerations and the needs and resources of society. Historical development of engineering and technology. Mission and content of engineering curricula. Representative case studies and project assignments. Open to all students. Spring. Mr. Jelinek and Staff.

362. Mechanics of Materials (3)
Three hours of lecture. Theories of stress, deformation, and stability of common structural materials subjected to various force systems. Fall.
Prerequisite: Integral calculus, statics.

364. Engineering Materials (3)
Two hours of lecture and one 3-hour laboratory a week. An introduction to the study of materials science emphasizing the structure and properties of materials used in the construction industry in general. Lab work includes fabrication, testing and evaluation of actual systems. Spring. Staff.
Prerequisites: Junior standing, physics, chemistry and engineering mechanics.

375. Elementary Corrosion (1)
One hour of lecture. Basic electro-chemistry, film formation and passivation, galvanic corrosion and pitting, cathodic and anodic protection, protective coatings and inhibitors. Application of the above in the home, car, field, at sea, and in industrial plants. Spring. Mr. Stenuf.

377. Process Control (2)
Two hours of lecture. The study of the basic principles of process control as applied both with or without electronic computers. The emphasis is on sensing and control elements, signal transmission, and noncomputerized controls. This course complements computer courses but does not go beyond the transmission of signals to computers and the response to return signals. Spring. Mr. Stenuf.
Prerequisite: College level physics.

440. Water Pollution Engineering (3)
Two hours of lecture and 3 hours of laboratory. Introduction to the physical, chemical and biological parameters of waste water treatment processes and to the principles of the unit operations involved. Study of the design parameters and design procedures of waste water treatment systems. Fall. Mr. Turai.
Prerequisites: PHY 211 and CHE 356 or equivalent.

441. Air Pollution Engineering (3)
Three hours of lecture and discussions. Study of the chemical, physical and meteorological principles of air pollution and its control. Local and global effects of air pollution. The

atmospheric survey. Examination of the operating principles and design parameters of the various air pollution control systems. Air quality and emission standards. Spring. Mr. Turai.

Prerequisites: PHY 211 and CHE 356 or equivalent.

496. Special Topics (1-3)

Lectures, readings, problems and discussions. Topics as announced in the areas of environmental or resource engineering. Fall and/or Spring. Staff.

563. Photogrammetry I (3)

Two hours of lecture and discussion, 3 hours of laboratory and discussion. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation, and unique requirements are considered. Fall and Spring. Mr. Brock.

Prerequiste: FEG 271 (or FEG 301 concurrent) or equivalent.

596. Special Topics (1-3)

Lectures, conferences, discussions and laboratory. Topics in environmental and resource engineering not covered in established courses. Designed for the beginning graduate student or selected upper division undergraduate. Fall and/or Spring. Staff.

ERM—RESOURCES MANAGEMENT (ENVIRONMENTAL & RESOURCE MANAGEMENT)

100. Introduction to Forestry and Environmental Management (3)

Two 1½ hour meetings per week. An introduction to environmental and resources management. Emphasis is placed on the breadth of the field and on the important interrelations among the social, physical and managerial aspects within which the environmental manager operates. Specific topics include: resources, institutions, values, the physical environment, the organism, the biological system, goals, management problems, information and analysis and dealing with people. Fall.

201. Social Sciences I—Socio-Cultural Processes (6)

Six hours of lecture and discussion. Introduction to the concepts, theories and terminology of psychology, anthropology and sociology, which are relevant to the understanding of the interrelationships of human social groups with their environments and resources. Human social and cultural behavior as possible reflections of adaptations to past environments; human cultural and social organization as adaptations to resources of present-day environments; human ecology as it relates to human economic and political systems. Spring.

202. Social Sciences II: Economic Processes (6)

Five 1-hour lectures and one 1-hour discussion per week. The course has two major subdivisions: macroeconomic processes are concerned with the composition, measurement and determination of national income, with the financial institutions of the United States and with fiscal and monetary policies; microeconomic processes are concerned with pricing of output and resource allocation, the theory of consumer demand, the theory of the firm and industrial organization, the role of labor unions in the United States and microeconomic policies of the Federal Government. Fall.

203. Social Sciences III—Political Processes (6)

Introduction to the concepts, theories and terminology which will provide students with a general understanding of the American political system, with emphasis upon how this system carries out and affects environmental and resource administration. The need and potential for, and direction of, change within and through the political system, and the roles of experts in defining and effecting change receive special consideration. Spring. Mr. Muniak.

204. Introduction to Economics for Forestry (3)
Three hours of lecture and discussion. Population and resources. Trends in the American economy. Supply and demand. Theory of the firm and industry. Composition, measurement and determination of national income. Monetary and fiscal policies. The roles of government, business and labor. Comparative economic systems. General economic principles are stressed. Spring. Mr. Petriceks

205. Introduction to Macroeconomics (3)
Three hours of lecture and discussion Composition, measurement and determination of national income. Financial institutions of the United States. Monetary and fiscal policies. The Theory of Economic Growth and problems in attaining adequate levels of economic growth. Spring. Mr. Bennett and Staff.

206. Introduction to Microeconomics (3)
Three hours of lecture and discussion. Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in antitrust policy. The Theory of International Trade. Fall. Mr. Bennett and Staff.

300. Summer Session in Field Forestry (6)
Fundamental training in forestry disciplines demonstrating elements of resource inventory, ecology and utilization within the context of total resource management. Course consists of five 6-day weeks of field exercises, reports and projects in areas of surveying and cartography, forest and tree measurements, dendrology, ecology and utilization of forest goods and services. Daily exercises develop understanding through active physical participation by students. Two repeating sessions per summer held at Warrensburg Campus. A service charge is required covering individual expenses while in residence at Pack Demonstration Forest, Warrensburg, New York. Staff.

322. Introductory Forest Mensuration (3)
Two hours lecture and discussion, one 3-hour laboratory. Principles and methods of estimation and measurement of forest trees and products, singularly and in the aggregate; of trees, forest products, forest stands, forest growth in time area and value. Determination by graphical and mathematical analysis of volume, growth, and valuation of wood products and other nonwood products and services of the forest through laboratory problems. Spring. Mr. Lea
Prerequisites: Summer Field Session or permission of instructor.

331. Introduction to the Physical Environment (6)
Lectures, discussions, field and laboratory work blocked in time and subject matter with ERM 332, Silvics-Silviculture. Study of the environmental media: air, soil and water, through examination of the flow of energy and matter within and between these components of the environment. Drawing together information from geology, physical geology, soil science, water science and meteorology, this course provides understanding of these areas, their interactions and the interface with the biological system. Fall.
Prerequisite: Junior year standing in ERM curriculum or equivalent. Course should be taken concurrently with ERM 332, Silvics-Silviculture, because of the blocking of these two courses.

332. Silvics-Silviculture (8)
Three 1-hour lectures and five 3-hour labs or field trips per week. Fundamentals of silvics and practices of silviculture enabling manipulation of forests to attain objectives of the forest owner. Emphasis is placed on the biological interrelationships within the forest community, including site factors and forest stand dynamics, and the consideration of these in silvicultural operations. Fall.
Prerequisites: Summer Session in Field Forestry, Physical Environment (taken concurrently) or permission of instructor.

333. General Silviculture (3)
Three hours of lecture per week for first half of semester; 2 hours of lecture and 3 hours of laboratory or field work per week during second half of semester. Presentation of silvicultural concepts, principles and practices. Not designed for biology or resource management majors. Spring. Mr. Lea.
Prerequisite: Junior standing.

345. Soils (3)
Two hours of lecture and 3 hours of laboratory. Introduction to the fundamentals of soil science with particular references to forestry, but including other land uses. Spring. Mr. Craul.
Note: Not available to Environmental and Resource Management students.

351. Meteorology and Fire Behavior (3)
Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall. Mr. Herrington
Prerequisite: PHY 103 and 104 (Calculus helpful but not required).

360. Principles of Management (3)
Three hours of lecture and recitation. Basic principles and concepts of management which are universally applicable to any organization, business enterprise or public agency. The various approaches to management including the classical, behavioral and quantitative concepts with emphasis upon the integrative approach, now required to meet modern society's changing life styles and values and the new awareness of the public regarding environmental matters and natural resources management. Fall.

361. Management Models (3)
Two hours of lectures, 3 hours of laboratory. Introduction to the various models used in managerial decisionmaking. Emphasis is on the characteristics of the various models: their formulation, assumptions, uses and limitations. The major topics covered will include: the role of models in management; simple optimization; constrained optimization; multivalued choices; time adjustment of value; simulation; and models in nondeliberated decisions. Integration of the deliberative and intuitive models is stressed. Spring. Staff.

362. Forest Information Systems (4)
Data needs, as specified by management goals and resource constraints, and the manner in which these needs influence acquisition, storage, retrieval and prediction. Spring.

364. Soil and Water Conservation (3)
Three lectures per week. An integrated historical survey of water and related land resource conservation in the United States. Interrelationships of planning, administration, and evaluation of policies, programs and projects by all levels of government and private units. Fall. Mr. Black.

371. Range Management (2)
Two hours of lecture. Range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring.

372. Planning and Developing Access for Forest Use (3)
Two hours of lecture, and one 3-hour laboratory/discussion. Planning and developing suitable access necessary in producing a wide range of goods and services derived from forest land. Overland and aerial access systems including costs, consideration of user characteristics, aesthetics, standards, maintenance and evaluation of alternatives in location and development. Fall. Mr. Koten.
Prerequisite: Senior standing or permission.

373. Timber Harvesting **(3)**
Two hours of lecture and one 3-hour lab/discussion. Harvesting as a production system including equipment, equipment mixes, costs and manpower in serving and logmaking and primary and secondary transportation. Evaluation of various systems as to environmental impacts. Wood as a raw material to the primary processing system and trees as inputs to the harvesting system. Spring.

400. The Social Environment of Resource Management **(3)**
Three hours of lecture and discussion. This course describes the institutional framework within which the resource manager practices his profession. It intends to show how economics, law, public policy, pressure groups and financial considerations constrain the professional judgment of the resource manager and the goals and objectives of the institution employing him.
Prerequisites: Silvics-Silviculture, Principles of Management, Management Models, Information Systems; Senior standing.

402. Legal Aspects of Surveying **(3)**
Three credit hours of lecture and discussion. Fundamental principles of real property law with special reference to boundary survey, conveyances, rules of evidence, title insurance, rights, duties, and liability of professional land surveyors. Case material and appropriate New York State statutes will be discussed. Fall. Mr. Horn.

404. Economics of Wood-Using Industries **(3)**
Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decisionmaking by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring.
Prerequisite: ERM 204 or equivalent.

405. World Forestry Resources: Problems and Prospects **(3)**
Three hours of lecture and discussion plus guided readings, pertaining to world forest resources and the problems and opportunities associated with their use and development. Major topics include: world forest resources; production and trade; principal wood-producing countries; forestry and the problems of underdevelopment; and special areas and topics of interest to world forestry. Spring. Staff.
Prerequisite: Upper division status. Senior status preferred.

429. Environmental Impact: Principles and Strategy **(3)**
Three hours of lecture and discussion. Principles and theory of environmental impact and statements of impact as required by Federal law. Administrative procedures for review and evaluation. Procedural strategy and effective constitution before various governmental levels. Means of obtaining and sources of authoritative information. Spring. Messrs. Black, Herrington and Staff.
Prerequisite: Senior standing.

430. Application of Ecology **(3)**
Two hours of lecture and discussion and 1 to 3 hours seminar, laboratory or field trips per week. Examination of ecological concepts relevant to practices modifying terrestrial ecosystems for human benefit. Discussion of selected ecological literature, seminars and field trips by specialists in various fields of applied ecology, and student presentations exploring ecological implications of specific problems or situations. Course designed for interdisciplinary participation. Spring. Mr. Richards.
Prerequisites: An ecology course or permission of instructor. Senior standing desirable.

431. Principles of Silviculture **(3)**
Three hours of lecture during the first half of the semester; 2 hours of lecture and 3 hours of laboratory during the second half of the semester. The forest as a community. Site

factors and forest stand dynamics. Introduction to manipulation of forest cover to meet objectives of forest owners. Spring. Mr. Berglund.

Prerequisites: Summer Session in Field Forestry, FBO 330 or FBO 530 concurrently, or permission of instructor.

Note: Not available to Environmental and Resource Management students.

432. Practices of Silviculture (3)

Two hours of lecture and one 3-hour laboratory or field trip. Theory and practices of silviculture manipulation of forest stands to gain objectives of the forest owner. Emphasis is on thinning, reproduction cuttings, plantings and other silvicultural operations in their relationships to economic and ecological factors. Fall or Spring. Mr. Johnson.

Prerequisite: ERM 431 or permission of the instructor.

Note: Not available to Environmental and Resource Management students.

434. Greenspace Silviculture (3)

Two hours of lecture and discussion, 1 to 3 hours seminar, workshop or field trip per week. Concepts and techniques applicable to the manipulation of vegetation systems primarily for their on-site values in park, recreation or multiple-use land, roadsides, utility rights-of-way, buffer and protection areas, etc. Fall. Mr. Richards.

Prerequisite: At least one general or plant ecology or silvics course. Senior standing desirable.

435. Regional Studies (2)

Two hours of lecture. Study and analysis of the many factors that influence the silvicultural management of the important tree species of North America. These factors include importance of forest and forestry to a designated region, physiography, geology, soils, climate and weather, sites and site types, ecology, problems of protection and silvical characteristics of the more important species. Spring. Mr. Johnson.

Prerequisite: ERM 432.

436. Forest Mensuration (3)

Two hours of lecture and one 3-hour laboratory. Principles and methods of measuring log, tree and forest characteristics in time and space. Direct and indirect measurements by sampling and regression. Methods for forest resources inventory of timber and other goods and services. Spring

Prerequisite: APM 492 or permission

440. Forest Hydrology (3)

Two hours of lecture; 3 hours of laboratory. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion and other variables. Fall and Spring. Mr. Eschner and Mr. Black.

441. Forest Influences (2)

Two full days/week for 4 weeks. Field observation of the effect of the presence of forest vegetation on easily quantified parameters of climate and the hydrologic cycle. Basic measurements of precipitation, radiation, temperature, interception, soil moisture, groundwater and streamflow. Summer Session II. Cranberry Lake Biological Station.

442. Practice of Watershed Management (3)

Two hours of lecture, 3 hours of laboratory. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring. Mr. Eschner.

Prerequisite: ERM 440.

446. Forest Soils (3)

One hour of lecture, 1 hour of discussion, 4 hours of laboratory, field study of forest soils. Effect of silvicultural operations on soil. Selection of tree species for planting on different soils. Tree growth and development—soil properties relationships. Methods of soil sampling and laboratory analysis. Fall. Mr. Leaf.

Prerequisite: ERM 345.

452. General Meteorology (3)
Three hours of lecture. Examination of the physical processes of the atmosphere as they relate to the exchange of heat, moisture and momentum in the earth-atmosphere system. Emphasis on the meteorological and micrometeorological basis of climate and its interaction with the biological world. Spring. Mr. Herrington.
Prerequisite: Junior standing or permission of instructor.

453. Meteorology Laboratory (1)
Three hours of laboratory. An extension of SIL 452 which provides analysis and discussion of the atmospheric processes important to weather and climate. Major topics include air mass analysis, surface weather map analysis, and climatological summarization procedures. Spring. Mr. Herrington.
Prerequisites: ERM 452 or concurrently and permission of instructor.

455. Forest Tree Improvement (3)
Two hours of lecture, 3 hours of laboratory or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. Spring. Mr. Westfall.
Prerequisites: FBL 370 and 371 strongly advised.

456. Management of the Forest Business (3)
Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to RMP 611. Fall or Spring. Staff

461. Operation Cost Control (3)
Three hours of lecture. Management uses of accounting data. Essentials of cost accounting and the uses and misuses of historical cost data in management decisionmaking. Concepts of financial analysis of past and projected cash flows, and various methods of comparing alternatives. Fall and Spring. Staff.
Prerequisite: Permission of instructor.

462. The Structure of Management Decisions (3)
Three hours of lecture. Introductory course in managerial decisionmaking. Covers theory, concepts and methodology of management practices and relates these to the realities of decisionmaking. Uses the problem solving approach in preparing the prospective resource manager or administrator for an understanding of the application of decisionmaking models. Spring. Staff.
Prerequisites: ERM 460, APM 491 or equivalent and permission of instructor.

464. Applied Communications (3)
Two hours of lecture. 3 hours of laboratory during first part of course. Major media production project required. Course objective is to acquaint students with the basic principles of instructional communications in the teaching-learning process. Various media including television, motion pictures, exhibits, illustrated lectures, slide talks, newspapers, etc., are examined with emphasis on their utilization in environmental education. Also, consideration is given to instructional design for meeting predetermined learning objectives in various publics—lay and professional adult audiences, school children, etc. Spring. Mr. Hanselman and Staff.

465. Managerial Economics (3)
Three hours of lecture and discussion. Analysis of decisionmaking by the firm. Review of principles employed in modeling, predicting, risk assessment, evaluation and selection of alternative actions. Emphasis on economic and financial decisions and on the delineation of systematic processes of decision. Spring.
Prerequisite: Not available to Resource Management undergraduates except with permission of the instructor.

470. Management of the Forest Enterprise (3)
Two hours of lecture and 1 of discussion/laboratory. This course is concerned with the management alternatives, both of a technical and social nature, that are available in the planning for and the production of timber, recreation, wildlife, forage and water from the forest and with the criteria for choice to meet management objectives. Fall.

471. Resources Management (3)
Three hours of lecture/discussion/recitation/case studies. The interrelationships between man and forest land resources and the multiple services which these resources provide; the extent and nature of responsibilities of the resource manager to the community and to society in his stewardship of natural resources. Spring.

472. Fundamentals of Outdoor Recreation (3)
Three hours of lecture per week. Introduction to the programs and practices of Federal, state and local agencies and private organizations involved in planning, administration and management of outdoor recreation areas. Emphasis is on major recreational issues and conflicts faced by area managers, and how they integrate solutions into their plans. Spring. Mr. Gratzer.

473. Planning and Development of Forest Recreation Areas (3)
Three hours of lectures or equivalent laboratory and assignments per week. Planning and designing forest recreation areas, structures and facilities. Development of construction plans for camp and picnic sites, for waterfront areas and for trails. Emphasis is on the functional relationship between planning and design, management and maintenance. Field trips required. Fall. Mr. Gratzer.
Prerequisite: ERM 472 and permission of instructor.

474. Advanced Practices of Silviculture (3)
Four hours of lecture and seminar during the first half of the semester; 6 hours of field exercises thereafter. Development of silvicultural decisions in management of woodlands. Trips to forest areas. A cultural plan prepared to attain assigned objectives. Spring. Mr. Lea.
Prerequisite: ERM 432.

475. Sociology and Psychology of Leisure Behavior (3)
Three hours of lecture and discussion. Introduction to theory and research findings dealing with the sociological and psychological aspects of leisure behavior; field work and lectures demonstrate applications, particularly with regard to leisure behavior. Spring. Mr. Morrison.
Prerequisites: ERM 472, Fundamentals of Outdoor Recreation, and an introductory course in sociology or psychology, or instructor's permission.

476. Management Planning and Operations (3)
Three hours of lecture and recitation. The overall management and operation of a forest property as a productive enterprise, particularly development and expediting of cutting budgets, work plans and operating schedules. Emphasis is on integration of principles and concepts of mensuration, silviculture, utilization, engineering, economics, administration and human relations in the context of a practical operating land ownership. Spring. Mr. Horn.

477. Resource Policy and Management (3)
Three hours of lecture supplemented by 1 hour of discussion and/or lecture. Public and private forest policy formation; principles of modern management; overall management and operation of a productive forest property. Primarily for forest engineers. Not available to Resource Management undergraduates. Fall or Spring. Mr. Koten.
Prerequisite: Mensuration and silviculture or by permission of the instructor.

478. Marketing of Forest Products **(3)**
Three hours of discussion and analysis. Case study analysis of product, pricing and market research policies and problems of market structure in the lumber, pulp and paper and other major wood-using industries. Spring. Mr. Armstrong.

496. Special Topics in Environmental and Resource Management **(1-3)**
Guided readings, lectures, discussions, tutorial conferences, or special coursework designed to help the undergraduate student apply scientific analysis of a social, biological, or physical nature to questions within his area of interest. Questions and analyses would include those dealing with forest resources management and administration; forest cultural practices; land use and land use planning; hydrology and watershed management; outdoor recreation; resource economics; world forestry; and others. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

497. Resources Management Seminar **(3)**
Three hours of group discussion and analysis. Current literature, plans and principles, and new developments in forest management. Fall or Spring. Staff.

498. Special Studies in Environmental and Resource Management **(1-3)**
Independent research in environmental and resource management for selected undergraduate students. Selection of subject areas determined by the student in conference with appropriate faculty member. Final written report is required for departmental record. Fall or Spring. Staff.
Prerequisite: Consent of instructor and department chairman.

EST—ENVIRONMENTAL STUDIES

100. Introduction to Environmental Studies **(3)**
Lecture and discussion on the nature of man, his social, cultural, economic and political institutions and how these condition his views of the environment. Fall. Staff.

101. Human Ecology **(3)**
Study of the principles of ecosystem structure and function developed in the context of human values and societal structures. Spring. Staff
Prerequisite: EST 100.

497. Undergraduate Seminar **(1)**
Seminars on problems of environmental concern. The subject of the seminar will be announced prior to registration. Fall and/or Spring. Staff.

498. Undergraduate Problem **(1-3)**
Interdisciplinary research designed to solve environmental problems. Selection of subject matter to be determined by students in conference with the Undergraduate Environmental Studies Advisory Group. Problem analysis and programs for solution in the form of a final report required. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

FBL—BIOLOGY (FOREST BIOLOGY)

320. General Ecology **(3)**
Two hours of lecture, 3 hours of field trips during the first half of the semester. Three hours of lecture during the second half of the semester. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. The ecological impact of man is reviewed. Fall. Mr. Alexander.
Prerequisite: A year course in biology or equivalent.

330. Principles of General Physiology (3)
Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Fall. Mr. Brezner.
Prerequisite: One semester of organic chemistry.

370. Principles of Genetics (3)
Three hours of lecture and discussion. A general course covering concepts of genetics and evolution basic to upper division biology and biochemistry courses. Includes the inheritance and analysis of Mendelian and quantitative traits, the chemical nature of the gene and its action, the genetic structure of populations and their evolution. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.
Prerequisites: Forest Botany 100 and Forest Zoology 100 or a 1-year college introductory biology course.

371. Principles of Genetic Laboratory (1)
Three hours of autotutorial laboratory. Experiments with plants and animals and computer simulation exercises demonstrate the basic principles of inheritance of Mendelian and quantitative traits and changes in populations caused by major forces in evolution or by breeding procedures. Numerical methods for characterizing quantitative traits and for testing hypotheses are introduced. Spring.
Corequisite: FBL 370 or equivalent.

372. Introduction to Quantitative and Population Genetics (1)
Ten lecture-discussions and 4 autotutorial laboratories the second half of the semester (incl. Lecture-Lab Modules 5 and 6 of FBL 370 and 371). Basic genetic concepts of quantitative inheritance, the structure of populations and evolution. Laboratory experiments and computer simulations are used to demonstrate these concepts. Numerical methods for characterizing and analyzing genetic data are introduced. Spring.
Prerequisite: An introductory genetics lecture-laboratory course deficient in these areas of genetics and permission of instructor. (Not open to students taking FBL 370 and 371.)

400. Forest Techniques for Biologists (1)
Techniques of forest stand inventory and measurements; mensurational analysis; stand manipulation, harvesting, regeneration, and protection. Summer Sessions I and II, Cranberry Lake Biological Station. 1 credit. Faculty, Ranger School Forest Technician Program.

405. History of Natural Science (1)
One hour of lecture. A review of the history of western science from pre-Ionian times to Darwin, with evaluation of the impact of culture and religion on scientific progress. Spring. Mr. Brezner.

421. Ecology of Freshwaters (2)
Two full days a week for 4 weeks. Experimental and observational studies of environmental and biotic interactions, influencing productivity of freshwaters. Basic concepts at the organismic, population and community level. Summer Session I, Cranberry Lake Biological Station. Staff, SUNYA.
Prerequisite: A course in ecology.

496. Topics in Biology (1-3)
Experimental, interdisciplinary, or special coursework in biology for undergraduate students. Subject matter and method of presentation varies from semester to semester. May be repeated for additional credit. Fall or Spring. Staff.

497. Undergraduate Seminar (1)
Literature surveys and seminars on topics of biological interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring. Staff.

498. Research Problem in Biology **(1-3)**
Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall, Summer and/or Spring. Staff.
Prerequisite: Consent of instructor.

540. Chemical Ecology **(3)**
Two hours of lecture and 1 hour of discussion. A treatment of biological phenomena incorporating elements of ecology, physiology and chemistry as a basis for development, behavior and survival. Emphasis is on intra- and interspecific relationships involving chemical messengers at the organismal, population and community levels. Spring. Mr. Simeone.
Prerequisites: Organic chemistry, general ecology, general physiology.

FBO—BOTANY (FOREST BOTANY AND PATHOLOGY)

100. General Botany **(4)**
Prerequisite to all other courses in Botany. Two hours of lecture and 4 hours of lecture-laboratory in the Autotutorial Learning Center. An introduction to plant biology with special emphasis on the structure and function of the green plant. Fall. Mr. Geis.

310. Classification of the Plant Kingdom **(3)**
Two hours of lecture and 3 hours of lab. Introductory study of the plant kingdom with emphasis on the angiosperms. Spring. Mrs. Wang and Staff.

315. Dendrology I **(2)**
One hour lecture and one 3-hour laboratory/field trip each week. Field study, identification, taxonomy and elementary silvics of important forest trees of North America. Fall. Mr. Ketchledge.

330. Plant Physiology **(2)**
Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Will not satisfy the plant physiology requirement of botany majors. Fall. Mr. Schaedle.
Prerequisite: FBO 100 or equivalent.

360. Forest and Shade Tree Pathology **(3)**
Two hours of lecture and 3 hours of autotutorial laboratory. Major diseases of forest, shade and ornamental trees and deterioration of forest products will be discussed with emphasis on disease identification, principles of disease development, effects of disease on the host and practical control measure. Spring. Mr. Manion.

415. Dendrology II **(1)**
One 3-hour field trip/laboratory each week. A continuation of Dendrology emphasizing trees and shrubs ecologically important in the central New York region and economically important in North America. Fall. Mr. Ketchledge.

417. Adirondack Flora **(2)**
Two full days a week for 4 weeks. Cranberry Lake Biological Station. Field study of the summer flora of the Adirondack Mountains. Session I. Mr. Baum.
Prerequisite: An elementary course in systematic botany.

422. Ecology of Forest Communities **(2)**
Cranberry Biological Station. Session II. Two full days per week for 4 weeks. Study of the structural and functional characteristics of selected Adirondack forest ecosystems; techniques of vegetational and environmental analysis. Special requirement: students

must be prepared to go on two overnight camping trips to an isolated study area. Mr. Ketchledge.

Prerequisites: At least 1 semester of general ecology plus 15 hours of other biological sciences.

425. Plant Ecology (3)

Two hours of lecture and discussion and one laboratory session per week. A first course in plant community ecology dealing with the dynamics of community development and change and the process of community analysis and description. Spring.

Prerequisites: FBL 320, ERM 432 or equivalent.

427. Bryoecology (2)

Two full days a week for 4 weeks. Field and laboratory work at the Biology Station. Study of the bryoflora of the major ecosystems of the Adirondack Mountain region.

Summer Session I, Cranberry Lake Biology Station. Mr. Ketchledge.

Prerequisites: Survey of the plant kingdom; systematic botany; general ecology.

Special requirement: Students must be prepared to go on two overnight trips to isolated areas.

428. Wetland Plant Ecology (1)

A 1-week minicourse involving field and laboratory work at the Cranberry Lake Biological Station. Study of wetland plant community dynamics and environmental relationships in the Adirondack Mountain Region. Summer Session at the Cranberry Lake Biological Station.

432. Diseases of Woody Ornamentals (1)

Three hours of lectures per week for 4 weeks. Major diseases of the common shade and ornamental trees will be discussed with emphasis on methods of control. Not open to students who have had FBO 360. Fall. Mr. Silverborg.

Prerequisites: None.

440. Environmental Microbiology (3)

Three hours of lecture and discussion. Topics to be discussed include: kinds of microbes and their morphology, how viruses and bacteria grow and reproduce, physiology of microorganisms, microbial transformation of the natural and polluted environment, symbiotic relationships of microbes with plants and animals, and microbes as model systems for higher organisms. Spring. Mr. Flashner and Mr. Griffin.

Prerequisites: Junior or Senior standing or permission of instructor.

460. Field Problems in Forest Pathology (2)

Two full days per week for 4 weeks. Field study of important tree diseases in the Adirondacks, including heartrots, root-rots, cankers, rusts, foliage diseases, mistletoe, and physiological diseases. Also field study of mycorrhizae and other tree-root mutualisms. Summer Session I, Cranberry Lake Biological Station.

461. Principles of Forest Pathology (3)

The equivalent of 3 credit hours per week as lecture, discussion or laboratory. Concepts and principles of tree diseases in relation to forest practices and practical experience in disease diagnosis and impact evaluation. Fall.

Prerequisite: FBO 360 or consent of instructor.

465. Field Mycology (2)

An introduction to the collection and identification of the Adirondack fungal flora. Field techniques and laboratory identification of the major fungi found in selected ecosystems.

Session II, Cranberry Lake Biological Station. 2 credit hours. Mr. Terracina.

490. Plant Propagation (2)

One combined lecture-demonstration-laboratory per week plus supervised greenhouse assignments. Spring. Mr. Ketchledge, Mr. Wilcox and Staff.

Prerequisite: 20 hours of biology, including dendrology and general physiology.

510. Mycology (3)
Two hours of lecture, 3 hours of laboratory. Fundamentals of the morphology, taxonomy, cytology, life histories and ecology of fungi. Laboratory experience in culturing and identification of fungi. Fall. Mr. Griffin.

515. Systematic Botany (3)
Two hours of lecture, 3 hours of laboratory. Identification, nomenclature and classification of flowering plants with special emphasis on local flora and on developing the ability to classify the plants of any region. Fall.
Prerequisite: FBO 310 or permission of the instructor.

530. Plant Physiology (2)
Two hours of lecture. Internal processes and conditions in higher plants with emphasis on physiological and biochemical concepts. For students majoring in the biological sciences. Spring. Mr. Wilcox.
Note: Botany majors electing this course for their concentration must also take FBO 531.

531. Plant Physiology Laboratory (2)
Two lab sessions. Introduction to current methods and procedures of physiological research including nutrition, tissue culture, photosynthesis, respiration and hormonal regulation of growth. Spring. Mr. Schaedle.
Prerequisites: FBL 330, corequisite FBO 530, or permission of instructor.

585. Plant Anatomy (3)
Two hours of lecture, 3 hours of laboratory. An introductory course in plant anatomy designed to familiarize the student with the organization and development of the primary and secondary plant body of higher plants. Spring. Mr. Tepper.
Prerequisite: FBO 100.

FCH—CHEMISTRY

221. Organic Chemistry I (3)
Two hours of lecture, 1 hour of recitation. A survey of representative classes of carbon compounds with an emphasis on structure, nomenclature and fundamental reactivity and other important properties, uses and characteristics. Fall. Mr. Schuerch.
Prerequisite: One year of freshman chemistry.

222. Organic Chemistry Laboratory I (1)
One 3-hour laboratory period. Laboratory techniques in organic chemistry. Melting points, distillation, recrystallization, extraction, column and thin layer chromatography. Qualitative functional group analysis. Fall. Staff and laboratory assistants.
Prerequisite: One year of freshman chemistry.
Corequisite: FCH 221 or equivalent.

223. Organic Chemistry II (3)
Two hours of lecture, 1 hour of recitation. A study in depth of the reactivity characteristics of the various classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three-dimensional characteristics of carbon compounds. Spring. Mr. Silverstein.
Prerequisites: One year of freshman chemistry and 1 semester of organic chemistry.

224. Organic Chemistry Laboratory II (1)
One 3-hour laboratory period. Continuation of FCH 222. Simple physical, quantitative and instrumental techniques applied to organic chemistry. Gas chromatography, polarimetry, kinetics. Introduction to synthesis. Spring. Staff and laboratory assistants.
Prerequisite: FCH 222 or equivalent.
Corequisite: FCH 223 or equivalent.

225. Organic Chemistry I (3)
Two hours of lecture, 1 hour of recitation. A survey of representative classes of carbon compounds with emphasis on structure, fundamental reactivity and other important properties and characteristics relevant to biological systems. Fall. Nonchemistry majors.
Prerequisites: One year of freshman chemistry.

226. Organic Chemistry II (3)
Three hours of lecture and discussion. The structure and reactivity of organic compounds, utilizing natural products as examples, will be studied in order to develop an organic chemical background for further study of biological chemistry. Spring. Nonchemistry majors.

310. Introduction to Environmental Chemistry (3)
Three hours of lecture. Introduction to the chemistry and physics of the atmosphere and aquatic systems. The course includes: chemical and physical properties of water, complexation and chelation, colloidal suspensions, pollution and trace substances in water, water purification, photochemical smog, pollutants and particulate matter in the atmosphere, pesticides, food additives, energy, et. cetera. Spring. Mr. Smith.
Prerequisites: Two years of chemistry or permission of instructor.

325. Organic Chemistry III (4)
Two hours of lecture, one 6-hour laboratory period. Classical and recent literature synthesis of organic compounds, employing advanced techniques. Fall. Mr. LaLonde.
Prerequisite: Two semesters of elementary organic chemistry.

380. Instrumental Methods of Analysis (3)
Two hours of lecture and one 3-hour laboratory. Lecture includes theory, applicability and limitations of a number of current methods of instrumental analysis. Laboratory sessions provide practice with several of these techniques. Spring. Mr. Johnson.
Prerequisites: General chemistry and quantitative analysis.

384. Spectrometric Identification of Organic Compounds (1-2)
Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the secondary half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultraviolet spectrometry will be applied to identification of organic natural products. Spring. Mr. Silverstein.
Prerequisites: Organic chemistry; 1 semester of advanced organic chemistry for second credit.

410. Topics in the Chemistry of Pollution (1-3)
Discussion of some specific areas of current concern to the environmental chemist. Lectures by staff members supplemented by outside speakers from industry and governmental agencies. Three hours of lecture per week. This course is taught in modules.
Prerequisite: Organic Chemistry and permission of instructor.

450. Introduction to Polymer Science (3)
Three hours of lecture. Introduction to the chemistry, physics and properties of synthetic polymers. Description and classification of polymers. Polymer synthesis. Polymer solutions. Polymer solid states, including discussion of rubber elasticity, glass transition, crystallization, viscoelasticity. Structure and properties of fibers, films, elastomers, foams. Fall. Mr. Sarko and Mr. Smid.
Prerequisites: One year of organic chemistry and 1 year of physical chemistry.

475. Wood Chemistry I (2)
Four hours of lecture first half of semester. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses and lignin. Cellulose derivatives. Wood extractives. Bark chemistry. Distribution of the cell wall constituents in wood. Fall. Mr. Timell.
Prerequisites: FCH 221—224 or equivalent.

476. Wood Chemistry II **(2)**
Four hours of lecture second half of semester. Interaction of cellulose with water and alkali. Effect of acids on cellulose, hemicelluloses and lignin. Sulfonation and oxidation of lignin. Action of alkali on cellulose, hemicelluloses and lignin. Topochemistry of the major wood delignification reactions. Wood defects. Chemical by-products from wood. Manufacture of cellulose acetate and rayon. Fall. Mr. Timell.
Prerequisite: FCH 475.

477. Wood Chemistry III **(2)**
Chemistry of pectin and starch. Photosynthesis, with emphasis on the chemical, dark phase. Biosynthesis of sucrose, starch and plant cell wall polysaccharides. Biosynthesis of aromatics, with emphasis on lignin. Effects of growth hormones on structure and chemistry of plant cell walls. Spring. Mr. Timell.

478. Wood Chemistry Laboratory **(1)**
Gravimetric and spectrophotometric determination of lignin in wood. Determination of number-average and weight-average molecular weights of ethylcellulose. Separation of larch arabinogalactans A and B and estimation of their molecular-weight and molecular-weight distribution by gel permeation chromatography. Fall. Mr. Timell.

495. Introduction to Professional Chemistry **(1)**
The professional chemist and his relationships with industry, government and universities. Employment opportunities for the chemist, professional organizations, and unions will be discussed. The selection of a senior research topic and a literature survey will be required.
Prerequisite: Senior status.

496. Special Problems in Chemistry **(1-3)**
An opportunity for a special problem, technique development, independent or unstructured study in an area related to the chemical profession. The work may be technical, professional or interdisciplinary. Advisors outside this department may be solicited. A brief proposal must be presented for approval with specific arrangements outlined including faculty advisor and objectives of the study. Evidence of competence and appropriate effort is required for credit. A written report will be expected. Fall and Spring. Staff.
Prerequisite: Upper division status.

497. Undergraduate Seminar **(1)**
One hour per week. Literature surveys and seminars on topics of current research interest and recent advances in chemistry. Spring. Staff.

498. Introduction to Research **(5)**
Eighteen hours of laboratory per week, library search and report writing. Solution of a selected research problem using special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring. Staff.

520. Nuclear and Radiation Chemistry **(2)**
The two 1-hour lectures will cover the information required for the basic understanding of nuclear reactions, the types of radiation emitted, the instrumentation necessary to detect and measure this radiation, the principles of radioisotope tracer techniques and radiation chemistry which is the effect of radiation on organic systems. Visits to the Cornell Reactor and the Nuclear Medicine Department of the Upstate Medical Center will be arranged. Spring. Mr. Meyer.
Prerequisites: Physical, organic and inorganic chemistry or by permission of instructor.
Note: This course can be taken independently of FCH 521.

521. Nuclear Chemical Techniques **(1)**
The laboratory will consist of one 4-hour laboratory class every 2 weeks, with 1 hour to be made up at the student's discretion to accommodate counting periods which extend over several weeks. A short movie by the AEC each week will be required for the sixth hour. The

laboratory will give each student the opportunity to use the individual counting instruments, gain experience in the handling and preparation of radioactive samples and the use of the 1000 Curie cobalt source in radiation chemistry. Spring. Mr. Meyer.

Prerequisite: Physical, organic and inorganic chemistry or permission of instructor. Advance tentative registration is required.

Corequisite: FCH 520.

530. Biochemistry I (3)

Three hours of lecture. General biochemistry with emphasis on cellular constituents and metabolic reactions. The chemical, physical and biological properties of amino acids, proteins, carbohydrates and their intermediary metabolism will be discussed. The chemistry of enzymes, energy transfers and biological oxidations will also be covered. Fall. Mr. Campbell.

Prerequisite: One year of organic chemistry.

Pre- or corequisite: One year of physical chemistry.

531. Biochemistry Laboratory (2)

Six hours of laboratory. This course will stress techniques used in biochemical research. Techniques used include various types of chromatography, electrophoresis, and spectrophotometry and methods involved in the isolation, purification and assay of enzymes. Fall. Mr. Flashner.

Prerequisites: One semester of quantitative analysis with laboratory.

532. Biochemistry II (3)

Three hours of lecture. Topics discussed are: application of tracer techniques to biochemistry, the chemical and biochemical properties of lipids, theories on the origin of life, photosynthesis and the biosynthesis of steroids and terpenes, plant aromatics, amino acids, porphyrins and other aspects of nitrogen metabolism. Spring. Mr. Flashner.

Prerequisites: FCH 530 and its pre- and corequisites.

539. Principles of Biological Chemistry (3)

Three hours of lecture. Principles of biochemistry with emphasis on their relationship to biology. Topics include basic metabolic pathways, structure and function of proteins, enzymes and nucleic acids, energy relationships and biochemical control mechanisms. Fall. Mr. Campbell and Mr. Flashner.

Prerequisite: A 2-semester course in organic chemistry is desirable, but a 1-semester course is acceptable. This course is not open to chemistry majors.

540. Chemical Ecology

This course is the same as FBL 540. Refer to description on page 94.

551. Polymer Techniques (2)

One hour of lecture and discussion and 3 hours of laboratory; lab reports. Techniques of polymer preparation: free radical solution and emulsion polymerization, copolymerization. Molecular weight determination by light scattering, osmometry, viscosity, ultracentrifugation. Structure characterization by X-ray diffraction, electron microscopy, nuclear magnetic resonance, optical rotatory dispersion, polarized microscopy, stress-strain and swelling equilibrium. Fall. Mr. Sarko.

Prerequisites: One year of organic and 1 year of physical chemistry.

552. Polymer Processing and Technology (3)

Industrial methods of production and processing of polymeric materials such as fibers, films, plastics, elastomers, foams, composites, adhesives and coatings, including discussions on the correlation between polymer structure and polymer properties. Spring. Mr. Smid and Staff.

Prerequisites: Introduction to Polymer Science, FCH 450.

FEG—FOREST ENGINEERING

271. Plane Surveying (3)
Two hours of lecture and recitation, 3 hours of field or office practice. A comprehensive development of the principles of plane surveying. Use of modern instruments and methods, computations related to topographic mapping and site development. Fall. Mr. Bender.
Prerequisite: Plane trigonometry, or permission of instructor.

300. Introduction to Engineering Design (1)
One hour of lecture and discussion. An introduction to methodologies for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall. Mr. D. Palmer.
Prerequisite: Junior standing.

302. Forest Engineering Problems (3)
Three hours of lecture and discussion. An introduction to methodologies of forest measurements for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Spring. Staff.

340. Hydrology (3)
Two hours of lecture and 3 hours of laboratory and discussion per week. Analysis of the waters of the earth; their occurrence, circulation and distribution; chemical and physical properties; and interaction with their environment, including their relation to living things. A system's perspective is developed towards the solution of typical hydrologic problems. Spring. Mr. Tully.
Prerequisite: 327, Principles of Fluid Mechanics; APM 491, Introduction to Probability and Statistics; and APM 360, Introduction to Computer Programming or equivalent.

342. Hydraulics in Construction (4)
Three hours of lecture, 3 hours of laboratory. The physical, mechanical, thermal and hydraulic properties of fluids relevant to the construction industry. A study of solutions to hydraulic problems in contemporary construction activities. Not open for credit to forest engineering students. Spring. Staff.
Prerequisites: Physics and differential calculus.

350. Introduction to Remote Sensing for Engineers (2)
Two hours of lecture and three hours of laboratory per week. The fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys and site development analyses. Oriented for multidisciplinary participation. Spring. Mr. Lillesand.
Prerequisite: Junior standing and FEG 363 (which may be taken concurrently with FEG 350).

352. Introduction to Remote Sensing (3)
Two hours of lecture and 3 hours of laboratory per week. Qualitative and quantitative introduction to the fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys, site development studies and land use analyses. Oriented for multidisciplinary participation. Spring. Mr. Lillesand.
Prerequisite: Junior standing, physics and calculus or consent of instructor.

363. Photogrammetry (3)
Two hours of lecture and discussion, 3 hours of laboratory. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation and unique requirements are considered. Fall and Spring. Mr. Brock.
Prerequisite: FEG 271 (or FEG 371 concurrent).

371. Surveying for Engineers (3)

Two hours of lecture and recitation, 3 hours of laboratory. The principles of plane surveying for engineers. Subject areas to be treated include linear and angular measurements in both the horizontal and vertical planes; error analysis; horizontal and vertical control and associated computations; areal and volumetric computations; circular and parabolic curves; state plane coordinates; astronomical observations for direction of lines; and consideration of potential computer relationships. The laboratory is essentially the same as FEG 271, but with additional work. Field work and computations culminate in a topographic map. Fall. Mr. Bender.

Prerequisite: Differential and integral calculus.

410. Structures (4)

Three hours of lecture, 3 hours of laboratory. Engineering principles in the analysis, planning, design, construction and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems and other facilities. Properties of timber, concrete, steel and other structural materials. Fall. Mr. Tully.

Prerequisite: CIE 325 or concurrent registration.

422. Production Systems Engineering (4)

Four hours of lecture per week. An introduction to concepts of production systems and procedures for planning, designing and managing production and large-scale physical systems with an emphasis on the coordination of resources to achieve well-defined objectives. Topics include: the concept of systems analysis as a design process; linear and dynamic programming; and select mathematical and economic techniques applicable to resource engineering and management. Fall. Mr. D. Palmer.

Prerequisite: ERM 206, FEG 300, APM 491, MAT 585.

430. Soil Mechanics (2)

Two hours of lecture, 3 hours of laboratory (9 weeks only). The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. A 9-week course, concluding with specifications of engineering soils. Credit towards forest engineering degree may be granted only by the completion of additional assigned work. Fall. Mr. Tully.

Prerequisite: Senior class standing or permission of instructor.

Note: A student may not enroll in and receive credit for both FEG 430 and FEG 432.

432. Soil Mechanics for Engineers (3)

Two hours of lecture, 3 hours of laboratory. The physical, mechanical and hydraulic properties of cohesive and noncohesive soils. Application of these and other engineering principles to the design of earthen structures common to the forest environment. Fall. Mr. Tully.

Prerequisites: FEG 340; also, CIE 325 concurrently.

Note: A student may not enroll in and receive credit for both FEG 430 and 432.

437. Transportation Systems (4)

Three hours of lecture and 3 hours of laboratory. Interrelationships among natural features, transportation types, design and management objectives to provide the most effective system within the given framework. Basic engineering principles in the planning location, design, construction and maintenance of suitable transportation systems to serve various aspects of forest resource management. Spring. Staff.

Prerequisites: FEG 371 and FEG 432 or equivalents.

442. Hydraulic Operations (2)

Three hours of lecture, 3 hours of laboratory. A 7-week course beginning at midsemester, which studies solutions to hydraulic problems in contemporary construction operational activities. Not open to students having previous credit for FEG 342. Spring. Mr. Tully.

Prerequisites: Senior class standing in engineering or permission of instructor based on a background in hydraulics.

447. Hydrologic Controls (3)
Three hours of lecture and discussion. A continuation of FEG 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring. Mr. Tully.
Prerequisites: FEG 340, FEG 430 or FEG 432, CIE 327 or equivalents as evaluated by the instructor.

460. Measurement Errors and Adjustment Computations (3)
Two hours of lecture, one 3-hour lab each week. The study of measurement errors and the adjustment of observations oriented toward geodesy and photogrammetry. Topics include error definitions, weighted observations, method of least squares, matrix algebra in adjustments, variance-covariance matrix, the error ellipse, the general case of adjustment, and the design of survey networks. Fall or Spring. Mr. Brock.
Prerequisite: Calculus, APM 491 or equivalent.

464. Photogrammetry II (4)
Two hours of lecture, 1 hour of recitation, 3 hours of laboratory each week. General analytic photogrammetry including interior and exterior orientation systems, intersection, space resection and orientation. Correction of photo coordinates for film deformations, lens distortions, atmospheric refraction and earth curvature. Introduction to photogrammetric plotters including the completion of a topographic mapping project. Planning photogrammetric projects, establishing product specifications, cost models, optimal components of photogrammetric systems, design of optimum procedures for the photogrammetric project. Spring. Mr. Brock.
Prerequisite: FEG 363 or equivalent.

474. Geodesy (4)
Three hours of lecture, 3 hours of laboratory. An introduction to Geodesy, including ellipsoidal geodesy, the direct and inverse problems, spherical triangles, conformal maps, astronomic methods of position determination, time, gravity field of earth. Fall. Mr. Bender.
Prerequisite: Calculus through MAT 328 and FEG 371 or equivalent.

477. Survey Systems Design (3)
Three hours of lecture and discussion. A study of the development and present status of Land Surveys, including the U.S. Public Land System, plane coordinate system, land use and resource systems such as New York's LUNR system. The impact of survey upon land use. The design of future systems. Spring. Mr. Bender.

486. Cartographic Surveying (3)
One hour of lecture and 6 hours of field or laboratory exercise each week. Lecture topics will include earth ellipsoid, state plane coordinates, position and azimuth determination, parametric equations of ellipsoid, data reduction techniques, field techniques and specifications and design of control surveys. A topographic mapping project will be planned and the necessary ground control established. Fall. Staff.
Prerequisite: FEG 371 and FEG 363 or equivalent.

489. Forest Engineering Planning (4)
Three hours of lecture and 3 hours of laboratory. A synthesis of the fundamental areas of forest engineering in the planning of the physical development of the forest resources. Specific design studies will be made emphasizing the interrelationship of man, forest resources and their multiple services. These studies will lead to the development and application of planning to simulated realistic conditions. Spring. Staff.

497. Undergraduate Seminar (1)
Literature surveys and seminars on topics of Forest Engineering interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring. Staff.

498. Research Problem in Forest Engineering **(1-3)**
Independent research in topics in Forest Engineering for the highly motivated undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring. Staff.
Prerequisite: Consent of instructor.

FEN—ENTOMOLOGY (FOREST ENTOMOLOGY)

300. Principles of Forest Entomology **(2)**
Elements of insect classification, living requirements and control manipulations that are prerequisite, with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, 3 hours of laboratory field work. Spring. Mr. Allen.

350. Elements of Forest Entomology **(3)**
Two hours of lecture, 3 hours of laboratory/field work. General classification of insects, morphology, physiology, ecology behavior and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall. Mr. Simeone.
Prerequisites: FBO 100 and FZO 100.

402. Forest and Shade Tree Entomology **(3)**
Two hours of lecture, 3 hours of laboratory/field trip. Important forest and shade tree insects; detection, evaluation, prevention and control of their damage; their relation to silviculture and management of forests and shade trees. Spring. Mr. Lanier.
Prerequisite: FEN 350 or FEN 300.

404. Wood Deterioration by Insects **(3)**
Three hours of lecture, discussion and demonstration. Biology, identification, ecology of insect and wood interrelations; prevention of injury and control of insects injurious to forest products and wood in use. Spring. Mr. Simeone.
Prerequisite: FEN 350, FEN 300 or consent of instructor.

432. Insects and Site Planning **(1)**
Three hours of lecture per week for 4 weeks. An introduction to insect pests of shade trees; other woody ornamentals, wood structures and man; cultural methods for dealing with insect problems. (No credit for students who have already taken FEN 300, FEN 350, or who are Biology majors.) Fall. Mr. Allen and Staff.

450. Forest and Aquatic Insects **(2)**
The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer (4-week period). Cranberry Lake Field Biology Station. Mr. Lanier.
Prerequisites: Background in botany, zoology, systematics and ecology.

451. Pest Management—Theory and Practice **(2)**
Two hours of lecture for 9 weeks; then one lecture hour and one 3-hour laboratory for 4 weeks. A review of the history and governmental policy of pest management, as well as basic instruction in theory and practicum. Spring.

452. Principles of Chemical Control **(3)**
Two hours of lecture; one 3-hour laboratory. A study of the chemistry, toxicology, handling and application of chemicals used to manage pest populations. A primer for the State Pesticide Application examinations. Fall.
Prerequisite: FEN 451

460. Insect Behavior and Ecology (2)
Descriptive, comparative and experimental behavior of aquatic and terrestrial insect species of the Cranberry Lake region. Field project, involving field study and paper required. Ecology of forest insects and field techniques used in their study. Emphasis on functional roles played by insects in forest ecosystems. Summer (4-week period), Cranberry Lake Field Biology Station.
Prerequisite: Background in introductory biology and ecology..

490. Medical Entomology (3)
Two hours of lecture, 3 hours of laboratory. Study of arthropods affecting man, domestic animals and wildlife with emphasis on their biology, control and relationship to vertebrate disease. Spring. Mr. Morris.
Prerequisite: A beginning course in biology, entomology, zoology or consent of instructor.

560. Environmental Toxicology of Insecticides (2)
Two hours of lecture. Basis of action of insecticides in living systems, behavior of insecticides and microtoxicants in environment, interaction of insecticides and biological systems. Fall. Mr. Nakatsugawa.
Prerequisite: FBL 330 or equivalent course in physiology or biochemistry.

580. Insect Morphology (3)
Two hours of lecture, 3 hours of laboratory. A comparative study of the external morphology of insects emphasizing evolutionary trends, especially modifications of homologous structures. Topics of special importance include intersegmental relationships, feeding, sensory mechanisms, locomotion and reproduction. Spring. Mr. Kurczewski.
Prerequisite: FEN 350.

FZO—ZOOLOGY (FOREST ZOOLOGY)

100. General Zoology (4)
Prerequisite to all other courses in Forest Zoology. An autotutorial course with 2 hours of lecture and recitation, 4 hours in the learning center. A brief survey of major phyla with emphasis on morphology, taxonomy, evolution and ecology followed by an introduction to the process of maintenance, perpetuation and adaptation by animal species. The importance of other animals to man and the ecosystem is emphasized. Spring. Mr. Van Druff.

200. Wildlife Conservation (3)
Two hours of lecture, 1 hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not designed for students concentrating in the area of Forest Wildlife Management. Fall. Mr. Payne.
Prerequisite: One semester of biological science.

313. Biology of Birds and Mammals (3)
A course surveying the taxonomy, anatomical-behavioral-physiological adaptations and natural history of birds and mammals. Techniques for the field study of a vertebrate species will be discussed. Fall. Mr. Van Druff.

352. Wildlife Ecology (3)
Two hours of lecture, 3 hours of laboratory. A study of the principles governing forest and range wildlife and of the biological mechanisms involved. Spring.
Prerequisite: FBL 320 or permission of instructor.

381. Vertebrate Anatomy, Histology and Physiology I (4)
Three hours of lecture, 3 hours of laboratory. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on the skeletal, muscle, nerve and endocrine systems. Fall. Mr. Hartenstein.
Prerequisite: General zoology or general biology.

382. Vertebrate Anatomy, Histology and Physiology II (3)
Three hours of lecture. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on digestion, metabolism, nutrition, circulation, respiration, excretion and body defense and destructive systems. Spring. Mr. Hartenstein.
Prerequisite: FZO 381 or some other course in anatomy.

383. Vertebrate Anatomy, Histology and Physiology III (1)
Three hours of laboratory. Macroanatomy, microanatomy and physiology of the digestive, metabolic, respiratory, circulatory, urogenital and immunological systems of vertebrates. Spring. Mr. Hartenstein.
Prerequisite: FZO 381, Vertebrate Anatomy, Histology and Physiology I or FZO 382, Vertebrate Anatomy, Histology and Physiology II.

411. Invertebrate Zoology (3)
Two hours of lecture, 3 hours of laboratory. Structure, classification and evolution of invertebrates. Emphasis on role of specific invertebrates in their natural habitat. Fall. Mr. Mitchell.

416. Ichthyology (3)
Two hours of lecture, 3 hours of laboratory. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring. Mr. Werner.

423. Microcommunity Ecology (2)
Two full days a week for 4 weeks. Study of terrestrial invertebrate microcommunities; descriptive and comparative assay of microhabitats incorporating experimental and field techniques. Summer Session I, Cranberry Lake Biological Station. Mr. Dindal, College of Environmental Science and Forestry.
Prerequisites: General biology, general ecology; invertebrate zoology is recommended.

424. Vertebrate Ecology (2)
Two full days a week for 4 weeks. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics and ecological role of vertebrates; standard field and laboratory techniques. Summer Session II, Cranberry Lake Biological Station. Staff, SUNYA.
Prerequisite: 12 hours of biology.

426. Ecology of Adirondack Fishes (2)
Cranberry Lake Biological Station, Session II, every third summer. Half time for 4 weeks. Study of the ecology of fishes, with detailed individual investigation of the ecology of Adirondack fishes. Mr. Werner.
Prerequisite: FZO 416.

427. Field Ornithology (2)
Two full days per week for 4 weeks. Field study of the ecology, distribution and behavior of birds of the Adirondack region. Techniques used in conducting field studies in avian biology will be emphasized. Summer Session A, Cranberry Lake Biological Station. Staff, SUNY at Albany.

440. Fishery Biology (3)
Two hours of lecture, 3 hours of laboratory. Principles and techniques of handling fisheries resources in freshwater environments. Fall. Alternate even years. Mr. Ringler.
Prerequisites: FZO 525 and FZO 416 or permission of instructor.

456. Wildlife Ecology and Management I (3)
Two hours of lecture, 3 hours of laboratory. A study of the ecological principles governing wild animal populations and the relationship of these to manipulation of said populations. Spring. Mr. Chambers.
Pre- or corequisites: FBL 320 and LIB 300.

457. Wildlife Ecology and Management II (3)
Two hours of lecture, 3 hours of laboratory. Occasional day-long field trips. A study of wildlife management techniques, management schemes and programs. Fall. Mr. Chambers.
Prerequisites: FZO 456.

470. Principles of Animal Behavior (3)
Three hours of lecture per week. A study of the basic principles of animal behavior, stressing exogenous and endogenous mechanisms of control. Fall. Mr. Price.
Prerequisite: General zoology.

475. Behavioral Ecology (2)
Cranberry Lake Biological Station. Session I. Half time for 4 weeks. Study of the behavioral adaptations of animals to their environment. Emphasis will be placed on animal orientation and social behavior. Habitat selection and interspecific interactions will also be considered. Mr. Price.
Prerequisites: General biology and general ecology.
Note: Credit may not be received for both FZO 475 and FZO 470.

520. Terrestrial Community Ecology (3)
Two hours of lecture, 3 hours of laboratory. Relations of terrestrial animals to their physical, chemical and biological environment. Emphasis on community principles, succession and terrestrial adaptations. Fall. Mr. Dindal.
Prerequisite: A course in basic ecology.

525a. Physical and Chemical Limnology (1)
Modular format, 2 hours of lecture/week for first 7 weeks of fall semester. An introduction to the physics and chemistry of inland waters with particular emphasis on lakes. Fall. Mr. Werner.
Prerequisites: Junior standing, an introductory physics course and an introductory chemistry course.

525b. Introduction to Biological Limnology (1)
Modular format. Two hours of lecture/week for last 7 weeks of fall semester. An introduction to the biology of inland waters. Particular emphasis is placed on the aquatic environment as a habitat and the effect of changes in this environment on the structure and function of the biological communities contained therein. Fall. Mr. Werner.
Prerequisites: FZO 525a.

525c. Limnology Laboratory (1)
One laboratory or field trip per week. An introduction to limnology techniques and the taxonomy of aquatic organisms. Field trips to local aquatic habitats. FZO 525a and FZO 525b must be taken concurrently or previously. Fall. Mr. Werner.

GFO—GENERAL FORESTRY

032. Orientation (0)
One hour of lecture and discussion per week designed to introduce the freshman student to the College and its academic and social environs. Fall. Mr. Payne and Staff.

GRA—GRAPHICS (LANDSCAPE ARCHITECTURE)

(See also courses listed under EIN and LSA.)

181. Graphics I (2)
Six hours of studio per week. Two 3-hour drafting room periods. Elements of perspective, isometric, oblique and orthographic projection. Practical applications of these principles in machine and architectural drawing, including piping, electrical and plant layouts. Spring.

182. Art Media I (1)
Three hours of studio per week. Studios, group instruction and demonstrations, individual critiques, sketching and drawing from model, from still life and landscape drawing. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Fall.

183. Art Media II (1)
Three hours of studio per week. Studio assignments, group instruction and demonstrations, individual critiques, sketching and drawing from model, from still life and landscape drawings. Field trips. Primary emphasis on "form description" drawing skills. Also taught: visual perspective, pictorial composition and techniques in various black and white media. Spring.

280. Technical Drawing (1)
One 3-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in freehand and instrument drawing. Fall.

284. Art Media III (1)
Three hours of studio per week. Studios, field trips, group instruction, criticism and demonstration, painting in oil, watercolor and acrylics. A studio painting course in oil, watercolor or acrylics to familiarize and develop color media skills and painting expressiveness. Fall.
Prerequisite: GRA 182 or 183 or permission of instructor.

285. Art Media IV (1)
Three hours of studio per week. Laboratory-Studios, field trips, group instruction, criticism and demonstration; painting, sculpture and other three-dimensional media. A studio course in various three-dimensional art forms and painting. Emphasis on individual experimentation and self-expression. Spatial relationships will be studied through the use of the third dimension, both from standpoint of "enclosure" and "setting." Spring.
Prerequisite: GRA 182 or 183 or permission of instructor.

482. Advanced Media (1-3)
Three hours of studio per week. Discussions, demonstrations, critiques and individual study. Study oriented toward perception and self-expression, use and possibilities of various media, as selected by student and instructor. Fall and Spring.
Prerequisite: Prior art media training or experience and permission of instructor.

LIB—LIBRARY (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSE)

300. Library Research (1)
Two hours of lecture or discussion, 1 hour of laboratory per week in the library, during the first 5 weeks of the semester. Introduction for students at all levels to basic library materials and the research process leading to preparation for a bibliography. Fall and Spring. Staff.

LSA—LANDSCAPE ARCHITECTURE

(See also courses listed under EIN and GRA.)

310. Elements of Landscape Architecture and Environmental Design for Architecture Students (2)
Two hours of lectures, discussions and assigned readings per week. A successive presentation of a landscape architectural philosophy toward the physical environment and environmental design. Presentation of operational systems involved in the physical environment from technical, functional and symbolic points of view. Fall.
Prerequisite: Enrollment in School of Architecture or permission of instructor.

311. Elements of Landscape Architectural Practice for Architecture Students (2)
Two hours of lectures, problems and assigned readings per week. An introduction to the design elements of Landscape Architecture in contemporary application and practice. Spring.
Prerequisites: LSA 310; enrollment in School of Architecture or permission of instructor.

320. Introduction to Landscape Architecture and Design Theory (2)
Two hours of lecture per week. Lecture and class discussion, notebooks, reports, assigned text reading and assigned reserve shelf reading, research reading, weekly quizzes and exams, slides, movies and field trips. Course describes the field of Landscape Architecture, its philosophy, design theory and interdisciplinary relationships. Fall.
Prerequisite: 3rd year status or permission of instructor.

326. Landscape Design Studio I (4)
Nine hours of laboratory and 1 hour of lecture per week. Lectures, studio problems, criticism, quizzes, exams, reports, composing and rendering two- and three-dimensional techniques used to simulate the physical environment. Course presents a theory of abstract design and offers studio time in which to apply theory to graphic problems. Topics presented are the mechanics and terminology of design and the simulation of natural and man-made environments. Fall.

327. Landscape Design Studio II (4)
One hour of lecture, 9 hours of studio per week. Studio assignments, drafting, readings, discussions and field trips. An introduction to the visual-mental concepts basic to landscape architectural design. Various abstract and realistic problems to graphically illustrate elements of the physical environment and their effect upon man. Special attention to the spatial context of these elements and spatial sequences characteristic of the natural and man-made environments. Spring. (Student field trip expense $125—$150.)
Prerequisites: LSA 326, 320 or permission of instructor.

343. Structural Materials and Elements (3)
Three hours of lectures, problems and assigned readings per week. Study of the physical properties of materials and structural elements commonly used in landscape architecture. Topics include elementary statics and strength of materials, wood, metal, plastics, concrete, masonry, retaining walls, dams, foundations. Spring.

345. Elements of Site Engineering (3)
Two hours of lectures and 3 hours of studio per week. Lectures, problems, drafting, modeling and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles, layout plans and earthwork quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring.
Prerequisites: FEG 271 and EIN 311.

422. Landscape Design Studio III (4)
Twelve hours of studio per week. Studio problems, research, drafting and field trips. The processes and methods of design considerations of variances upon the natural physical environment, ranging from broad regional areas to specific site concerns. Fall.
Prerequisites: LSA 320, 326 and 327 or permission of instructor.

423. Landscape Design Studio IV (4)
Twelve hours of studio per week. Studio problems, research and drafting. Interaction of cultural influences with the physical environment, with attention focusing on the resulting forms. Observations and illustrations of people and places as inputs into the design process. Spring.
Prerequisite: LSA 422 or permission of instructor.

425. Orientation for Experiential Studio (3)
Three hours of lecture and recitation. Investigation and documentation of an area of specialty, discussion, readings and research. Fall and Spring.
Prerequisite: Permission of instructor.

432. Plant Materials Culture **(1)**
Three lectures per week for 5 weeks. Grasses, arboriculture, propagation, transplanting, planting plans and specifications. Fall.
Prerequisite: Permission of instructor.

440. Site Development Systems **(3)**
Three hours of lectures, problems and assigned reading per week. Study of various engineering systems as they relate to the design and development of land. Topics include pedestrian ways, utilities (water, solid waste, sewage, electric, gas), road location and design, shore protection, swimming pools. Fall.
Prerequisite: Surveying.

490. Social Behavior and the Designed Environment **(3)**
Three hours of class per week. Lectures, readings, discussion and project. An examination of the concepts of individual and social behavior in relation to the physical design of the environment, focusing on perceptual and cognitive evaluations as determinant of spatial meaning. Fall and Spring.

495. Selected Readings in Environmental Studies **(1-3)**
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.
Prerequisite: Permission of instructor.

498. Introductory Research Problem **(1-3)**
Guided study of a selection of problems relating to landscape architecture and environmental design. Emphasis on study procedure and methods employed. Fall and Spring. Staff. Enrollment at periodic intervals throughout the semester.
Prerequisite: Permission of instructor.

522. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Studio problems, research, drafting and field trips. Concentration on complex urban problems. Concern for social and psychological considerations of the individual and large groups of people, their interaction and resultant forms of the environment. Spring.
Prerequisite: Permission of instructor.

524. Experiential Landscape Studio Design **(16)**
Forty-eight hours per week. The articulation of the study proposal established in LSA 425, as approved by faculty, through research, readings, field study with graphic and written documentation and group discussion. Academic study in an off-campus location in an area of landscape architectural significance, as described and delineated in a student-prepared proposal approved by the faculty. Not available for Graduate Credit. Fall or Spring.
Prerequisites: LSA 425 or equivalent and LSA 423 or permission of instructor.

525. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Investigation of a problem in landscape architecture as proposed by the student and conducted in conjunction with faculty advisor. Spring.
Prerequisite: Permission of instructor.

527. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Studio problems, research, reports and field trips. Concentration on regional landscape problems, the techniques of their analysis and derivation of their significance to the practice of landscape design. Spring.
Prerequisite: Permission of instructor.

529. The Major Elements of Environmental Design **(3)**
Lectures, readings, discussions and studios. The course presents an introductory survey of environmental design methods and associated skills and techniques. While studio work is part of the course, no design background is required. Fall.

530. Herbaceous Plant Materials (2)
Two hours of lectures, study problems, assigned readings and field trips per week. Identification, understanding and design use of nonwoody plants. Fall.
Prerequisite: Permission of instructor.

532. Woody Plant Materials (3)
Three hours of lecture per week. Field study, lectures, slide presentations and readings. An elective course providing opportunity for extension of basic knowledge in the identification and design of woody plant materials in professional practice. Fall or Spring.
Prerequisites: LSA 533 and LSA 432 or permission of instructor.

533. Plant Materials (3)
Field trips and discussion. Ornamental woody plant identification. Observation and sketches of outstanding examples of planting design. Three weeks. Summer Session.
Prerequisite: Permission of instructor.

542. Highway Location and Design (3)
Two hours of lecture, 3 hours of studio per week. Lectures, assigned reading, studio projects, field trips. Environmental, engineering and human factors which determine highway location and design, particularly as they relate to landscape architectural concerns. Location, alignment, geometric design, drainage, roadbed construction, pavements, roadside development. Fall or Spring.
Prerequisites: LSA 343 and 440 or permission of instructor.

545. Professional Practice Studio II (2)
Three hours of studio, 1 hour of recitation per week. Studio problems, research, discussion and recitation sessions on the processes and methods of office practice. Emphasis on all aspects of site-development. Spring.
Prerequisite: Permission of instructor.

547. Principles of Professional Practice (2)
Two hours of lecture per week. Lectures, assigned readings, reports, cost estimates, specifications, contracts, professional ethics, registration laws, professional practice. Spring.
Prerequisite: Upperclass standing.

562. Architecture (3)
Two hours of lecture, 3 hours of studio. Discussion and investigation of the principles of architectural design and procedures of architectural practice. Functional building systems coupled with site and program considerations as to their relative impacts on architectural form. Spring.
Prerequisite: Permission of instructor.

595. Selected Reading in Landscape Architecture (1-3)
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions.
Prerequisite: 5th year status or permission of instructor.

597. Landscape Architecture Seminar (3)
Three hours of seminar per week. Discussion of current social, political, cultural and technological problems as to their relationship to the physical environment. Fall and Spring.
Prerequisite: Permission of instructor.

598. Research Problem (1-3)
Independent study of selected areas of environmental interest. Emphasis on a self-disciplined study, development of procedures and techniques to be employed in environ-

mental design and planning. Engagement with specific sites and problems as proposed for study by individual communities. Fall and Spring. Enrollment at periodic intervals throughout the semester.

Prerequisite: Permission of instructor.

MAT—MATHEMATICS (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES)

115. Plane Trigonometry (3)

Three hours of lecture. The course includes: the six trigonometric functions, the radian measure of angles, the variation and graphs of the trigonometric functions, the solution of right triangles and applications, trigonometric identities, trigonometric equations, inverse trigonometric functions, the general triangle complex numbers, logarithms and accuracy of computed results. Fall or Spring. Mr. Green.

116. College Algebra (3)

Three hours of lecture. The course includes a review of the axioms of algebra, the algebraic operations, inequalities, functions and their graphical representation, linear and quadratic functions, determinants, theory of equations, inverse functions, permutations, combinations and probability, the Binomial Theorem, mathematical induction, exponential and logarithmic functions and complex numbers. Fall or Spring. Mr. Green.

PSE—PAPER SCIENCE AND ENGINEERING

300. Introduction to Papermaking (3)

Three hours of lecture. Historical and commercial consideration of the paper industry. Technology of papermaking with emphasis on stock furnish, stock preparation and paper machine operation. Introductory discussions of papermaking materials and formation and reactions of a fibrous web. Fall. Mr. Bambacht.

301. Pulp and Paper Processes (3)

Three hours of lecture. Technological consideration of pulping and bleaching of woody raw material. Includes consideration of wood procurement and preparation, pulping and bleaching processes, pollution abatement and other ancillary operations. Spring. Mr. Gorbatsevich.

Prerequisites: FCH 475 and 476, CHE 332, PSE 300, (or concurrent).

302. Pulp and Paper Processes Laboratory (1)

One 3-hour laboratory. Study and practice in the techniques of laboratory procedures normally encountered in the pulp and paper industry. Laboratory exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring. Mr. Gorbatsevich.

Prerequisite: PSE 301 (or concurrent).

304. Mill Experience (2)

Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Staff.

305. Mill Inspection Report (1)

Inspection trip to representative manufacturers of pulp and paper, papermaking equipment, plastics, chemicals, or related products selected for demonstrating typical plant scale operations. Ultimate emphasis is on manufacture of pulp and paper. Daily discussions. Typewritten report required on termination of trip. Trip expenses are borne by the student. Spring. Staff.

Prerequisites or concurrent: PSE 301, 302 and 370.

370. Principles of Mass and Energy Balance (3)
Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Fall. Mr. Gorbatsevich.
Prerequisites or concurrent: MAT 227, Physics, CHE 346.

371. Fluid Mechanics (2)
Two hours of lecture and/or demonstration. The study of momentum transfer. Flow of liquids and gases in pipelines, ducts and open channels. Newtonian and non-Newtonian flow. Pulp and blower characteristics and selection. Flow measurements and flow system design with economic considerations. Fall. Mr. Turai.
Prerequisites: PHY 211, 212, or equivalent.

372. Heat Transfer (2)
Two hours of lecture and/or demonstration. The study of heat transfer including conduction, convection, radiation and their applications in industry. Heater and heat exchanger design and selection, and industrial evaporation. Spring. Mr. Turai.
Prerequisites: PSE 370, 371 or equivalent.

461. Pulping Technology (3)
One hour of lecture and 6 hours of laboratory. Discussion of pulping and bleaching processes: Effect of chemical and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall. Mr. Gorbatsevich.
Prerequisites: PSE 301, CHE 346 and CHE 356.
Note: A student may not enroll in or receive credit for both PSE 461 and ERE 671.

465. Paper Properties (4)
Three hours of lecture, 3 hours of laboratory and discussion. Evaluation and study of the physical, optical and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results and the ultimate properties desired in the finished paper. Fall. Mr. Bambacht.
Prerequisites: PSE 301, PSE 302.
Note: A student may not enroll in or receive credit for both PSE 465 and ERE 677.

466. Paper Coating and Converting (3)
Two hours of lecture and 3 hours of laboratory. Evaluation and study of various coating materials and processes used by the paper industry. Introduction to polymers and their use in converting operations. Study of materials and equipment used in converting operations, fundamentals and parameters which control their use, effects on final properties of papers. Spring. Mr. Bambacht.
Prerequisites: PSE 465
Note: A student may not enroll in or receive credit for both PSE 466 and ERE 678.

468. Papermaking Processes (3)
One hour of lecture and 6 hours of laboratory. Laboratory study of the papermaking process, with emphasis on operation of the semicommercial Fourdrinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished product and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring. Messrs. Bambacht, Gorbatsevich and Stenuf.
Prerequisites: PSE 461 and PSE 465.

473. Mass Transfer (3)
Three hours of lecture. The study of mass transfer. Humidification, air conditioning, drying, gas adsorption, distillation, leaching, washing, and extraction. Fall. Mr. Stenuf.
Prerequisites: PSE 370, 371, 372 or equivalent.

491. Paper Science and Engineering Project I (1)
Student makes a systematic survey of all available literature on the problem assigned him and incorporates it in a formal, typewritten report. An essential part of this report is a

detailed outline of a research project (PSE 492) which the student proposes to undertake during the next semester. Fall. Staff.
Prerequisites: PSE 300 and 301.

492. Paper Science and Engineering Project II **(3)**
The analysis of a problem, the synthesis of a solution and the basic design of the facilities needed to solve the problem. Laboratory research, field work and consulting as needed in addition to the literature survey completed in PSE 491. Progress reports and a final report and seminar-style presentation. Spring. Staff.
Prerequisite: PSE 491.

496. Special Topics **(1-3)**
Lectures, conferences and discussions. Specialized topics in chemistry, chemical engineering and physics as well as topics pertaining to management as related to the pulp, paper, paperboard and allied industries. Spring and Fall. Staff.

498. Research Problem **(1-4)**
The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique rather than on the results of commercial importance. The information obtained from the literature survey, along with the data developed as a result of the investigation, is to be presented as a technical report. Spring and Fall. Staff.
Prerequisites: PSE 461 and PSE 465.

RMP—RESOURCE MANAGEMENT AND POLICY

587. Environmental Law **(3)**
Three hours of lecture and discussion. Studies in Environmental Law designed for Resource Managers. Review of structure and processes of American Legal System, Constitutional Framework of Environmental Law, The National Environmental Policy Act, legal framework for management of Federal lands, focus on legal aspects of common property resource management, land, water and air. Fall. Mr. Dall.
Prerequisite: Open to undergraduate seniors.

588. The Law of Natural Resource Administration **(3)**
Three hours of lecture and discussion. An introduction to the law concerning the procedures, powers and judicial review of public agencies responsible for the management of natural resources. Topics will include the extent of an agency's rulemaking power and the rights of aggrieved parties to appeal from agency decisions. Spring. Mr. Horn.
Prerequisite: ERM 460 or equivalent course in public administration.

SCE—SCHOOL OF CONTINUING EDUCATION

510. Creative Problem Solving Seminar **(3)**
Three hours of lecture and discussion per week. A course designed to extend the student's understanding and application of creative problem solving processes. One requirement will be to select and carry out an application of the techniques to a particular problem, with consultation and guidance from the instructor. Critique and survey of the literature on creativity, in-depth analysis of the synectics process, and various procedures which have been developed for nurturing creative behavior comprise the essence of the program. Spring and Fall. Mr. Maraviglia.
Prerequisites: Undergraduate degree or permission of instructor.

530. (FEN) Pest Identification, Biology and Management **(3)**
A study of the life history and management practices for pests common to the home, landscape and recreational areas. Suggested for pest control personnel and teachers of primary and secondary science areas. Not open to College of Environmental Science and Forestry students. Summer.
Prerequisite: One course in biology.

576. Special Topics Course: Environmental Education - Processes and Strategies (3)
Lectures, discussions, field problems and structured outdoor laboratory assignments in environmental education processes and strategies for professional educators in elementary and secondary schools who are part-time, nonmatriculated at ESF. Summer.
Prerequisite: Consent of instructor. Not acceptable for credit in graduate programs of the School of Environmental and Resource Management.

596. Special Topics in Resource Management (1-3)
Lectures, field exercises, guided readings and discussions, in a shortcourse format. The study of recent developments and applications in resource management. Illustrative topics include management of forest stands, resource economics, land planning, or recreation planning and site development. Summer. Not acceptable for credit in graduate programs of the School of Environmental and Resource Management
Prerequisite: Permission of instructor.

SIL—SILVICULTURE

553. Energy Exchange at the Earth's Surface (3)
Two hours lecture and 3 hours of laboratory. A comprehensive study of the physical processes taking place in the lowest layer of the atmosphere. Primary emphasis on the turbulent transfer of heat, momentum and water vapor and the expression of these fluxes in the microclimate. Spring. Mr. Herrington.
Prerequisite: ERM 452, physics and calculus.

WPE—WOOD PRODUCTS ENGINEERING

300. Properties of Wood for Designers (2)
Two hours of lecture. An introduction to the basic structure and properties of wood for the designer. Discussion of the effects of wood structure and properties on practical wood-working techniques. Fall and Spring. Mr. Kyanka.

320. Polymeric Adhesives and Coatings (2)
Two hours of lecture a week. An introduction to organic adhesives and coatings for the purpose of being able to specify proper materials for particular applications. Knowledge acquired will allow the individual to understand product literature and specifications. Wood product systems are discussed in detail, but the principles involved are easily transferred to other substrate systems. A knowledge of chemistry is not required. Spring. Mr. L. Smith.
Prerequisites: Junior standing.

321. Adhesives and Coatings Laboratory (1)
Three hours of laboratory a week. Laboratory experiments to identify materials, methods of application and methods of evaluation of adhesives and coatings normally used in the wood industry. Spring. Mr. L. Smith.
Prerequisites: WPE 320 (may be concurrent) or permission of instructor.

322. Mechanical Processing (3)
Two hours of lecture and 3 hours of laboratory. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall. Mr. Moore.

326. Fluid Treatments (2)
Two hours of lecture. An introduction to wood-moisture relationships, wood permeability and pressure treatments, thermal conductivity, water-vapor movement and drying and fire retardancy. The flow of fluids, heat and water vapor are treated as analogous phenomena and are related to the cellular structure of wood. Unsteady-state flow of gases, heat and water vapor are introduced. Spring. Mr. Siau.
Prerequisites: Junior status.

327. Fluid Treatments Laboratory (1)
Three hours of laboratory a week. Laboratory studies in relative humidity measurement, wood-moisture relationships, the relationship between permeability and treatability, wood-preservative treatments, wood drying and flame testing. Spring. Mr. Siau.
Prerequisites: Junior status, concurrently with WPE 326.

386. Elementary Wood Technology (2)
One hour of lecture and 3 hours of laboratory. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U.S. timber by gross feature. Spring. Mr. de Zeeuw and Staff.

387. Wood Structure and Properties (2)
Two hours of lecture. Structure of wood and its relation to physical properties and uses. The normal variability of wood, abnormal growth, defects, deterioration of wood and their influence on properties and uses. Fall. Mr. de Zeeuw.
Prerequisite: FBO 100 or equivalent is recommended.

388. Wood and Fiber Identification Laboratory (2)
Six hours of laboratory. Wood and papermaking fiber identification using both gross and microscopic features. Fall. Mr. de Zeeuw.
Prerequisite: WPE 387 (may be concurrent).

389. Wood Identification Laboratory (1)
Three hours of laboratory. Identification of principal commercial timbers of United States on gross characteristics. Spring. Mr. de Zeeuw.
Prerequisite: WPE 387.

390. Field Trip (2)
Two weeks supervised study and reporting of representative wood products industries. Spring. Staff. Required of all students in WPE. Estimated individual expenses are $100—$150 while on the trip.

400. Introduction to Forest Products (2)
Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. Fall.

404. Design of Wood Structural Elements (3)
Lectures plus laboratory exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall. Mr. Kyanka.
Prerequisite: ERE 362.

422. Composite Materials (3)
Two hours of lecture and 3 hours of laboratory. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites and extruded and molded products. Fall. Mr. R. Moore.
Prerequisites: WPE 320 and WPE 326. Concurrent or prior registration in WPE 362 or 302.

442. Light Construction (3)
Two hours of lecture, 2 hours of discussion, problems and practice. Elements of light frame construction, blue print reading and estimating. Fall and Spring. Mr. G. Smith.

444. Materials Marketing (3)
Three hours of lecture and discussion. Marketing functions, agencies and management in the wood products and related industries. Principles of salesmanship and their application. Spring. Mr. G. Smith.

450. Construction Equipment (3)
Three hours of lecture. Principles of selection, operation and maintenance of construction equipment. Primary types of site preparation, handling and assembly devices and

their efficient utilization will be examined. Spring.Mr. Kyanka.
Prerequisite: Senior standing.

454. Construction Management (3)
Two hours of lecture and 3 hours of laboratory. Conception, management and control of the construction processes with emphasis on specifications, costs, legal boundaries, erection planning and control, inspection and supervision. Spring.
Prerequisite: Senior standing.

470. Production Systems I: Analysis (3)
Two hours of lecture and 3 hours of laboratory. Elements of system engineering. Analysis of performance characteristics of integrated production systems. Analysis of long-range vs. short-range system planning. A comprehensive lab problem is commenced which deals with the analysis prerequisite to the establishment of a manufacturing plant in a wood-processing industry. Fall.
Prerequisite: Senior status and INE 548, APM 491, and concurrent registration in INE 575 or equivalent.

472. Production Systems II: Synthesis (3)
Two hours of lecture and 3 hours of laboratory. Organization for production. Manufacturing engineering and production planning and control. Plant layout and materials handling. A comprehensive problem of production system synthesis is carried out in a succession of lab exercises oriented toward a wood-processing industry. Spring.
Prerequisite: WPE 470 or equivalent.

497. Senior Seminar for Wood Products Engineering Majors (2)
Discussion and assigned reports in current problems and new developments in wood products engineering. Fall. Staff.

498. Research or Design Problem (1-3)
Conferences, library, laboratory and/or field research on a specific problem in wood products engineering. Typewritten report (original and one copy) required. Fall and/or Spring. Staff.
Prerequisite: Consent of instructor.

SYRACUSE UNIVERSITY COURSES REQUIRED IN COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY CURRICULA

ACC—ACCOUNTING

204. Financial Accounting Systems (3)
Fundamentals of financial accounting systems are described and applied to business organizations. Topics include: the recording process, income determination, asset valuation, financial statements, funds statements, ratio analysis and use of financial accounting information for decisionmaking.

252. Introduction to Managerial Accounting (3)
Fundamentals of accounting described and applied to business organizations. Topics include: the recording process, income determination, asset valuation, financial statement analysis, business equities, cost accumulation and control, and the use of accounting for management and investors.
Prerequisite: Sophomore standing.

LPP—LAW AND PUBLIC POLICY

355. Introduction to the Legal System (3)
The law as an instrument of social control. An understanding of peoples' rights and duties is developed through a study of basic legal concepts, procedures and reasoning.
Prerequisite: Junior standing or permission of instructor.

557. The Law of Commercial Transactions (3)
The legal aspects of commercial transactions are studied, with special attention given to contracts, the sale of goods, the use of commercial paper, the treatment of security and the protection of consumers.
Prerequisite: LPP 355 or permission of instructor.

CHE—CHEMISTRY

106, 116. General Chemistry Lecture (3)
Fundamental principles and laws underlying chemical action; states of matter, atomic and molecular structure, chemical bonding, stoichiometry, properties of solutions, chemical equilibrium and descriptive chemistry. CHE 107 and 117 or 129 and 139 must be taken concurrently.

107, 117. General Chemistry Laboratory (1)
Open to students in CHE 109 and 119 or CHE 106 and 116. An experimental study of basic principles and techniques of chemistry. The states of matter, determination of formulas and molecular weights, simple volumetric and gravimetric analysis, heats of reaction. Studies of equilibrium, rates of reactions and qualitative analysis.

332. Quantitative Analysis (2)
The fundamentals of gravimetric and volumetric analysis. Two lectures per week. CHE 333 must be taken concurrently; it is recommended that CHE 326 also be taken concurrently.
Prerequisite: CHE 285.

333. Quantitative Analysis Laboratory (1)
Laboratory to accompany CHE 332.

346. Physical Chemistry I (3)
The properties of gases, liquids and solids. Elementary thermodynamics and chemical equilibrium. Three lectures per week.
Prerequisites: One year of college physics and some familiarity with differential and integral calculus.

356. Physical Chemistry II (3)
Solutions, electrochemistry, kinetics and elementary statistical thermodynamics. Three lectures per week.
Prerequisite: CHE 346.

357. Physical Chemistry Lab (1)
Experimental techniques of physical chemistry and error analysis. Measurement of molecular weights, reaction rates, heats of reaction, equilibrium constants, spectroscopy One laboratory period. CHE 346 and 356 are either prerequisites or corequisites.

CIE—CIVIL ENGINEERING

325. Mechanics of Deformable Bodies (3)
Theories of stress, deformation and stability of elastic and nonelastic bodies subjected to various force systems.
Prerequisites: MEE 225 and MAT 398 (the latter may be taken concurrently).

326. Engineering Materials (3)
Study of the atomic, molecular and crystalline structures of solid engineering materials. The explanation and interpretation of physical, mechanical and electrical properties of materials based on these structures. Two 1-hour lectures and one 2-hour laboratory per week.
Prerequisite: CIE 325 or permission of instructor.

327. Principles of Fluid Mechanics (4)
Dimensional analysis; hydrostatics; equations of motion; Bernoulli's equation; Euler's momentum theorem; one-dimensional analysis; velocity potential; stream function; laminar viscous flow; Reynolds' stresses; isentropic flow.
Prerequisites: MAT 398, MEE 226.

437. Soil Mechanics and Foundations I (3)
Study of the formation and composition of soil. Concepts of soil mechanics, including hydraulic and mechanical properties. Two lectures and one laboratory per week.
Prerequisites: CIE 325, 327.

ECE—ELECTRICAL AND COMPUTER ENGINEERING

221. Electrical Science I (3)
Introduction to electric and magnetic field and circuit concepts; resistance and diode circuits; network reduction using techniques like Thevenin's theorem; elements of transient and steady-state circuit analysis.
Prerequisites: MAT 295, 296, PHY 103, 104.

222. Electrical Science II (3)
Mathematical description of electric and magnetic fields; elements of electromechanical conversion; analysis and design of simple electronic circuits, with emphasis on semiconductor diodes and transistors.

FIN FINANCE

355. Money and Banking (3)
Introduction to general principles of money and banking, including organization and control of the banking system, commercial bank functions and operations, organization and operation of the Federal Reserve System, and monetary theory and policy.
Prerequisite: ECO 205.

EGR—ENGINEERING

126. Introduction to Computer Methods in Engineering (3)
Operation and programming of electronic computers, with emphasis on time-sharing digital systems using the APL language. Problem formulation and modeling for computer solution. Application to introductory engineering problems.

GOL—GEOLOGY

105. Earth Science (3)
An introduction to earth science providing an integrated approach to the study of the solid earth, continental surfaces, atmosphere and oceans. Lectures, no laboratory; not for geology majors.

IOR—INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH

548. Engineering Economic Analysis (3)
Deals with the economic factors of engineering decisions: the "will it pay?" aspect of engineering. Study of comparisons between old and alternative proposed economic plans from an engineering economy viewpoint involving consideration of management, materials, design, machine selection.
Prerequisite: Junior standing.

575. Industrial Methods and Systems Engineering (3)
Study of man-machine relationships, workplace design, process selection with emphasis on production subsystems and automation. Special topics include measurement of human and machine activity, flow analysis, line balancing, feedback systems and control theory.
Prerequisites: IOR 525 or concurrent registration, or equivalent.

MAR—MARKETING MANAGEMENT

355. Marketing and Society (3)
An analytical study of marketing as a major business function and a social process. Introduces analysis of market forces; marketing opportunities; determination of price, product, distribution, promotion and organization policies required to control and fulfill planned marketing programs.

MAT—MATHEMATICS

125. Elementary Analytic Geometry (3)
A study of geometry by algebraic means with emphasis on representation of lines, conics and other curves by equations; polar coordinates; parametric equations; solid analytic geometry.
Prerequisites: MAT 015 and 016 or equivalent.

226. Differential Calculus (3)
Limits; derivatives of algebraic and transcendental functions; applications to maxima and minima problems, curve tracing and rates of change; differentials.
Prerequisite: MAT 125.

227. Integral Calculus (3)
Law of the mean, definite and indefinite integrals, techniques of integration, geometric and physical applications.
Prerequisite: MAT 226.

295. Analytic Geometry and Calculus I (3)
Plane point sets: relations, functions, and their graphs; basic concepts of lines, circles, inequalities. Limits, continuity, derivatives.
Prerequisites: Two years algebra, one year plane geometry, one-half year trigonometry.

296. Calculus II (3)
Mean value theorem, differentials, applications of derivatives, conic sections; definite integrals, transcendental functions; methods of integration.
Prerequisite: MAT 295.

397. Calculus III (3 or VC)
Related rates, parametric representation, arc length, Taylor's formula, L'Hopital rules, asymptotes, generalized integrals, line integrals, and Green's theorem. Sequences and series, approximations.
Prerequisite: MAT 296.

398. Calculus IV (3 or VC)
Analytic geometry of three dimensions, functions of more than one variable, multiple integrals, partial differentiation, physical applications.
Prerequisite: MAT 397.

585. Differential Equations and Matrix Algebra for Engineers (3)
Solution of ordinary differential equations, including series methods; vector spaces, matrix algebra, rank, solution of linear systems, eigenvalues and eigenvectors. Cannot be taken for credit before or after MAT 584 or 531.
Prerequisites: MAT 328 or 398.

MEE—MECHANICAL AND AEROSPACE ENGINEERING

225. Statics and Dynamics (4)
Fundamental concepts; vector algebra, forces, moments, equivalent systems; free body diagrams. Statics and dynamics of particles. Energy and momentum methods.

351. Fundamentals of Thermodynamics I (3)
Basic concepts and methods in engineering thermodynamics. The laws of thermodynamics and their implications in mechanical, chemical, electrical and magnetic systems. Properties of solids, liquids and gases, including perfect gases and mixtures thereof.

PHY—PHYSICS

103. and 104. General Physics (4)
Basic course dealing with the fundamental principles of physics. Lectures with demonstrations, discussion, recitations and laboratory. The first semester covers the fields of mechanics, heat and sound; the second semester, electricity and light.
Prerequisite: Course in trigonometry, or trigonometry as a parallel course.

211/212. General Physics for Science Students, I, II (4)
An advanced level introductory course that makes use of calculus methods. First semester: mechanics, heat and sound. Second semester: electricity and magnetism, light and some atomic physics. Lectures, recitations and laboratory.
Corequisite: MAT 295 or equivalent.

361. Introduction to Modern Physics (3)
Recent developments, including atomic theory, quantum theory, electronic structure of the nucleus.
Prerequisites: PHY 103 and 104 or equivalent.

SPC—PUBLIC SPEAKING

215. Public Speaking (3)

Application of the principles of informing, interesting and motivating an audience; emphasis upon selection, organization and development of ideas. Students deliver, listen to and criticize expository and persuasive speeches. No prerequisite.

Summer Attendance

A wide array of Syracuse University courses at the undergraduate and graduate levels is available to College of Environmental Science and Forestry students. Syracuse University courses taken as an integral part of the student's planned program and *approved by his faculty advisor* may be taken without additional cost to the student during the regular academic year.

Syracuse University courses are also available, at the student's expense, during the Syracuse University summer sessions. Research problems, theses, and special courses regularly available at the College may also be taken during the summer sessions.

Summer session tuition charges at the College for New York State residents are $25.00 for undergraduate lower level students, $30.00 for undergraduate upper level students, and $58.50 for graduate level students, per credit. Tuition charges for non-residents of New York State are correspondingly $40.00, $50.00 and $75.00 per credit. A College fee will be charged at the rate of eighty five cents per credit hour.

SUMMER FIELD PROGRAMS

Program in Field Forestry

Charles Lathrop Pack Demonstration Forest
Warrensburg Campus
Warrensburg, New York

A five-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted twice each summer at the Pack Demonstration Forest near Warrensburg, New York. These sessions are coordinated with the Syracuse University summer sessions, permitting students to attend an on-campus session and a field session in the same summer. The courses presented in the field forestry

program are listed in both the forest biology and resources management curricula sections. Room, board, and fee charges approximating $250 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the junior year. *Transfer students* planning to enroll in either the resources management or forest biology curriculum should write to the Coordinator, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the field forestry program is required of students in resource management prior to the fall term of their junior year. Students in forest biology are also required to attend either this program or the program at Cranberry Lake Biological Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

Program in Environmental Biology

Cranberry Lake Biological Station
Charles Lathrop Pack Demonstration Forest
Cranberry Lake Campus
Cranberry Lake, New York

The Summer Program in Environmental Biology provides graduate students and undergraduate biology majors with the opportunity to continue their studies and research at a lake-and-forest field station in the summer. Qualified students from other institutions are welcome and are encouraged to attend.

Cranberry Lake and its environs are ideally suited for an advanced biology summer program. The surrounding topography is rolling hill and lake country dotted with numerous small ponds, closed bogs, and stream drainages. The lake itself is the third largest body of water in the Adirondacks. Because eighty percent of the shoreline is in State ownership, the lake remains relatively unspoiled by recreational developments and is free of pollution problems. Much of the original forest cover in the region was harvested years ago; today a rich variety of community types occupy those sites as the vegetation reverts again to the natural forest condition. The remaining virgin forests also provide the student with many examples of stable forests, each type reflecting the particular environmental conditions controlling forest development. A wealth of wildlife parallels the variety of cover types over the region. The area is centrally located providing easy access to a wide range of additional ecosystems ranging from bog to alpine types.

Facilities include four classroom-laboratories; dining facilities capable of serving 120; faculty quarters and cabins; an administration building; 12 cabins housing 6-8 students each; a recreation hall; and several smaller, supporting buildings.

The ten-week program extends from mid-June into mid-August and is divided into two five-week sessions. Courses are taught in blocks of two-

day units, permitting concentrated study without hourly interruptions. These courses are designed to emphasize and effectively utilize the unique nature of this Adirondack setting and include the ecology of plants, invertebrate and vertebrate animals, in such diverse offerings as aquatic ecology, bryophyte ecology, insect ecology, vertebrate ecology, micro-community ecology, ornithology, forest communities, ecological measurements, forest pathology and limnology. Room, board and fee charges are approximately $50.00 per week. The offerings vary from year to year, and interested students should contact the Director, Cranberry Lake Biological Station, State University of New York College of Environmental Science and Forestry, Syracuse, New York 13210 for additional information.

Forest Technician Program

THE PROGRAM

In 1912, some 1,800 acres of land in the Adirondack Mountains were donated as a site for the development of a Ranger School by the College. Since that time, the forest technician program has trained more than 2,800 graduates, most of whom are now working in a variety of nationwide forest activities, and has earned the School a national reputation for excellence.

The 2-year curriculum trains students as forest technicians. The degree of Associate in Applied Science in Forest Technology (A.A.S.) is awarded upon the successful completion of the curriculum. The objectives of the curriculum are to provide students with a knowledge of the field practices of forestry as related to forestry managerial needs; the ability to work and communicate effectively with professional and paraprofessional forestry personnel; and an understanding of the sciences and practices of forestry with some emphasis on ecological applications.

Graduates are generally classified as forest technicians or forestry aides in initial employment positions. Forestry agencies and wood-using industries employ forest technicians as an important part of their forest management teams, usually as the "men on the ground" who plan and execute the field practice of forestry.

Since this curriculum is structured as a terminal, 2-year program at the paraprofessional level, students interested in a professional degree in forestry are advised to enroll initially in one of the College's 4-year undergraduate programs.

The freshman year of the forest technology curriculum consists primarily of general studies' courses which may be taken on the Syracuse Campus or at accredited community and junior colleges and agricultural and technical institutes.

The second year of the curriculum is taken at the College's Ranger School on the Wanakena Campus. Presented in a varied forest environment, the curriculum's emphasis is on practical field training and on the relationships between forest technology and managerial needs. Fifty percent of the studies is devoted to field exercises, most of which are held in the School's forest. This rolling belt of managed forest, containing both hardwood and coniferous species, covers an area some 3½ miles long with widths varying from 6/10ths of a mile to 2¼ miles. On two sides the forest is bounded by State Forest Preserve Lands. The forest is

also adjacent to an area of several square miles of virgin timber within the Adirondack Forest Preserve. This excellent forest backdrop for the technology program provides a most diverse laboratory for instructional purposes.

Since the Ranger School is situated within a forest environment, some applicants to the forest technology program may mistakenly believe that the program is one of forest lore and wilderness survival. It is, therefore, strongly emphasized that the forest technology curriculum demands high quality academic achievement. Students cannot complete the program without concentrated and consistent study. Classes are scheduled from 8 a.m. to 5 p.m., Monday through Friday, with classroom and laboratory or field time equally divided. The intensity of the program normally requires a minimum of 70 hours a week of evening and weekend study, daily classes, and laboratory/field exercises. Several short trips, at no additional expense to the student, are made during the year in connection with courses in logging, forest recreation, forest mensuration and silviculture. A longer trip of seven days' duration emphasizing regional forestry practice is sponsored during the spring semester of the second year. Students must bear their proportionate share of the cost of this field trip which consists primarily of plane fare, lodging and meal expenses.

LIFE AT WANAKENA

The Wanakena Campus of the College of Environmental Science and Forestry is located on the banks of the Oswegatchie River near the picturesque hamlet of Wanakena. Approximately 65 miles northeast of Watertown, New York, and 35 miles west of Tupper Lake, New York, the School's buildings and its surrounding forest border on Cranberry Lake.

The main School building consists of a central service unit with dormitory wings on either side. The central unit contains classrooms, laboratories, a student lounge, faculty offices, the library, a kitchen, dining room and 47 student rooms, each housing two students.

Faculty living quarters are nearby on the campus. Other buildings include a maintenance shop, garages, a sugar house and storage buildings.

The close proximity of faculty offices and student quarters and the intensive field-work pattern enables students to consult easily and frequently with the faculty. The School considers this traditional close student-faculty association to be of major benefit in its training program.

A small library of approximately 1,500 volumes consists of highly specialized materials required for the teaching and study programs of the School.

Students taking the second year of the forest technology curriculum at the Wanakena Campus are required to live in the School's dormitories. An exception may be made for married students who may bring their families and rent their own private accommodations in the vicinity of the Wanakena Campus. Such accommodations are not plentiful. It is

recommended that each married student arrange rental arrangements well in advance of the registration date.

The Wanakena Campus does not maintain an infirmary, nor does it have on its staff a physician or nurse. There are three physicians and a dentist available in the immediate area as well as an excellent Community Hospital in nearby Star Lake, New York. In emergency situations, the School transports the sick or injured student to the local physician of his choice or to the hospital. Furthermore, there is no student accident or sickness insurance plan available through the Wanakena Campus, so that it is strongly suggested that the student consider such coverage before reporting to the Campus.

Because of the comparatively isolated location of the Wanakena Campus, a stock of books and supplies used in connection with the second year of the program is maintained on campus for sale to students.

During the first year of the program, College-enrolled students will be guided by the rules and regulations that govern their attendance at the Syracuse Campus. During the second year of the program, students will be guided by the general rules and regulations for all College students and an additional set of Wanakena Campus "house rules" that supplement the College's general rules and regulations.

ADMISSION

Admission Requirements

Admission requirements for entrance into the forest technology curriculum are generally the same as for other curricula of the College of Environmental Science and Forestry. Minimum requirements are 16 Carnegie high school units along this pattern: English, 4; history (social science), 2; science, 2 (one must be chemistry or physics); mathematics, 3 (including trigonometry or Math 11); and electives. Mechanical drawing and typing are strongly suggested electives.

An applicant must submit the test results of any one of the following: New York State Regents Scholarship Examination, College Entrance Examination Board (CEEB), Scholastic Aptitude Test (SAT), or American College Test (ACT).

The Director of Admissions may waive some of the above requirements under special circumstances.

In addition to the above-listed requirements, the following requirements must be met by all applicants:

1. The applicant must be strongly motivated toward a career as a forest technician.
2. The applicant must be aware of and willing to accept the work requirements of this field-forestry program and its strenuous physical demands.
3. The applicant's parents (if the applicant is under 21 years of age) must be fully aware of the field nature of the study program, its rigorous study-work regime and supporting academic facilities.
4. A full medical examination report must be submitted.

Admission Procedures

The decision to admit any student to the Forest Technician Program rests solely with the College of Environmental Science and Forestry. Most openings in the program are filled by students who received conditional acceptances while still seniors in high school, contingent on successful completion of the first year of college. Remaining openings are filled by transfer students who have already attended college. Therefore, it is suggested that the potential forest technician student apply while still a high school senior. Transfer admission at a later date is still possible for those not conditionally accepted in high school.

Here is the procedure:

Seniors in high school must (a.) submit a regular freshman application (S-1) with supplemental forms to the College of Environmental Science and Forestry, using Curriculum Code 620 (Forest Technology). On one of the supplemental forms the student can indicate what school has been chosen for the first year; (b.) submit a regular application to the school selected for the first year of studies, using Curriculum Code 620.

Transfer Students

Students with previous college experience, or students who are currently enrolled at another college, may apply for transfer. However, courses transferred for credit can be applied only to the freshman year course of studies, and they must be appropriate to these courses and comparable in subject matter, content, and level. All second year courses must be taken at the Wanakena Campus, and therefore a student cannot transfer any previously earned credit toward the second year. Transfer applicants must submit a recent official copy of the college transcript and a list of courses they anticipate completing prior to enrollment.

Students spending the first year of studies at some other college must complete the following courses or their equivalents before they will be permitted to enroll in the Wanakena Campus portion of the program.

English	*6 semester hours*
Math (College Algebra and Trigonometry)	*6 semester hours*
General Biology (or Botany—course should be plant-oriented)	*6-8 semester hours*
Economics	*3 semester hours*
Electives (Recommended: Public Speaking, Technical Report Writing, Geology, Botany)	*9 semester hours*
	30-32 semester hours

EXPENSES

Costs of the first year will vary with the specific institution attended.

Estimated costs of the second-year program on the Wanakena Campus are as follows:

	Tuition	*Board & Room*	*Books & Supplies*
New York Resident	$ 750	Approx. $1250	Approx. $350
Nonresident	$1200	Approx. $1250	Approx. $350

An additional estimated expense of $150.00 will likely be incurred to cover the cost of laundry and clothing. The cost of the 5-day regional forestry practice trip during the spring semester is estimated at approximately $200. There is also a $10 graduation fee and a $10 student activity fee.

FINANCIAL ASSISTANCE

Financial aid is available upon acceptance to the College of Environmental Science and Forestry. There are three basic loans: scholarships or grants, part-time employment and long-term loans.

More detailed information on these financial aid opportunities can be found on pages 31-35 of this bulletin and in the *Undergraduate Financial Aid Bulletin.*

The student must file an application with the Office of Financial Aid at the Syracuse Campus and submit a *Parents' Confidential Statement* to the College Scholarship Service, Princeton, New Jersey 08540.

PLACEMENT

The School assists in placement of graduates. The reputation of the College's Ranger School usually results in graduates being able to find employment readily. Employment is common with local, state and federal forestry and land resource agencies, private forestry enterprises and surveying firms. Positions most frequently filled by recent graduates include: state forest ranger, state forest technician, forestry aide, industrial forest district supervisor, timber inventory specialist, timber sales supervisor, forest surveyor, forest engineering aide, forest protection technician, forest research technician and forest equipment salesman.

FOREST TECHNOLOGY CURRICULUM
(Associate in Applied Science Degree)

Freshman Year

			Credit Hours
First Semester	[1]General Botany		4
	[2]English		3
	[3]Math		3
	[4]Electives		4
	Orientation		0
			14
Second Semester	[1]General Zoology		4
	[2]English		3
	[3]Math		3
	Economics		3
	[4]Elective		3
			16

Senior Year
(Wanakena Campus)

First Semester	FTC 200	Dendrology I	2
	FTC 202	Plane Surveying I	4
	FTC 204	Forest Mensuration and Statistics I	3½
	FTC 206	Forest Ecology	3
	FTC 208	Forest Installations	3
	FTC 209	Forest Roads	2
	FTC 213	Forest Protection I	2
	FTC 223	Graphics	1
			20½
Second Semester	FTC 201	Dendrology II	½
	FTC 203	Plane Surveying II	3
	FTC 205	Forest Mensuration and Statistics II	2
	FTC 207	Aerial Photogrammetry	2
	FTC 211	Silviculture	2
	FTC 212	General Forestry	1
	FTC 214	Personnel Management	1½
	FTC 215	Timber Harvesting	2
	FTC 216	Wood Technology	1½
	FTC 217	Forest Management	2
	FTC 218	Forest Recreation	1½
	FTC 219	Elements of Wildlife Ecology	1½
	FTC 221	Water Resource Management	2
	FTC 225	Regional Forestry Practices	1
	FTC 227	Forest Protection II	2
			25½

[1]Courses selected may be in general biology but at least one course in introductory botany is preferred.
[2]Freshman English or equivalent.
[3]Competency in plane trigonometry and college algebra is required. If demonstrated, credits become electives.
[4]Courses related to technical report writing and speech are strongly recommended. Additional electives in biology, botany and geology also should be seriously considered.
[5]Students are expected to complete the one-day orientation session to be given at the Wanakena Campus in late May, prior to the Fall registration.

NOTE: A total of 76 credit hours is required. Upon satisfactory completion, an Associate Science (A.A.S.) degree in Forest Technology will be awarded.

FOREST TECHNOLOGY

200. Dendrology I (2)

25 hours of lecture and 32 hours of field time. A study of the distinguishing characteristics, growth features, distribution, associates and importance of the major tree species of North America.

Seasonal field identification and on-the-spot discussion of habitats, associates, and the place in succession of the predominant forest trees and shrubs as found in the Adirondack area of the Northeast, plus a limited number of introduced species. Fall. Mr. Coufal.

201. Dendrology II (½)

20 hours of field time. A continuation of Dendrology I, with special emphasis on identification of plants in their winter form. Also special coverage of trees likely to be encountered in the south during the regional forestry practice trip. Spring. Mr. Coufal.

Prerequisite: FTC 200.

202. Plane Surveying I (4)

50 hours of lecture and 98 hours of field time. An introduction to the theory and practice of plane surveying. Emphasis is on individual skill development through small crew projects handling typical surveying equipment in typical field situations. Lecture topics include theory of measurements and errors, mathematics for ordinary surveying, field problems, and the production and preparation of maps. Field projects include traversing with both foresters' and engineers' tools, and the actual production of several maps. Fall. Mr. Sterbenz.

203. Plane Surveying II (3)

18 hours of lecture and 86 hours of field time. A continuation of F. Tech 202 with emphasis on small field projects including leveling, boundary surveying, triangulation, and circular curves. Classroom work develops the mathematical principles behind the solution of field problems. Several maps are prepared. A day trip is scheduled to the County Court House to examine a typical system of filing and recording property boundary information. Other topics include the Survey of the Public Lands and surveying as a profession. The use of the computer in problem solving is included. Spring. Mr. Sterbenz.

Prerequisites: FTC 202; FTC 223.

204. Forest Mensuration and Statistics I (3½)

67 hours of lecture and 36 hours of field time. A classroom and field study of the basic principles and skills required for the measurement of standing trees and their products. Volume tables, their use and construction are studied. Sampling designs are statistically approached from the standpoint of sampling errors and necessary sampling intensity. Cruise reports are required in which the student presents cruise results in tabular form. Fall. Mr. Martin.

205. Forest Mensuration and Statistics II (2)

2 hours of lecture and 54 hours of field and laboratory time. A field problem of practical nature utilizing methods for collecting, analyzing and presenting data dealing with timber volumes. Spring. Mr. Martin.

Prerequisite: FTC 204.

206. Forest Ecology (3)

42 hours of lecture and 52 hours of field time. Study of weather and weather data collection; students manning a forest weather station. Study of weather and soil factors as to how they affect trees and forests, plus the interactions within the forest community and with the environment. Introduction to cover type mapping. Final field problem and report on detailed measurement and analysis of a belt transect. Fall. Mr. Remele.

207. Aerial Photogrammetry (2)
20 hours of lecture and 36 hours of laboratory. Development of the ability to interpret important ground features by viewing aerial photos singly and in pairs, using stereoscopic techniques and equipment. Scale problems and the making of reliable horizontal and vertical measurements. Radial line plot control for the transfer of detail to base maps. Forest type mapping and forest mensuration using photos. Spring. Mr. Remele.

208. Forest Installations (3)
36 hours of lecture and 60 hours of laboratory or field time. This course provides the student with the technical competence necessary to use, plan, construct and maintain such typical forest improvements as telephone lines, radio systems, trails and light frame structures. Fall. Mr. Miller.

209. Forest Roads (2)
22 hours of lecture and 32 hours of laboratory or field time. This course provides the student with the technical competence necessary to administer, locate and design the construction and maintenance of a typical forest gravel road. Fall. Mr. Miller.
Prerequisite: FTC 202.

211. Silviculture (2)
43 hours of lecture and 32 hours of field and laboratory time. Orientation regarding the place, terminology, and methods of silviculture. Coverage of the most generally used techniques for establishing and manipulating the more important forest types in the Northeast for ecological and economical satisfaction. Field demonstration and practice in planting, thinning, pruning, timber marking and chemical silviculture. Spring. Mr. Remele.
Prerequisite: FTC 206.

212. General Forestry (1)
14 hours of lecture. This course provides the student with an understanding of the nature of their employment opportunities, how and where to apply for employment, and a review of the history of forest technician education with special emphasis on the Ranger School. Spring. Mr. Castagnozzi.

213. Forest Protection I (2)
38 hours of lecture and 28 hours of field and laboratory time. A study of the insect and disease agents that damage trees and their role in the total forest community. The course covers identification of local forest insects and disease-causing organisms, study of the major pest groups of other forest regions, and control measures including the effects of pesticides on the environment. Field trips cover local pests and the damage caused, while laboratory work covers major groups of pests likely to be encountered elsewhere. Fall. Mr. Coufal.

214. Personnel Management (1½)
26 hours of lecture. A study of company and agency organization groups including selection of and placement of personnel, training of personnel and performance evaluations, planning for and administering crew responsibilities, human relations in the working situation and special personnel problems of the forest technician and forester are covered.
Techniques of foremanship are applied in various field exercises in other courses, along with the study of safety hazards, accident prevention, accident classification and accident reporting. Spring. Mr. Miller.

215. Timber Harvesting (2)
20 hours of lecture and 32 hours of field time. This course acquaints the student with the basic harvesting methods and techniques, with emphasis on the Northeast, along with the knowledge of how and where harvesting fits in with other forest uses. Students gain technical competence in timber sale contract administration and basic timber appraising. Spring. Mr. Miller.

216. Wood Technology **(1½)**

15 hours of lecture and 20 hours of laboratory. Study of the development of various cell and tissue structures within trees, the gross structural features of wood, and the part these features play in the physiological processes of living trees. Physical properties of wood are studied with special emphasis given to those gross features which identify species. Attention is given to wood quality, defects of wood, and those special features which make certain species desirable for specific uses.

In the laboratory a variety of samples from the more commercially important lumber trees of North America are identified by the use of a gross feature key and 10X magnification. Spring. Mr. Martin.

217. Forest Management **(2)**

25 hours of lecture and 16 hours of field or laboratory time. The relation of silviculture to management. Subdivisions and classification of forest properties. Determination of growing stock and growth. The forms of managed forests and methods by which forests are brought to a regulated condition. Field and lab work in preparation for a report giving recommendations for management of a portion of the School Forest. Spring. Mr. Remele.

Prerequisite: FTC 206.

218. Forest Recreation **(1½)**

18 hours of lecture and 24 hours of laboratory or field time. This course acquaints the student with the forest recreational resources—its present and future needs. Principles of recreation development and management are discussed with special emphasis placed on the technical aspects. Spring. Mr. Miller.

219. Elements of Wildlife Ecology **(1½)**

28 hours of lecture and 4 hours of field time. A study of the principles of wildlife ecology with fundamentals related to the actions of the preservationist, conservationist, and particularly those of the forest manager. Spring. Mr. Martin.

Prerequisite: A course in biology or its equivalent.

221. Water Resource Management **(2)**

27 hours of lecture and 36 hours of field time. A comprehensive study of the concepts of the hydrologic cycle and quantification of its components. Particular stress on basic water measurements, erosion sedimentation and protection of the soil-water resource. Spring. Mr. Suhr.

Prerequisites: FTC 202, FTC 206, FTC 207.

223. Graphics **(1)**

22 hours of lecture. An introduction to lettering and drafting with emphasis on the skills needed by the forest or surveying technician. Individual skill development is achieved through many projects. The theory behind each aspect of the project is covered in lecture and each student is then expected to complete the project on his/her own time. Several lettering plates are produced in addition to precision drawing for the production of maps.

The use of drafting machines is explained and demonstrated for the students. Fall. Mr. Suhr.

225. Regional Forestry Practices **(1)**

40 hours of field time. A 7-day field trip to provide concentrated and varied field observation. It is conducted during the Spring semester to give the student first-hand observation of the current forestry practices in various parts of the United States. Spring. Staff.

227. Forest Protection II **(2)**

23 hours of lecture and 24 hours of field and laboratory time. The basic principles of forest fire behavior, fire danger and fire danger rating, forest fire prevention and control, and prescribed burning are covered. Fire suppression techniques are demonstrated and practiced. Spring. Mr. Suhr.

Prerequisite: FTC 213.

State University of New York

STATE UNIVERSITY OF NEW YORK

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Secretary of the University ..... MARTHA J. DOWNEY, B.S., M.A.

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The State University of New York, now in its 29th year of service, is the largest, centrally managed, multi-level system of public higher education in the nation.

Since its founding in 1948, through consolidation of 29 State-supported but unaffiliated campuses, the University has grown in response to need until its services are now felt educationally, physically and culturally, the length and breadth of New York State.

The University's 64 geographically dispersed campuses bring educational opportunity within commuting distance of virtually all New York

citizens. In many communities, the SUNY campuses are cultural centers of the area and a significant contributor to the local economy.

In academic 1976-77, nearly 344,000 students were studying in its classrooms or pursuing study at home, at their own pace, through such innovative institutions as Empire State College, a campus without walls. More than 100,000 students are 24 years of age or older, reflecting SUNY's ability to adjust to meet the needs of more mature students.

During its relatively brief existence, it has graduated more than 600,000 alumni, the majority of whom are pursuing their careers in villages, towns and cities across the State.

The State University welcomes not only the future architects, business executives, engineers, surgeons and literary critics, but also future dairy farmers and medical technicians, accountants and social workers, foresters and automobile mechanics. And through work in film, electronics, pollution control, data processing, police science, urban studies and similar fields, the University seeks to educate persons for tomorrow's roles as well as those of today.

To provide such opportunity on a continuing basis, the University is uniquely organized into a system comprised of:

Four University centers (two of which, Buffalo and Stony Brook, include health science centers); two medical centers; 13 colleges of arts and science, a nonresidential college; three specialized colleges, six agricultural and technical colleges; five statutory colleges administered in cooperation with Cornell and Alfred Universities; and 30 locally-sponsored community colleges.

In addition to baccalaureate studies, 12 of the senior campuses offer graduate study at the doctoral level, and 22 at the master's level.

The two-year colleges offer associate degree opportunities in arts and science in a wide range of technical areas. They also provide transfer programs within the University for students wishing to continue to the baccalaureate degree.

Ten Educational Opportunity Centers serve the educationally deprived by upgrading occupational skills for more gainful employment and identifying students with college potential to prepare them for enrollment in the State's public and private colleges.

Overall, at its EOC's, two-year colleges, four-year campuses and university and medical centers, the University offers 3,500 academic programs.

State University is governed by a Board of Trustees, appointed by the Governor, which determines the policies to be followed by the 34 State-supported campuses.

The 30 community colleges operating under the program of State University have their own local board of trustees. The State contributes 30 to 40 percent of their operating costs and one-half of their capital costs.

The State University motto is "Let Each Become All He Is Capable of Being."

STATE UNIVERSITY OF NEW YORK

UNIVERSITY CENTERS

State University at Albany
State University at Binghamton
State University at Buffalo
State University at Stony Brook

COLLEGE OF ARTS AND SCIENCE

College at Brockport
College at Buffalo
College at Cortland
Empire State College
College at Fredonia
College at Geneseo
College at New Paltz
College at Old Westbury
College at Oneonta
College at Oswego
College at Plattsburgh
College at Potsdam
College at Purchase
College at Utica/Rome

COLLEGES AND CENTERS FOR THE HEALTH SCIENCES

Health Sciences Center at Buffalo University Center
Health Sciences Center at Stony Brook University Center
Downstate Medical Center at Brooklyn
Upstate Medical Center at Syracuse
College of Optometry at New York City
College of Veterinary Medicine at Cornell University*

AGRICULTURAL AND TECHNICAL COLLEGES

College at Alfred
College at Canton
College at Cobleskill
College at Delhi
College at Farmingdale
College at Morrisville

SPECIALIZED COLLEGES

College of Agriculture and Life Sciences at Cornell University*
College of Ceramics at Alfred University*
College of Environmental Science and Forestry at Syracuse
College of Human Ecology at Cornell University*
Fashion Institute of Technology at New York City
Maritime College at Fort Schuyler
School of Industrial and Labor Relations at Cornell University*

COMMUNITY COLLEGES

(Locally-sponsored, two-year colleges under the program of State University)

Adirondack Community College at Glens Falls
Broome Community College at Binghamton
Cayuga County Community College at Auburn
Clinton Community College at Plattsburgh
Columbia-Greene Community College at Hudson
Community College of the Finger Lakes at Canandaigua
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie Community College at Buffalo
Fulton-Montgomery Community College at Johnstown
Genesee Community College at Batavia
Herkimer County Community College at Herkimer
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
Niagara County Community College at Sanborn
North County Community College at Saranac Lake
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Rockland Community College at Suffern
Schenectady County Community College at Schenectady
Suffolk County Community College at Selden
Sullivan County Community College at South Fallsburg
Tompkins Cortland Community College at Dryden
Ulster County Community College at Stone Ridge
Westchester Community College at Valhalla

*These operate as "contract colleges" on the campuses of private universities.

College of Environmental Science and Forestry

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Director of Computer Services ..... CHARLES N. LEE
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Coordinator of Facilities ..... CHARLES N. LaFORTY
Director of Campus Safety and Security ..... JOHN F. LITCHER
Associate for Institutional Research ..... RHONDDA K. CASSETTA
Director of Analytical and Technical Services ..... JOHN A. MEYER
Affirmative Action Officer ..... ALTON W. ZANDERS

Dean, School of Biology, Chemistry and Ecology ..... STUART W. TANENBAUM
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Dean, School of Environmental and Resource Engineering ..... WILFRED A. CÔTÉ, JR.
Dean, School Environmental and Resource Management ..... CHARLES C. LARSON
Dean, School of Landscape Architecture ..... ROBERT G. REIMANN
Director, School of Forest Technology ..... DANIEL M. CASTAGNOZZI
Director, Graduate Program in Environmental Science ..... ROBERT D. HENNIGAN
Director, Adirondack Ecological Center ..... WILLIAM C. TIERSON
Director, Applied Forestry Research Institute ..... RAYMOND L. MARLER
Director, Empire State Paper Research Institute ..... BENGT LEOPOLD
Director, State University Polymer Research Center ..... MICHAEL M. SZWARC
Director, Ultrastructure Studies Center ..... WILFRED A. CÔTÉ, JR.
Director, Tropical Timber Information Center ..... ROBERT W. DAVIDSON
Director, Cellulose Research Institute ..... TORE E. TIMELL
Project Leader, U.S. Forest Service Cooperative Research Unit ..... J. ALAN WAGAR

COLLEGE FACULTY AND PROFESSIONAL STAFF

This listing represents an official record of the State University of New York College of Environmental Science and Forestry faculty and professional staff for 1977. It is designed for use in 1977-78. Any changes should be filed with the Office of Personnel.

The date in parentheses after each name denotes the first year of service, two or more dates, the term of service. An asterisk (*) indicates graduate faculty.

LAWRENCE P. ABRAHAMSON (1977), *Senior Research Associate*, Applied Forestry Research Institute; B.S., Michigan Technical University, 1964; M.S., University of Wisconsin, 1967; Ph.D., University of Wisconsin, 1969.

MAURICE M. ALEXANDER (1949)*, *Professor and Chairman*, Department of Forest Zoology; B.S., State University of New York College of Forestry, 1940; M.S., University of Connecticut, 1942; Ph.D., State University of New York College of Forestry, 1950

DOUGLAS C. ALLEN (1968)*, *Associate Professor*, Department of Forest Entomology; B.S., University of Maine, 1962; M.S., 1965; Ph.D., University of Michigan, 1968

IRA H. AMES (1972), *Adjunct Associate Professor*, Department of Botany and Pathology; B.A., Brooklyn College, 1959; M.S., New York University, 1962; Ph.D., 1966

DAVID G. ANDERSON (1959), *Vice President for Administration and Services; Associate Professor;* A.A.S., State University of New York College of Forestry (Ranger School), 1950; B.S., State University of New York College of Forestry, 1953; M.S., University of Utah, 1958

ROBERT E. ANTHONY (1953), *Technical Specialist*, Department of Botany and Pathology; A.A.S., State University of New York Agricultural and Technical College at Morrisville, 1952

GEORGE R. ARMSTRONG (1950)*, *Professor*, Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1949; M.S., 1959; Ph.D., 1965

ROBERT W. ARSENEAU (1972), *Programmer/Analyst*, Computer Center; A.A.S., Mohawk Valley Community College, 1967

JAMES P. BAMBACHT (1967)*, *Associate Professor*, Department of Paper Science and Engineering; A.B., Kalamazoo College, 1954; M.S., The Institute of Paper Chemistry, 1956; Ph.D., State University of New York College of Environmental Science and Forestry, 1973

C. ELLISON BECK (1970), *Technical Specialist*, Analytical and Technical Services, Office of the Vice President for Administration and Services

DONALD F. BEHREND (1960-67) (1968)*, *Assistant Vice President for Research Programs; Executive Director of the Institute of Environmental Program Affairs; Senior Research Associate;* B.S., University of Connecticut, 1958; M.S., 1960; Ph.D., State University of New York College of Forestry, 1966

ROBERT M. L. BELLANDI (1974), *Research Assistant*, Institute of Environmental Program Affairs; B.S., Montana State University, 1972; M.R.P., Syracuse University, 1973

LEE U. BENDER (1970)*, *Associate Professor*, Department of Forest Engineering; A.A.S, State University of New York College of Forestry, (Ranger School), 1953; B.S., State University of New York College of Forestry, 1959; M.S., 1960; Ph.D., Ohio State University, 1971

JOHN D. BENNETT (1960)*, *Associate Professor*, Department of Managerial Science and Policy; B.A., Ohio Wesleyan University, 1954; Ph.D., Syracuse University, 1968; *Chancellor's Award for Excellence in Teaching* (1973)

CAMILLO BENZO (1975), *Adjunct Associate Professor*, Department of Forest Zoology; B.A., Utica College of Syracuse University, 1964; Ph.D., University of Pennsylvania, 1969

JOHN V. BERGLUND (1965)*, *Professor and Chairman*, Department of Silviculture and Forest Influences; B.S., Pennsylvania State University, 1962; M.S., 1964; Ph.D., State University of New York College of Forestry, 1968

WILLIAM H. BETTINGER (1972), *Technical Specialist*, Analytical and Technical Services, Office of the Vice President for Administration and Services

DONALD H. BICKELHAUPT (1969), *Technical Assistant*, Department of Silviculture and Forest Influences; B.S., State University of New York College of Forestry, 1969

PETER E. BLACK (1965)*, *Professor*, Department of Silviculture and Forest Influences; B.S., University of Michigan, 1956; M.F., 1958; Ph.D., Colorado State University, 1961; *Executive Chairman of the Faculty* (1974-76) (1976-78)

WILLIAM R. BORGSTEDE (1971), *Technical Assistant*, Department of Forest Zoology; A.A.S., Minor Institute, 1966; A.A.S., State University of New York College at Delhi, 1970; B.S., State University of New York College of Environmental Science and Forestry, 1975

JEROME BREZNER (1961)*, *Professor*, Department of Forest Entomology; A.B., University of Rochester, 1952; A.M., University of Missouri, 1956; Ph.D., 1959

ROBERT H. BROCK, JR. (1967)*, *Professor*, Department of Forest Engineering; B.S., State University of New York College of Forestry, 1958; M.S., 1959; Ph.D., Cornell University, 1971

RANIER H. BROCKE (1969)*, *Senior Research Associate*, Adirondack Ecological Center; B.S., Michigan State University, 1955; M.S., 1957; Ph.D., 1970

ALTON F. BROWN (1963) *Technical Specialist*, Empire State Paper Research Institute

KENNETH F. BURNS (1970), *Technical Assistant*, Applied Forestry Research Institute; A.A.S., Paul Smith's College, 1969

HARRY W. BURRY (1962), *Extension Specialist*, Applied Forestry Research Institute; *Associate Professor*; B.S., State University of New York College of Forestry, 1941; M.F., 1964

PAUL M. CALUWE (1969)*, *Senior Research Associate*, Department of Chemistry; M.S., University of Louvain, 1964; Ph.D., 1967

ROBERT L. CALVER (1976), *Director of Development*, Alumni/Development Office, B.S., University of South Dakota, 1971

ROBERT CAMERON (1974), *Research Assistant*, Adirondack Ecological Center; State University of New York College of Environmental Science and Forestry (Ranger School), 1973

ROBERT W. CAMPBELL (1972)*,*Adjunct Associate Professor*, Department of Entomology; B.S., State University of New York College of Forestry, 1953; M.F., University of Michigan, 1959; Ph.D., 1961

WILBUR H. CAMPBELL (1975), *Assistant Professor*, Department of Chemistry; A.A., Santa Ana College, 1965; B.A., Pomona College, 1967; Ph.D., University of Wisconsin, 1972

HUGH O. CANHAM (1966)*, *Assistant Professor*, Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1960; M.S., 1962; Ph.D., 1971

DIANNE M. CAPRITTA (1967), *Associate Librarian*, F. Franklin Moon Library; B.S., University of Illinois, 1965; M.S.L.S., Syracuse University, 1967

RHONDDA K. CASSETTA (1967), *Associate for Institutional Research*, Office of the Vice President for Administration and Services; A.B., Elmira College, 1933

DANIEL M. CASTAGNOZZI (1956), *Professor and Director*, School of Forest Technology; A.A.S., State University of New York College of Forestry (Ranger School), 1950; B.S.F., University of Michigan, 1952; M.F., State University of New York College of Forestry, 1957

ROBERT E. CHAMBERS (1967)*, *Associate Professor*, Department of Forest Zoology; B.S., Pennsylvania State University, 1954; M.S., 1956; Ph.D., Ohio State University, 1972

WALLACE CHRISTENSEN (1975), *Adjunct Professor*, Department of Managerial Science and Policy; State University of New York College of Forestry (Ranger School), 1946; B.S.F., University of Michigan, 1949; M.F., State University of New York College of Forestry, 1954; Ph.D., 1957

WILLIAM M. CHRISTIAN (1974), *Technical Assistant*, Department of Security and Safety

NEILS B. CHRISTIANSEN (1960)*, *Associate Professor*, Department of Managerial Science and Policy; *Summer Camp Coordinator*, Warrensburg Campus; B.S., University of Idaho, 1957; M.S., State University of New York College of Forestry, 1959; Ph.D., 1966

ROLLA W. COCHRAN (1964), *Assistant to the President for Community Relations;* Office of the President; *Associate Professor;* Coordinator of Demonstration and Information, Institute of Environmental Affairs; B.A., Denison University, 1949; M.S., Ohio State University, 1951

JACK B. CODY (1968), *Extension Specialist,* Applied Forestry Research Institute; B.S., University of Michigan, 1954; M.F., 1963

JAMES M. COLMAN (1973), *Assistant Director of Admissions,* Office of the Vice President for Student Affairs; B.A., Villanova University, 1967; M.A., Lateran University, 1968

HARRY J. CORR (1967), *Director of Business and Fiscal Affairs,* Office of the Vice President for Administration and Services; B.S. Siena College, 1957

WILFRED A. CÔTÉ, JR. (1950)*, *Professor and Dean,* School of Environmental and Resource Engineering; *Director,* Nelson Cortlandt Brown Center for Ultrastructure Studies; B.S., University of Maine, 1949; M.F., Duke University, 1950; Ph.D., State University of New York College of Forestry, 1958

JAMES E. COUFAL (1965), *Associate Professor,* School of Forest Technology; State University of New York College of Forestry (Ranger School), 1957; B.S., State University of New York College of Forestry, 1960; M.S., 1962

PHILLIP J. CRAUL (1968)*, *Associate Professor,* Department of Silviculture and Forest Influences; B.S.F., Pennsylvania State University, 1954; M.S., 1960; Ph.D., 1964

JAMES O. CREVELLING (1970), *Technical Assistant,* Department of Forest Zoology; A.A.S., Paul Smith's College, 1965; M.S., University of Massachusetts, 1967

CLAY M. CROSBY (1964), *Research Assistant,* Empire State Paper Research Institute; B.S., State University of New York College of Forestry, 1964; M.S., 1970

TIBERIUS CUNIA (1968)*, *Professor,* Department of Managerial Science and Policy; Forest Engineer, Ecole Nat. des Eaux et Forets, 1951; M.S., McGill University, 1957

GEORGE W. CURRY (1966)*, *Associate Professor,* School of Landscape Architecture; B.A., Michigan State University, 1962; B.S., 1965; M.L.A., University of Illinois, 1969

BENJAMIN V. DALL (1975)*, *Professor and Chairman,* Department of Managerial Science and Policy; B.S., Yale University, 1955; M.F., 1956; J.D., University of Virginia, 1959; Ph.D., Pennsylvania State University, 1972

ROBERT W. DAVIDSON (1957)*, *Professor and Chairman,* Department of Wood Products Engineering; *Director,* Tropical Timber Information Center; B.S., Montana State University, 1948; M.S., State University of New York College of Forestry, 1956; Ph.D., 1960

ARNOLD C. DAY (1969), *Technical Specialist,* Nelson Cortlandt Brown Center for Ultrastructure Studies

SALVACION De La PAZ (1973), *Associate Librarian,* F. Franklin Moon Library; B.S.L.S., University of the Philippines, 1956; M.S.L.S., Simmons College, 1962

CARLTON W. DENCE (1951)*, *Senior Research Associate,* Empire State Paper Research Institute; *Professor,* B.S., Syracuse University, 1947; M.S., State University of New York College of Forestry, 1949; Ph.D., 1959

CARL H. DeZEEUW (1946)*, *Professor,* Department of Wood Products Engineering; A.B., Michigan State College, 1934; B.S., 1937; M.S., State University of New York College of Forestry, 1939; Ph.D., 1949

ARTHUR G. DILLON (1976), *Technical Assistant,* Department of Paper Science and Engineering; B.S., State University of New York College of Environmental Science and Forestry, 1974

DANIEL L. DINDAL (1966)*, *Professor,* Department of Forest Zoology; B.S., Ohio State University, 1958; M.A., 1961; Ph.D., 1966; *Chancellor's Award for Excellence in Teaching* (1974)

GEORGE F. EARLE (1952)*, *Professor,* School of Landscape Architecture; B.F.A., Syracuse University, 1937; M.F.A., Yale University, 1946

HERBERT E. ECHELBERGER (1966), *Research Forester,* U.S. Forest Service Cooperative Recreation and Related Environmental Studies Research Unit; *Adjunct Associate Professor;* B.S., Southern Illinois University, 1965; M.S., 1966

ANDREW L. EGGERS (1967), *Media Engineer,* Educational Communications Section, Office of the Vice President for Administration and Services

ELIZABETH A. ELKINS (1973), *Associate Librarian,* F. Franklin Moon Library; B.A., Hartwick College, 1968; M.L.S., State University of New York at Geneseo, 1970

JOHN H. ENGELKEN (1959), *Assistant Professor; Forest Property Manager,* Tully Campus; B.S.F., Utah State University, 1950

ARTHUR R. ESCHNER (1961)*, *Professor,* Department of Silviculture and Forest Influences; B.S., State University of New York College of Forestry, 1950; M.S., Iowa State College, 1952; Ph.D., State University of New York College of Forestry, 1965

EDMUND FALLON (1975), *Adjunct Professor,* Graduate Program in Environmental Science; B.S., Clarkson College of Technology, 1931

MILDRED FAUST (1976), *Adjunct Professor,* School of Biology, Chemistry and Ecology; A.B., Penn College, 1921; M.S., University of Chicago, 1923; Ph.D., University of Chicago, 1933

JOHN P. FELLEMAN (1973)*, *Associate Professor,* School of Landscape Architecture; B.C.E., Cornell University, 1966; M.E.C., 1966; D.P.A., New York University, 1975

JEAN E. FISHER (1963), *Senior Research Associate,* Applied Forestry Research Institute; *Professor;* B.S., University of Idaho, 1941

JOHN S. FISHLOCK (1965), *Technical Assistant,* Department of Botany and Pathology; State University of New York College of Forestry, 1965

MICHAEL FLASHNER (1973), *Assistant Professor,* Department of Chemistry; B.S., Brooklyn College, 1965; A.M., University of Michigan, 1970; Ph.D., 1971

CLAUDE C. FREEMAN (1959), *Associate Professor,* School of Landscape Architecture; B.S., State University of New York College of Forestry, 1959

ROBERT L. FRIEDMAN (1967), *Director of Admissions,* Office of the Vice President for Student Affairs; A.B., Syracuse University, 1952; M.A., 1954

ROBERT H. FREY (1977), *Assistant Vice President for Academic Programs,* Office of the Vice President for Program Affairs; B.A., Valparaiso University, 1965; M.Ed., Springfield College, 1966; Ed.D., Indiana University, 1973

EVA GALSON (1965), *Research Assistant,* Department of Chemistry; B.S., Queens College, 1949; M.S., Syracuse University, 1965

THOMAS L. GEE (1975), *Technical Assistant,* Department of Chemistry; A.A., Corning Community College, 1965; B.S., State University of New York at Geneseo, 1968

JAMES W. GEIS (1968)*, *Associate Professor,* Department of Botany and Pathology; B.S.F., University of Illinois, 1965; M.S., 1967; Ph.D., State University of New York College of Environmental Science and Forestry, 1972

SERGE N. GORBATSEVICH (1956)*, *Associate Professor,* Department of Paper Science and Engineering; B.S., State University of New York College of Forestry, 1954; M.S., 1955

MORT GRANT (1976), *Adjunct Professor,* Institute of Environmental Program Affairs; B.A., Whitman College, 1946; M.B.A., University of Chicago, 1949; M.P.A., Harvard University, 1959

STEPHEN GRANZOW (1969), *Technical Specialist,* Empire State Paper Research Institute

MIKLOS A. J. GRATZER (1973)*, *Associate Professor,* Department of Managerial Science and Policy; Diploma for Forest Engineering, Sopron University, 1956; B.Sc., University of British Columbia, 1959; M.S.R.C., University of Montana, 1965; Ph.D., 1971

PAUL F. GRAVES (1947)*, *Professor,* Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1939; M.F., 1941; Ph.D., Syracuse University, 1950

RICHARD L GRAY (1975), *Research Associate,* Applied Forestry Research Institute; B.A., State University of New York College of Environmental Science and Forestry, 1967; M.A., 1970; Ph.D., 1974

DONALD F. GREEN (1965), *Director of Counseling and Scheduling*, Office of the Vice President for Student Affairs; *Associate Professor*; A.B., New York State College for Teachers, Albany, 1942; M.S., 1950

DAVID H. GRIFFIN (1968)*, *Associate Professor*, Department of Botany and Pathology; B.S., State University of New York College of Forestry, 1959; M.A., University of California, 1960; Ph.D., 1963

DAVID M. GUOKAS (1973), *Technical Assistant*, School of Landscape Architecture; B.A., University of Kentucky, 1972

AUSTIN F. HAMER (1968), *Associate for Continuing Education*, School of Continuing Education; *Associate Professor*; B.S., Oregon State University, 1942; M.S., University of Oregon, 1962

DAVID L. HANSELMAN (1963)*, *Associate Professor*, Department of Managerial Science and Policy; B.S., Cornell University, 1957; M.S., 1958; Ph.D., Ohio State University, 1963

DAVID B. HARPER (1972), *Research Associate*, School of Landscape Architecture; B.S., Bates College, 1959; M.R.P., University of Pennsylvania, 1969

ROY C. HARTENSTEIN (1959-65) (1967)*, *Professor*, Department of Forest Zoology; B.S., State Teachers College at Buffalo, 1953; M.S., Syracuse University, 1957; Ph.D., State University of New York College of Forestry, 1959

GORDON M. HEISLER (1973), *Adjunct Assistant Professor*, Department of Silviculture and Forest Influences; B.S., Pennsylvania State University, 1961; M.F., Yale University, 1962; Ph.D., State University of New York College of Forestry, 1970

ROBERT D. HENNIGAN (1967)*, *Professor*, Department of Managerial Science and Policy; *Director*, Graduate Program in Environmental Science; B.C.E., Manhattan College, 1949; M.A., Syracuse University, 1964

LEE P. HERRINGTON (1965)*, *Professor*, Department of Silviculture and Forest Influences; B.S., University of Maine, 1959; M.F., Yale University, 1960; Ph.D., 1964

JOSEPH A. HIBBARD (1975), *Assistant Professor*, Department of Landscape Architecture; B.L.A., College of Environmental Science and Forestry, 1969

BRUCE E. HOLLOWAY (1975), *Technical Assistant*, State University Polymer Research Center; A.S., Hudson Valley Community College, 1970; B.S., College of Environmental Science and Forestry, 1975

BERNARD T. HOLTMAN (1968), *TV/Motion Picture Producer-Director, Acting Director*, Educational Communications Section, Office of the Vice President for Administration and Services; B.A., Siena College, 1950; M.S., Syracuse University, 1972

ALLEN F. HORN, JR. (1957)*, *Professor*, Department of Managerial Science and Policy; B.S., Michigan State University, 1950; M.S., 1951; Ph.D., State University of New York College of Forestry, 1957; L.L.B., Syracuse University, 1967

JOEL R. HOWARD (1977), *Coordinator*, Summer Sessions in Field Forestry; *Instructor*, Department of Silviculture and Forest Influences; State University of New York College of Forestry (Ranger School), 1966; B.S., State University of New York College of Environmental Science and Forestry, 1973; M.S., 1977

THEODORE HULLAR (1976), *Adjunct Professor*, Institute of Environmental Program Affairs; B.S., University of Minnesota, 1957; Ph.D., University of Minnesota, 1963

HUGO A. JAMNBACK (1973), *Adjunct Senior Research Associate*, Department of Forest Entomology; B.A., Boston University, 1949; M.A., University of Massachusetts, 1951; Ph.D., 1953

ROBERT V. JELINEK (1972)*, *Professor*, Department of Paper Science and Engineering; B.S., Columbia University, 1945; M.S., 1947; Ph.D., 1953

HAZEL S. JENNISON (1965), *Research Assistant*, Analytical and Technical Services, Office of the Vice President for Administration and Services; B.S., Western Kentucky State College, 1941; M.S., Syracuse University, 1966

DAVID L. JOHNSON (1975), *Assistant Professor*, Department of Chemistry; B.S., Antioch College, 1965; Ph.D., University of Rhode Island, 1973

JOHN W. JOHNSON (1970), *Adjunct Professor*, Department of Silviculture and Forest Influences; B.S., University of Michigan, 1946; Ph.D., North Carolina State University, 1972

WILLIAM L. JOHNSON (1974), *Technical Specialist*, Department of Forest Engineering; B.S., University of Wisconsin, 1972; M.S., 1974

JAMES C. JOSEPH (1976), *Assistant to the President*, Office of the President; M.P.A., Syracuse University, 1976; B.S., Oregon State University, 1975

RONALD R. KARNS (1965), *Editorial Associate*, Office of Publications; B.S., Ohio State University, 1954

ROWENA V. KATHER (1974), *Technical Assistant*, Analytical and Technical Services, Office of the Vice President for Administration and Services

EDWIN H. KETCHLEDGE (1955)*, *Distinguished Teaching Professor*, Department of Botany and Pathology; *Director*, Cranberry Lake Biological Station; *Forest Manager*, Pack Demonstration Forest, Cranberry Lake Campus; B.S., State University of New York College of Forestry, 1949; M.S., 1950; Ph.D., Stanford University, 1957

GLENN O. KLOCK (1976), *Adjunct Associate Professor*, Department of Silviculture and Forest Influences; B.S., Oregon State College, 1959; M.S., Iowa State University, 1963; Ph.D., Oregon State University, 1968

LEE E. KOPPELMAN (1975)*, *Adjunct Professor*, Graduate Program in Environmental Science; B.E., City College of New York, 1950; M.S., Pratt Institute Graduate School of Architecture, 1962; D.P.A., New York University, 1970

DONALD E. KOTEN (1961)*, *Associate Professor*, Department of Managerial Science and Policy; B.A., North Central College, 1951; B.S., Oregon State College, 1957; Ph.D., State University of New York College of Forestry, 1966

STELLA D. KROFT (1973), *Technical Assistant*, F. Franklin Moon Library

FRANK E. KURCZEWSKI (1966)*, *Professor*, Department of Forest Entomology; B.S., Allegheny College, 1958; M.S., Cornell University, 1962; Ph.D., 1964

GEORGE H. KYANKA (1967)*, *Associate Professor*, Department of Wood Products Engineering; *Director*, Educational Opportunity Program; B.S., Syracuse University, 1962; M.S., 1966; *Chancellor's Award for Excellence in Teaching* (1973);Ph.D., 1976

CHARLES N. LaFORTY (1965), *Assistant Facilities Program Coordinator*, Office of the Vice President for Administration and Services

ROBERT T. LaLONDE (1959)*, *Professor*, Department of Chemistry; B.A., St. John's University, 1953; Ph.D., University of Colorado, 1957

JUDITH A. LaMANNA (1973), *Assistant Director of Personnel*; Office of the Vice President for Administration and Services; A.A.S., Onondaga Community College, 1969; B.A., LeMoyne College, 1971; M.P.A., Syracuse University, 1976

GERALD N. LANIER (1970)*, *Associate Professor*, Department of Forest Entomology; B.S., University of California, 1960; M.S., 1965; Ph.D., 1967

RONALD F. LaPLAINE (1963), *Technical Specialist*, Department of Paper Science and Engineering

CHARLES C. LARSON (1950)*, *Professor and Dean*, School of Environmental and Resource Management; A.S., North Dakota State School of Forestry, 1938; B.S., University of Minnesota, 1940; M.S., University of Vermont, 1943; Ph.D., State University of New York College of Forestry, 1952

RICHARD V. LEA (1946-56) (1967)*, *Associate Professor*, Department of Silviculture and Forest Influences; B.S., State University of New York College of Forestry, 1946; M.S., 1948; Ph.D., 1953

ALBERT L. LEAF (1957)*, *Professor*, Department of Silviculture and Forest Influences; B.S.F., University of Washington, 1950; M.S., 1952; Ph.D., University of Wisconsin, 1957

CHARLES N. LEE (1959)*, *Director*, Computer Services; *Professor*, Department of Forest Engineering; B.S., State University of New York College of Forestry, 1949; B.C.E., Syracuse University, 1957; M.C.E., 1959

RAYMOND E. LEONARD (1964)*, *Adjunct Professor*, Institute of Environmental Program Affairs; B.S., University of Vermont, 1955; M.M.M., University of Helsinki, 1957; M.F., Yale University, 1964; Ph.D., State University of New York College of Forestry, 1967

BENGT LEOPOLD (1961)*, *Professor and Chairman*, Department of Paper Science and Engineering; *Director*, Empire State Paper Research Institute; B.Sc., Royal Institute of Technology, Stockholm, 1947; Licentiat, 1949; Ph.D., 1952

GIDEON LEVIN (1972), *Senior Research Associate*, State University Polymer Research Center; B.S., Technion, Israel Institute of Technology, 1960; M.S., Purdue University, 1965; Ph.D., State University of New York College of Forestry, 1971

ALLEN R. LEWIS (1970)*, *Associate Professor*, School of Landscape Architecture; B.A., University of Oklahoma, 1959; M.C.P., University of California (Berkeley), 1961

THOMAS M. LILLESAND (1973)*, *Associate Professor*, Department of Forest Engineering; B.S., University of Wisconsin, 1969; M.S., 1970; Ph.D., 1973

JOHN F. LITCHER (1970), *Director of Campus Security and Safety*, Office of the Vice President for Administration and Services; A.A.S., Onondaga Community College, 1968

ROBERT C. LOOMIS (1974), *Manager*, Computer Center; B.S., Wheaton College, 1949; M.A., Columbia University, 1952

PHILIP LUNER (1957)*, *Senior Research Associate*, Empire State Paper Research Institute; *Professor*, B.Sc., University of Montreal (Loyola College), 1947; Ph.D., McGill University, 1951

J. DONALD MABIE (1967), *Coordinator for Sponsored Programs*, Office of the Vice President for Program Affairs; B.S., State University of New York at Albany, 1961

WALTER A. MAIER (1966), *Technical Specialist*, Department of Wood Products Engineering; B.S., State University of New York College of Forestry, 1960

PAUL D. MANION (1967)*, *Associate Professor*, Department of Botany and Pathology; B.S., University of Minnesota, 1962; M.S., 1965; Ph.D., 1967

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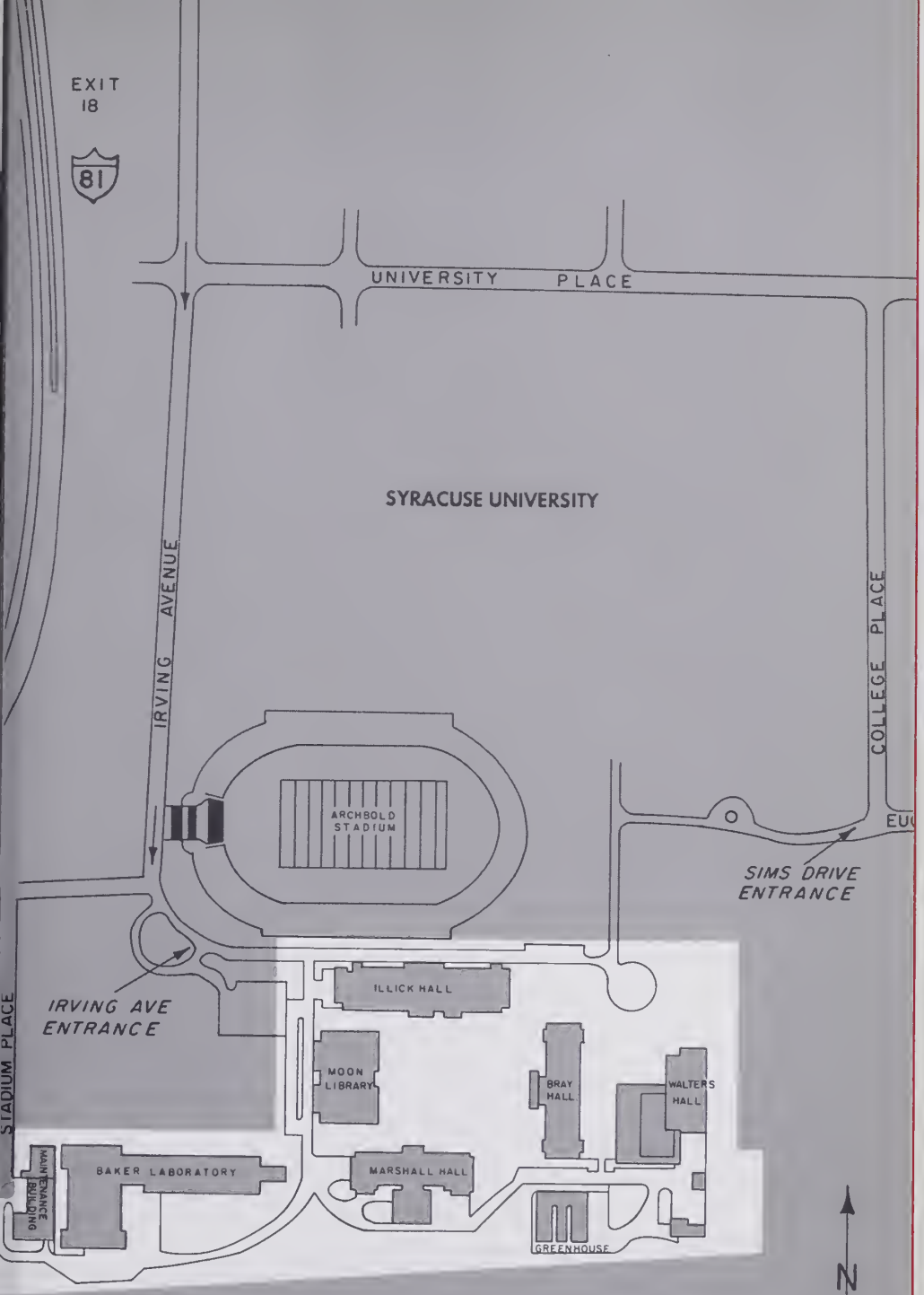

COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY
SYRACUSE, NEW YORK 13210

Undergraduate Studies

SUNY
COLLEGE OF
ENVIRONMENTAL SCIENCE
AND FORESTRY

CORRESPONDENCE DIRECTORY

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Coordinator of Financial Aid
109 Bray Hall
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Transcripts and Academic Records
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Syracuse, New York 13210
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The calendar, courses, tuition and fees described in this Bulletin are subject to change at any time by official action either of the State University of New York Board of Trustees or of the College of Environmental Science and Forestry.

State University of New York

COLLEGE OF

ENVIRONMENTAL SCIENCE AND FORESTRY

1978-79
Undergraduate Studies Bulletin

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Academic Calendar

SYRACUSE CAMPUS

FALL 1978

Registration	September 6-7	Wednesday-Thursday
First Day of Classes	September 8	Friday
Rosh Hashana	October 2	Monday
Yom Kippur (no classes)	October 11	Wednesday
Thanksgiving Vacation	November 22-26	Wednesday-Sunday
Last Day of Classes	December 15	Friday
Exam Period	December 18-22	Monday-Friday

SPRING 1979

Registration	January 15-16	Monday-Tuesday
First Day of Classes	January 17	Wednesday
Spring Recess	March 10-18	Saturday-Sunday
Last Day of Classes	May 1	Tuesday
Reading Day	May 2	Wednesday
Exam Period	May 3-9	Thursday-Wednesday
Commencement	May 12	Saturday

SCHOOL OF FOREST TECHNOLOGY—WANAKENA CAMPUS

FALL 1978

Students Arrive	August 21-22	Monday-Tuesday
Classes Begin	August 23	Wednesday
Rosh Hashana	October 2	Monday
Yom Kippur (no classes)	October 11	Wednesday
Thanksgiving Recess	November 22-26	Wednesday-Sunday
Semester Ends	December 22	Friday
Intersession	December 23-January 21	Saturday-Sunday

SPRING 1979

Classes Begin	January 22	Monday
Spring Recess		
a. One half of class	February 24-March 3	Saturday-Saturday
b. Other half of class	March 4-March 11	Sunday-Sunday
Semester Ends	June 1	Friday
Graduation	June 2	Saturday


COLLEGE OF
ENVIRONMENTAL
SCIENCE AND FORES

ESF: What's in a Name?

1911. Governor John A. Dix signed a bill establishing the New York State College of Forestry at Syracuse University.

1948. Legislative action incorporated into State University of New York all state-supported higher education. Thus, the State University College of Forestry at Syracuse University.

1972. By special legislative act, the College was renamed the State University of New York College of Environmental Science and Forestry.

Why, in the first place, all the name changes? And, secondly, what difference do they make? What, really, is in our name?

ESTABLISHING A TRADITION

While a professional forestry education in this country is almost entirely a development of the twentieth century, its primary roots can be traced back as early as 1862 when Congress passed the Morrill Act establishing a system of land-grant colleges.

The growing importance of forests in America's economy was reflected in the 1870 Census, when, for the first time, information on forest resources was included. Several attempts to establish a national school of forestry were made; while none was approved, the movement shows that there was considerable demand for professionally trained foresters.

By 1900 there was a spirit of reform in the country—the same spirit that produced the early muckrakers also produced a generation interested in the conservation, preservation and careful management of precious natural resources. Between 1903 and 1914, 21 schools of forestry were established.

The first college of forestry in this country to offer a full, four-year undergraduate program was established in 1898 at Cornell University. Under the leadership of Bernard E. Fernow, students were introduced to critical field experience in their junior and senior years at the college's 30,000-acre forest in the Adirondacks. There, Fernow taught many experimental management practices, including clear-cutting and surface-burning. These techniques have always been controversial, and they aroused criticism by the wealthy summer residents in adjacent areas of the Adirondacks. After only five years of operation, the Cornell College of Forestry was closed in 1903 when the State Legislature, yielding to the influential property owners, ended fiscal support.

The beginnings and early development of the New York State College of Forestry were largely due to James R. Day, Chancellor of Syracuse University, and community leaders who were attuned to the growing national

sentiment favoring forest conservation and who sensed the need for a professional school of forestry. The legislative act which created the College instructed that the institution "conduct such special research in State-wide investigations in forestry as will throw light upon and help in the solution of forestry problems. . ." and that it be "the institution for educational work in forestry in the State."

From the very first years of its existence under the first dean, Hugh P. Baker, the College responded to the broad needs of environmental professionalism. While other schools and colleges of forestry became more specialized, the College at Syracuse broadened to include the essentials of environmental science: design, engineering and the life sciences, as well as resource management.

BROADENING THE BASE

With the formation of the State University of New York in 1948, coordination and systematization came to higher education in the state. The University, according to its charter, was to "supplement, not supplant, the great network of private colleges and universities." The College of Forestry which, from its beginning had been state-supported and governed by a Board of Trustees currently made up of nine members appointed by the Governor and six *ex-officio* members, was recognized as a specialized college within the State University system.

Stemming from Chancellor Day's early sponsorship of the College, Syracuse University and ESF have long been engaged in numerous fruitful devices of institutional cooperation. This relationship is probably the most outstanding example in this country of collaboration between public and private institutions of higher education. Even as a part of State University, the College maintains this unique position. The major character of the relationship stems from the fact that for more than 60 years the College purchased from Syracuse University the major portion of its supportive and enrichment instruction, thus allowing the College to more fully develop its professional upper division and graduate level instruction.

Other cooperative areas are living centers and dining facilities, athletic programs, the use of the University's infirmary and health counseling services, the bookstore facilities, the University library system and participation in numerous social activities including the elaborate religious, dramatic and cultural benefits of a large university.

ESF TODAY

The third phase in the evolvement of the College's name came in 1972 when it was rechartered as the State University of New York College of Environmental Science and Forestry. Thus, the name reflects more deeply the traditional grounding and concern of forestry in the environment; it illuminates more clearly the capabilities of its program.

The College of Environmental Science and Forestry has completed a plan, conceived more than 10 years ago, to achieve complete upper division/graduate status. Students wishing to embark upon a career in the

environmental sciences and forestry will enroll for two years at a junior college or four-year institution, studying an ESF prescribed math/science program and transfer to this college as juniors. The move to upper division/graduate college status marks another step in the College's long-standing commitment to educate professionals capable of facing the complex environmental problems of today and of the future.

For over 60 years, the full thrust of the State University of New York College of Environmental Science and Forestry has been focused on the environment on all of its six campuses and in each of its three mission areas—instruction, research and public service. The College has been, and continues to be, devoted to the advancement of environmental science and forestry.

The Mission: Instruction, Research, and Public Service

INSTRUCTION

Undergraduate Education

In the Fall of 1977, student enrollment reached 1,918. Of this number, 1,550 were undergraduates and 368 were graduate students. In addition, there were 25 students engaged in postdoctoral work.

At the baccalaureate level, the College offers professional study in seven four-year curricula: *biology, chemistry* (with options in biochemistry and natural products, environmental chemistry or natural and synthetic polymer chemistry), *forest engineering, paper science and engineering, wood products engineering* (with options in building construction or forest products), *resource management*, and *landscape architecture*. These programs are registered with the New York State Education Department.

Each of these curricula leads to the bachelor of science degree. In the case of landscape architecture, an additional year of study results in a bachelor of landscape architecture degree, and in the forest engineering program, a fifth year leading to a bachelor's degree in civil engineering can be taken at Syracuse University or State University at Buffalo.

Graduate Education

The College awarded its first graduate degree in 1913. Today the College offers advanced degrees in seven major program areas: *environmental and forest biology, chemistry, resource management and policy, silviculture and forest influences, environmental and resource engineering, landscape architecture, and environmental science*. These programs are registered with the New York State Education Department.

Graduate study leads to the master of science degree, the master of landscape architecture degree, and the doctor of philosophy degree. A postdoctoral study program, closely related to the College's research effort, is also available.

Technical Education

At the paraprofessional level, the College has been training forest technicians since 1912 at its Wanakena Campus in the Adirondack Mountains. It is the oldest Ranger School in the United States.

In 1973, a two-year *forest technology* curriculum replaced the one-year certificate program. Graduates are awarded an associate in applied science degree. In the new curriculum, students take their first year of general education at an accredited 2- or 4-year college. The second year, with its emphasis on practical field training in the relationships between forest technology and managerial needs, is taken at Wanakena with its 2,800 acres of forested land. Graduates of this degree program in practical forestry are prepared for positions as forest rangers, federal, state and private industry forest technicians and forestry aides, company district forest supervisors, timber inventory specialists, timber sales supervisors, forest surveyors and engineering aides, and forest protection technicians.

Continuing Education

The philosophy that education is a lifelong pursuit is an ancient one and was written into the law creating the College. This concept is doubly important to the sciences and professions in this technological age when,

with new knowledge bursting in all directions, major environmental problems still remain to be resolved. The informational needs of New York's citizens also are undergoing change. The increasing urban character of our population, the changing pattern of agricultural and forest land ownership and use, the rise in level of education and sophistication in a more efficient society, and the increase in leisure time, travel mobility and need for recreational facilities and pursuits all contribute to a growing need for educational opportunities in environmental science and forestry for adult audiences.

The College has, over the years, succeeded in communicating knowledge on forest resources management, utilization and conservation to a variety of off-campus publics. The entire College faculty has contributed to these programs. To reinforce this commitment, the College established a School of Continuing Education upon which to base expanded educational opportunities at both the undergraduate and graduate course levels.

Conferences, symposia, seminars and short courses on various aspects of forestry and the related sciences are conducted at both the basic and applied levels. Audiences include forest owners, managers and operators, wood engineers and forest industries personnel, academic and scientific groups, conservation and recreation personnel from local and other public and private planning groups and citizen-action committees. Upon request, continuing education programs can be designed to meet specific needs of professional organizations, agencies and industry. Credit or noncredit courses, at campus or off-campus sites, can be arranged.

Expansion of "in-service" training courses, establishment of "environmental learning centers" on College forest properties and production of media materials for public information and education are examples of activities directed toward updating and upgrading professional clients and broadening the public's awareness and appreciation of New York's forest-lands and other natural resources.

For information on specific continuing education projects, inquiries should be sent to Dean, School of Continuing Education.

RESEARCH

The College's commitment to scientific inquiry stretches far back to its second year of existence. In 1912, Dean Hugh P. Baker initiated the first research project of the College by joining forces with the U.S. Forest Service in an industry study designed to show what kinds of firms were using wood in New York State and the species and quantities of lumber they used.

In the 1970's, the College's research program has attracted a worldwide clientele of industrial, governmental, professional and scientific groups; and through liaison with them, the program maintains its vigor and relevancy to the important environmental issues of the decade. Support from this clientele amounts to about $2.9 million a year.

Students and faculty from across the College contribute to the depth and diversity of the research program. Findings from these studies are applied to

a host of issues and problems through various demonstrations and information devices. Recent examples include studies of limestone quarry reclamation; the development of polymeric materials for artificial human organs; nonchemical control measures for insect pests, e.g., the gypsy moth; studies of the ecology of Antarctic birds; and new wood pulping processes leading to pollution-free water and air effluents.

The Institute of Environmental Program Affairs

The Institute of Environmental Program Affairs (IEPA), created at the College in 1972, is an umbrella-like structure that coordinates the overall research effort of the College with the efforts of other academic institutions, public agencies and private industries for a concerted attack on compelling and complex environmental problems. IEPA culminates the College's ongoing examination of its appropriate role as a leader in environmental education for the 1970's and beyond in face of urgent appeals for multidisciplinary approaches, for problem-oriented task forces by both faculty and students, and for the greater application of higher education to society's needs. Because it is a process, the Institute preserves the identity of each collaborator: institutions, faculty members and students come together for just as long as necessary to solve a problem, then return to other ongoing areas of interest. Recent projects have included: resource and environmental studies for the St. Lawrence Eastern Ontario Commission, and the Tug Hill and Catskill study commissions; a study of wetlands evaluation systems for the Adirondack Park Agency; development of environmental impact assessment guidelines for the New York State Department of Environmental Conservation; a study of selected environmental impacts of possible nuclear power developments in New York State for the Argonne National Laboratory; and studies of the St. Lawrence River ecosystems and impacts of oil spills and extension of the shipping season for the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service, respectively.

Applied Forestry Research Institute

Much of the research being conducted at universities and institutes, while of value to long-range scientific study and technological progress, is of limited immediate application for forest practitioners. With this consideration, the Applied Forestry Research Institute (AFRI) was established in 1967 at the College with the cooperation of the New York State Department of Conservation. At the time of its founding, AFRI was charged with the task of carrying out research in the state that can be implemented at once by practicing foresters and forest resource managers.

The need for such research becomes more acute with time: the demands placed on the forest resource are ever increasing, and conservation groups are deeply concerned about the environmental impact of forestry's operations.

Research activities of AFRI include the environmental effects of forest practices, forest harvesting and forest products engineering, hardwood and conifer silviculture, forest pest and disease control, and multiple-use management planning.

There is close cooperation with the College's highly competent teaching-research faculty who provide the latest information about basic research findings by disciplines as well as supporting technical information and techniques. This liaison allows for the exchange of views between the academician and the field practitioner.

AFRI is supervised by a director, and has a staff of six full-time research associates and two technical assistants.

Empire State Paper Research Institute

The Empire State Paper Research Institute (ESPRI), located on the main campus, is the only worldwide basic research organization in the pulp and paper field. It performs investigations in cooperation with the Empire State Paper Research Association (ESPRA), which is comprised of 62 pulp and paper companies in 11 countries. The Institute was established in 1945 when the members of ESPRA recognized the need for new scientific and technical knowledge and methods, and since then ESPRI has been able to maintain an efficient balance between the practical and theoretical bases of the pulp and paper industry.

Housed in the modern J. Henry Walters Hall with its own pilot paper mill, and staffed by scientists who are internationally recognized for their accomplishments, ESPRI provides a research base for long-range industry development. Its program has widened in scope to cover almost all aspects of pulping and papermaking, including additive retention, oxygen pulping and bleaching, effluent control, sheet drying, printability, and energy efficiencies.

State University Polymer Center

In 1966 the College's polymer research institute was designated as the State University of New York Polymer Research Center in order to stimulate University-wide interest in polymer chemistry.

Scientists at the College have made many original contributions to the field of pure and applied polymer chemistry, including the development of living polymers, the study of anionic polymerization and electron-transfer initiation, and work on the permeation of gases and films through polymeric films.

College faculty members specializing in polymer chemistry have trained several hundred graduates and postdoctoral researchers, many of whom now hold leading positions in universities and industrial and governmental laboratories.

USDA—Forest Service Cooperative

The Northeast Forest Experiment Station of the USDA-Forest Service maintains a research center at the College. Until 1977, this unit pursued studies of forest centered recreation with the aim of developing improved methods for integrating recreation and other uses of forests.

Beginning in 1978, the Cooperative Research Unit will be re-oriented to research on urban environmental forestry problems. This will provide increased opportunities for faculty and students to collaborate with Forest Service scientists in studies of a variety of urban environmental problems.

Nelson Cortlandt Brown Laboratory for Ultrastructure Studies

This center, located in Baker Laboratory, is a teaching, research and service facility of the College. It is equipped to handle virtually every type of modern microscopy operation, including light, scanning electron and transmission electron. Among the major items of equipment are: an RCA EMU-3 transmission electron microscope; an RCA EMU-4, an ETEC autoscan scanning electron microscope, energy dispersive X-ray analyzer, several types of light microscopes, high vacuum evaporators and microtomy equipment.

The primary service of the center is teaching; course offerings include microtechnique, photomicrography, electron microscopy and interpretation of cellular ultrastructure. A second function of the center is to provide research on a service basis to faculty and students and to the community at large.

Adirondack Ecological Center

The Adirondack Ecological Center (AEC) is located on the College's Newcomb Campus in the center of the Adirondack Mountains. Staffed by resident scientists, technicians, and support staff, the AEC conducts studies of the Adirondack region year round. Research includes studies of managed and unmanaged forest lands, wildlife populations and habitats, terrestrial and aquatic ecology, wilderness management, etc. Work is carried on in close collaboration with the New York State Department of Environmental Conservation, the U.S. Fish and Wildlife Service, the USDA, and forest industries.

The vigorous research program of the Center provides excellent opportunities for collaboration by Syracuse based faculty and students. Several graduate students are regularly in residence at Newcomb pursuing their thesis research.

PUBLIC SERVICE

The College, throughout its 67-year history, has continued to respond to its specific legislative mission prescribing major responsibilities in the area of public service. Public education and information, technical advice and guidance to cooperating local, state and federal agencies and organizations, and technical assistance to the forest and wood-using industries constitute the principal formal public service activities. The Institute of Environmental Program Affairs (described in the Research section) coordinates the College's public service activities on the professional level.

While the list of public service contributions is lengthy, a few examples include: the College's Film Library; the Tree Pest Service, which provides technical advice to private citizens and to governmental agencies; the participation of ESF faculty members in Central New York's Poison Control Center; and membership in PACE (Planning Approaches for Community Environments), a faculty-supervised student design and planning service to benefit community development. Altogether, the public service programs of the College reach approximately one million New York State residents each year.

The Campuses

The College operates a multiple campus system with regional campuses and field stations located at Syracuse, Tully, Wanakena, Warrensburg, Cranberry Lake, Newcomb and Clayton. This system is composed of about one million square feet of facilities in 179 buildings and 25,000 acres of land. Collectively, they represent the largest fully utilized campus in the world.

THE SYRACUSE CAMPUS

The main campus is in Syracuse, and lies on 12 acres adjacent to Syracuse University, in an area that traditionally has been known as "The Hill." Located here are the Schools of Biology, Chemistry and Ecology; Environmental and Resource Engineering; Environmental and Resource Management; Landscape Architecture; and Continuing Education. In addition, the main campus houses the Institute of Environmental Program Affairs, the Applied Forestry Research Institute, the Empire State Paper Research Institute, the State University Polymer Research Center, a cooperative research unit of the U.S. Forest Service, and an ultrastructure center.

These program units are housed in five major academic buildings (Baker Laboratory and Walters, Bray, Marshall and Illick Halls). The administrative headquarters of the College is located in Bray Hall. The main campus also embraces Moon Memorial Library, the Maintenance Building and several other small service and storage facilities.

Specialized facilities at the Syracuse campus include electron microscopes, plant growth chambers, air-conditioned greenhouses, an animal environmental simulating chamber, a bio-acoustical laboratory, a 1,000-curie cobalt-60 radiation source, radioisotope laboratory, computer center, and specialized instrumentation including nuclear magnetic resonance spectrometer, electron spin resonance spectrometer, mass spectrometer, ultracentrifuge, X-ray and infrared spectrophotometer. Photogrammatic and geodetic facilities of the forest engineering department include one of the most extensive arrays of equipment in the United States, with a Nistri TA-3 stereocomparator, Mann comparator, computerized Nistri photocartograph, and nine other varieties of plotters. The paper science and engineering laboratory has a semicommercial paper mill with accessory equipment. The wood products engineering department has a complete strength-of-materials laboratory as well as a pilot scale plywood laboratory and a machining laboratory. The greenhouses and forest insectary are used

to produce plant and insect material for classroom and laboratory. Extensive collections are available for study, including wood samples from all over the world, botanical materials, insects, birds, mammals and fishes.

The **F. Franklin Moon Library** contains more than 71,000 cataloged items. Over 800 journals and corresponding indices are currently received. The collections constitute an information center for forestry and environmental science programs in ecology, botany and pathology, biochemistry, chemical ecology, forest chemistry, polymer chemistry, economics, entomology, environmental studies, industrial pollution abatement, landscape architecture, environmental design, management, paper science and engineering, photogrammetry, silviculture, soil science, water resources, world forestry, wildlife biology, wood products engineering and zoology. These are supplemented by large collections in the environmental resource field. Additional strength is found in the comprehensiveness of abstract and indexing services relevant to the College's programs. The library also offers a selected and broad choice of general-interest reading material.

The collections of Syracuse University Libraries and State University Upstate Medical Center are within walking distance. They may be used by all members of the College of Environmental Science and Forestry. Arrangements often can be made to use industrial libraries in the Syracuse area. Other collections are accessible through the Inter-library loan privilege.

The library building, opened in 1968, can accommodate 132,000 volumes and can seat 575 persons. The main reading areas are in the center of the upper level surrounding open stacks, a current periodicals room, bibliographic center, individual study carrels and library staff offices. The archives, special collections, conference rooms, audiotutorial center and informal study rooms are located on the lower level.

The audiotutorial center provides facilities for study with nonbook materials. Slides and cassettes prepared as integral units of particular courses are held on reserve for use in the center. Materials are available for review on weekends, evenings and times when other facilities are closed.

Leisure reading material is distributed throughout the total collection which represent the Robin Hood and Raymond F. Crossman collections, and contain books on national and world social problems, humanities, education and popular books concerned with the environment. The archives consist of historical items relevant to the College and forestry developments in New York State. The special collections room contains rare and valuable books and folios.

Reference service, orientation and bibliographic instruction (Library Research 300) are provided by the librarians. Study guides, user aids and other such publications are prepared and distributed by the librarians as needed.

The **Educational Communications** unit directly supports the program areas of the College through development and application of media materials and methods for the classroom, for the presentation of research findings and for public service endeavors. These include television programming, slide/tape and motion picture production and photographic services. Other

services to the College community include engineering, A-V equipment distribution, and maintenance and support functions. The Educational Communications staff also participates directly and actively in instructional programs in environmental communication at both the undergraduate and graduate levels as well as through the School of Continuing Education.

The College **Computer Center** provides computational service via terminals connected to the Syracuse University academic computer facilities. Two computer systems are accessible—An IBM-370 model 155 used for batch processing and APL, and a large Digital Equipment Corporation DEC-KL10 used primarily for timesharing applications. Computer usage can be classified into academic and administrative categories with the academic use amounting to 80 percent of the total College load. The major academic use is in the graduate programs where students investigate problems in areas such as hydrology, transportation networks, forest and tree growth studies, genetics, disease and insect behavior and controls, land use, production and processing techniques, polymer and cellulose chemistry, cellular ultrastructure, photogrammetry and remote sensing, landscape architecture, and other related and supporting fields.

THE TULLY CAMPUS

Located about twenty-five miles south of Syracuse is the Tully Campus which is composed of the Heiberg Memorial Forest and the Genetic Field Station.

Heiberg Memorial Forest is located on the northern escarpment of the Allegheny Plateau in New York. It includes 3,800 acres of diverse terrain and forest growth. The Forest is utilized both as an extensive outdoor teaching laboratory and as a site for intensive research. The Forest Ecosystem Lab, which is a highly instrumented outdoor teaching laboratory; a large complex of all-weather classrooms; many experimental plantings, some from known seed sources from throughout the world; a commercial-scale maple syrup operation; and an experimental deer research area are among the developments on this forest. Each fall the Heiberg Memorial Forest is the site of an intensive program for environmental and resource management students in a total ecosystem approach to forest community management instruction.

The **Genetic Field Station** is located adjacent to the Village of Tully, New York. It is in a particularly fertile area and is devoted to relatively short-term outplantings of plant materials developed in the various genetics research projects of the College.

THE WANAKENA CAMPUS

The Wanakena Campus is located on the Oswegatchie River, 65 miles northeast of Watertown, New York, and 35 miles west of Tupper Lake, New York. This campus, with its large instructional and demonstration forest, supports the College's **School of Forest Technology**, the oldest forest technician school in the country. It is on this campus that forest technicians are trained in an associate degree program.

THE WARRENSBURG CAMPUS

The Warrensburg Campus is located in the southeastern Adirondack region and encompasses the Charles Lathrop Pack Demonstration Forest, an area of roughly 2,500 acres of heavily forested land noted for its white pine. The Forest has been under intensive management since 1927 for the combined purpose of instruction, research and demonstration in forestry and allied fields.

Each week this campus hosts the Summer Session in Field Forestry, a five-week course devoted to introductory instruction in field forestry principles and techniques. The course is required of all entering students in Environmental and Resource Management and is open to election by students in Environmental and Forest Biology. Formal offerings in Continuing Education and various meetings and conferences are also held here for practicing professionals and organizations directly associated with forestry and allied environmental fields.

THE CRANBERRY LAKE CAMPUS

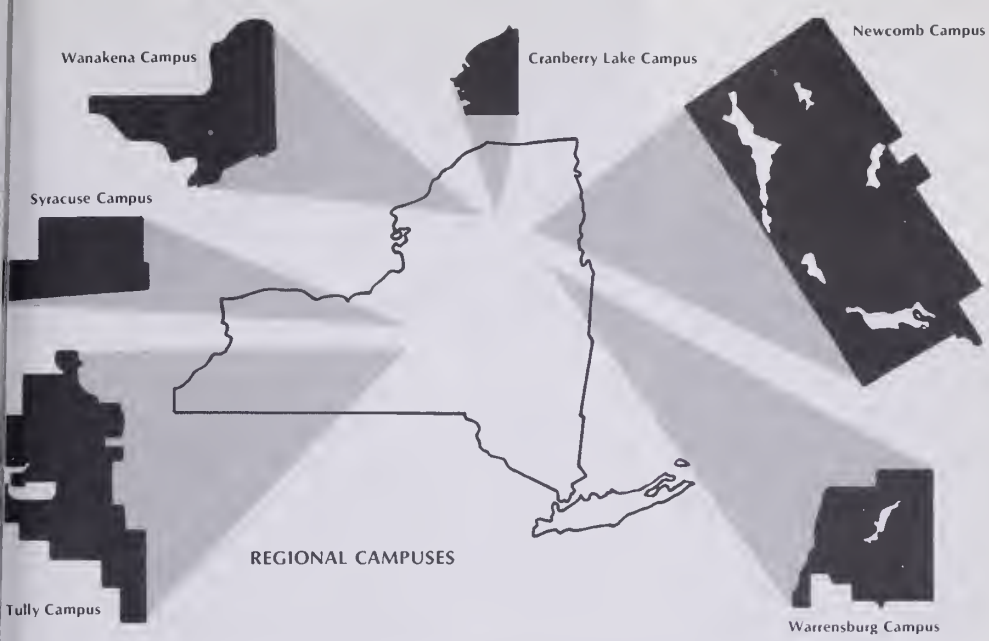
The Cranberry Lake Campus, accessible only by water, is the site of the College's biological station, where, every year, a cooperative program in environmental biology is sponsored jointly by the College and other institutions of higher education. Bounded by 150,000 acres of forest preserve, by Cranberry Lake, and by isolated forest bogs and beaver meadows, the extensive facilities are intensely utilized in a comprehensive curriculum of upper-level and graduate courses.

THE NEWCOMB CAMPUS

Located in the central Adirondack Mountains, Newcomb is the largest of the regional campuses and home to the **Adirondack Ecological Center** where extensive studies of animal biology and ecology are carried out. Located there also is **The Archer and Anna Huntington Wildlife Forest**.

THE FIELD STATIONS

In addition to its Regional Campus System, the College operates several field stations which directly support the programs of the institution. The 44-acre **Forest Experiment Station**, located only a few minutes drive from the main campus, is used to support main campus academic programs. Located at the Station are a large arboretum, tree nursery and experimental greenhouse facility. Adjacent to the Tully Campus is the College's **Genetic Field Station**. With its irrigation system and layout of level blocks, it is an excellent facility for developing hybrids, for grafting experiments, and for research in heritability. A magnificent island, the **Ellis International Laboratory**, is situated in the heart of the Thousand Islands-St. Lawrence River area off the village of Clayton. Accessible only by water, this laboratory, which is the College's most recent property acquisition, is an unusually appropriate site for the College-wide, cooperative and international environmental monitoring and research activities.



REGIONAL CAMPUSES


Larry's
PIZZA
SANDWICHES
TAKE OUT & DELIVERY
OUR SPECIALTY

The Syracuse Metropolitan Area

The College of Environmental Science and Forestry is located on one of several hills that overlooks Syracuse, a growing metropolitan area of nearly 500,000. Known as the "Salt City" because of the great salt industry which was centered here for more than seventy years, Syracuse is today a city of diversified industry and commerce. The area is a leader in the manufacture of china, quality shoes, air-conditioning equipment, medical diagnostic equipment and decorative home accessories.

The City of Syracuse offers students many cultural, recreational and educational opportunities, including a symphony orchestra, several museums, live theater and historical points of interest.

Called the "Crossroads of New York State," Syracuse is one of the few cities in the nation situated at the crossing point of two major superhighways. It is located at the intersection of the 500-mile east-west New York State Thruway and the north-south Penn-Can Highway. Driving time from New York City, Philadelphia, Boston, Toronto and Montreal is about five hours; from Buffalo and Albany about three hours. The city is served also by a modern international airport and major bus and rail lines.

Admission

The College of Environmental Science and Forestry at Syracuse is an upper division/graduate center, enrolling only college juniors, seniors and graduate students. The College has reorganized its academic structure and expects to complete the change to a fully Upper Division/Graduate Center by 1980.

Admission to the College is for transfer students only; there are no freshmen admitted.

High school students who think they may wish to transfer into Environmental Science and Forestry at the junior level should enroll in a math/science transfer program at any college of their choice. Only those students who will have completed at least two years of postsecondary coursework appropriate to their intended curriculum will be considered for admission to the College. Each curriculum listed in this catalog defines the required lower-division courses necessary for admission to its upper-division program.

For the benefit of high school students who are already certain that they wish to enter Environmental Science and Forestry, dual-enrollment programs have been established with the following SUNY units:

Columbia-Greene Community College
Herkimer County Community College
Monroe Community College
Nassau Community College

For the student who wishes to attend a private four-year college, this same arrangement is available through Syracuse University.

Upon successful completion of the freshman and sophomore years of the program at these schools, the student is guaranteed admission to the College of Environmental Science and Forestry at the junior level. Information on the dual-enrollment program is available from the individual participating colleges.

ADMISSION

For those students not in the dual-enrollment program, admission to the College of Environmental Science and Forestry is based on the student's previous college coursework, overall academic aptitude, and interest in the programs offered at this College. Consideration is given to both the quality and appropriateness of the student's prior academic experience. The minimum grade point average for acceptance is 2.0 (4.00 = A).

High school students who wish to apply to the Forest Technology program (Associate Degree) for entrance to Wanakena in 1980 must do so this year (one year in advance). Students currently in college may apply for this year as transfer students—for further information see page 108.

If you have further questions, contact the Office of Admissions at the College of Environmental Science and Forestry.

TRANSFER CREDIT

Courses transferred for credit must be appropriate to the student's curriculum choice. Credit will be awarded for all such courses completed with a passing grade of "D" or better.

Furthermore, courses to be transferred as required courses in a curriculum must be acceptable in content. Course credit hours are transferred, but grades and grade points are not.

No transfer credit will be awarded until all final transcripts are received. It is the student's responsibility to see that this is done.

COLLEGE PROFICIENCY EXAMINATIONS

The New York State College Proficiency Examination Program (CPE) is a means by which students may receive college credit for specific courses by examinations, without being in residence for a course or taking structured correspondence lessons. College credit is generally awarded for a grade of "C" or better. The College also accepts credits from the College Level Examination Program (CLEP) of the College Entrance Examination Board.

INTERNATIONAL STUDENTS

The College accepts international students on the undergraduate level if they can satisfy all regular admission requirements. It is recommended, however, that students from foreign countries obtain their baccalaureate degree in their home country, and apply to the College as graduate students. Experience has shown that this arrangement provides for greater academic achievement and more efficient use of the student's time and funds. International students applying for admission must satisfy all of the course prerequisites for their intended major. In addition they must:

1. Demonstrate proficiency in the English language through acceptable performance on the Test of English as a Foreign Language (TOEFL) and/or the College Entrance Examination Board (CEEB) Achievement Text in English, and
2. Produce evidence of their ability to meet all their financial obligations.

Undergraduate international students must file official State University of New York foreign student admission forms. No fee is required for processing the application. Prior to international student acceptance, adequate financial resources must be demonstrated, and after acceptance health and accident insurance must be obtained before the student will be allowed to register at the College.

International students who are currently at an American college may apply for transfer to the College. They must meet all entrance requirements of

international students plus those of a transfer student as listed above. Permission to transfer must be obtained from the U.S. Immigration and Naturalization Service district office having jurisdiction over the College in which the student is currently enrolled.

HEALTH EXAMINATION BOARD

Each new student is required to submit a medical history and physical examination report on a form that will be sent after the initial acceptance notice.

Student Expenses

APPLICATION FEE

When a student applies for admission to any of the State University of New York units, a nonrefundable application fee of $9 is required. More information about the fee and guidelines for exemptions is provided in the "Application Guidebook" for the State University of New York.

ADVANCED PAYMENT FEE

All students pay a fee of $50, which is credited to the student's first semester tuition. This payment should be sent to the Business Office, SUNY College of Environmental Science and Forestry, Syracuse, New York 13210, accompanied by the form provided by the Office of Admissions. The payment is required prior to May 1, or 30 days after acceptance, whichever is later. It is refundable up to May 1, or within that 30-day period.

TUITION AND FEES

The tuition and fee structure of the College of Environmental Science and Forestry covers usage of library, infirmary, physical education facilities, ROTC, special testing, and other services, as well as an assessment for student activities and charges for expendable supplies and equipment.

Tuition is charged at the following rate per semester:

Matriculated Undergraduate	New York State Resident	Out of State Resident
Full-time	$450	$750
Part-time	$30 per credit hour	$50 per credit hour
Nondegree student who does not hold a Baccalaureate degree courses numbered:		
0-299	$25 per credit hour	$40 per credit hour
300-599	$30 per credit hour	$50 per credit hour
Nondegree student who holds a Baccalaureate degree Courses numbered:		
0-499	$30 per credit hour	$50 per credit hour
500-599	$58.50 per credit hour	$75 per credit hour

STUDENT ACTIVITY FEES

In addition to tuition, the student body has voted to assess each student $20 per year to cover the cost of student activities. ESF students also pay

yearly Syracuse University fees to cover the costs of the many student activities they participate in; these fees are $24.75 for full-time students and $14.50 for part-time students. An optional yearly fee of $3 supports Syracuse University's Public Interest Research Group (PIRG).

OTHER FEES

There is a General College Fee of $25 per year for all full-time students. In addition, all students pay $20 per year State University Health Services fee (Wanakena students exempted).

COMMENCEMENT FEE

A commencement fee of $10 for students at Syracuse Campus, and $20 for Wanakena students, is required at the beginning of the semester in which the degree is expected.

TERMS OF PAYMENT

A check or money order for tuition and fees should be made payable to State University of New York College of Environmental Science and Forestry. This payment is required by the last day of the registration period and can be paid at the College's Business Office either prior to registration or during registration. A fee of $10 is charged for registering later than the established dates.

HOUSING AND BOARD COSTS

Depending on the room, housing costs at Syracuse University range from $970 to $1,200 for an academic year. Most rooms accommodate two students and are furnished with beds, mattresses, desks, chairs, study lamps and dressers. A commercial linen service is available to those who order it.

A variety of options on board offerings are available for all students. Costs range from $860 to $1,000 for an academic year.

Housing and board rates are subject to change, and inquiries about them should be addressed to Office of Residential Life, Syracuse University, Syracuse, New York 13210.

Payment for housing and board is made directly to Syracuse University.

A $50 housing deposit is required and is refundable to June 1.

OTHER COSTS

Students majoring in Resource Management attend a five-week Summer Session in Field Forestry at the Warrensburg Campus between the sophomore and junior years. The basic cost is approximately $275 plus travel and personal expenses.

Forest Biology majors attend either the Summer Session in Field Forestry (end of sophomore year) or the Summer Session in Environmental Biology at the Cranberry Lake Biological Station (end of junior year). Cost for the five-week session is approximately $275 plus travel and personal expenses.

An extended field trip of up to three weeks at the end of the junior year costs approximately $200 for Wood Products Engineering students.

Field trips for Landscape Architecture students range between $125 and $150. In addition, students enrolled in the 5-year Landscape Architecture program are required to spend one semester off campus. This is a self-described and student-budgeted program. Costs do not necessarily exceed those of a semester on campus, but additional costs are often incurred depending upon the location chosen.

The cost of books and supplies is approximately $200-300 a year. Additional costs for personal expenses, recreation, clothes and travel depend on the individual, and they may range from $500 to $700 a year.

REFUNDS

The following policies apply to tuition liability and refunds for students canceling their registration.

A student who is given permission to cancel registration is liable for payment of tuition in accordance with the following schedule:

Liability During	*Semester*
1st week	0
2nd week	30%
3rd week	50%
4th week	70%
5th week	100%

Application for refund must be made within one year after the end of term for which the tuition was paid to State University. The first day of class session is considered the first day of the semester, and Saturday of the week in which this first session occurs is considered the end of the first week for refund purposes. It is interpreted that a student who does not attend any class sessions after Saturday of the first week and who notifies the College of his intent to cancel registration on or before the second Saturday following the first day of classes will be considered to have canceled his registration during the first week.

There is no tuition or fee liability established for a student who withdraws to enter military service prior to the end of an academic term for those courses in which the student does not receive academic credit.

A student who is dismissed for academic or disciplinary reasons prior to the end of an academic term is liable for all tuition and fees due for that term.

A student who cancels registration at a unit of the State University and within the same term registers at another unit of the State University is entitled to full credit for tuition and fees paid for that term.

Notwithstanding any other provisions for refund, when a student has withdrawn through circumstances beyond the student's control, under conditions in which the denial of refund would cause undue hardship, the Chief Administrative Officer of the unit may, at his discretion, determine that no liability for tuition has been incurred by the student, provided the student has not completed more than one half of the term and has not received or will not receive academic credit for the term. Such action, including the reason for withdrawal, must be in writing.

Financial Assistance

The College of Environmental Science and Forestry offers three basic forms of student financial assistance: scholarships or grants, part-time employment and long-term loans. These programs are coordinated to supplement parental support, summer work, savings, and assistance from other sources. The sources of funds for financial assistance programs, the guidelines for determining the recipients, the procedures for applying, and the method of disbursement of funds vary from one program to another. This information is presented in detail in *Financial Assistance at ESF*, a separate publication which is available by contacting the Office of Financial Aid.

Financial aid advisors are aware of the many problems of financing higher education and meeting day-to-day living expenses and are available to discuss individual student problems.

HOW TO APPLY

Each year students interested in receiving financial assistance must complete the application process. Two forms are necessary to apply:

1. The candidate must complete a COLLEGE APPLICATION FOR FINANCIAL AID and return it to the Office of Financial Aid by MARCH 15. The application is included in the publication, *Financial Assistance at ESF*. Applications will be accepted after March 15; it should be noted, however, that available funds may already be committed to other students. Applicants need not wait for notification of acceptance to the College before applying for financial aid.
2. The candidate must also complete the FINANCIAL AID FORM (FAF) available in the College's Office of Financial Aid, high school guidance and most college financial aid offices.
3. Students are invited to discuss with the professionals in the Financial Aid Office any problems in financing their education.

SELECTION OF RECIPIENTS

In making award decisions, consideration is given primarily to comparative financial need; however, scholastic standing, character, and potential contribution to the College community are also factors in making certain awards.

SCHOLARSHIP AND GRANT PROGRAMS

Supplemental Educational Opportunity Grants

The College is the recipient of funds authorized under Title IV-A of the Higher Education Act of 1965, as amended. These funds enable the College to award grants to students who have high financial need. Grants range from $200 to $1,500 per year and must be matched by other awards.

Forestry Educational Opportunity Grant Program

Students accepted into the FEOP may receive partial tuition waivers and grants to help meet the cost of their education. Students must come from a socio-economically disadvantaged background to be eligible for this program. Prospective FEOP students must apply for financial aid concurrent with their admissions application.

Basic Educational Opportunity Grants

The BEOG Program was authorized in the Education Amendments of 1972. Grants are available to eligible full-time and half-time students. The amount of the award can vary from $200 to $1,600.

Applications are available from high school guidance offices or any college office of financial aid. Students should submit the Student Eligibility Report (SER) to the Office of Financial Aid as soon as it is received from the processor.

Tuition Waivers for International Students

Tuition waivers may be granted each year to qualified students from foreign countries. Interested students should contact the Assistant Vice President for Academic Programs or the Director of Admissions.

Regents Programs

Additional information and applications for the following programs are available from the College or:

New York Higher Education Services Corporation
Tower Building
Empire State Plaza
Albany, New York 12255

REGENTS COLLEGE SCHOLARSHIPS

High school students who are New York State residents may qualify for a $250 annual scholarship by taking a competitive exam during their senior year.

TUITION ASSISTANCE PROGRAM

These awards are available to New York State residents who are enrolled in full-time degree programs. Based on income, awards range from $200 to full tuition.

REGENTS GRANTS FOR CHILDREN OF DECEASED OR DISABLED VETERANS

These grants are awarded to children of parents who served during specific periods of war or national emergency and who died as a result of such service, or suffered a disability of at least 50 percent. The award entitles a New York State resident to $450 per year.

Vocational Rehabilitation Grants

Financial assistance and program counseling are provided by New York State for students with disabling handicaps. Information is available from any Office of Vocational Rehabilitation.

Veterans' Benefits

The Veterans' Readjustment Benefits Act of 1966 as amended enables veterans and children of deceased or disabled veterans to obtain financial aid for their college education.

Additional information and counseling are available from the Veterans' Affairs Counselor at the College. Local veterans' administration offices, or the State Regional Office, 111 West Huron Street, Buffalo, New York 14202, can provide information and application forms.

Social Security Benefits

The 1965 Amendments to the Social Security Act extended the age limit for a child's benefits from 18 to 22, providing the child is a full-time student. Local Social Security offices have additional information.

Assistance for Native American Students

Native American students with financial need may be eligible for scholarship and grant assistance through programs sponsored by the Federal Bureau of Indian Affairs and the New York State Education Department. For more information about the programs, students should contact local Agency offices. The Bureau of Indian Affairs, 1951 Constitution Avenue NW, Washington, D.C., or the Native American Education Unit, State Education Department, Education Building Annex, Albany, New York 12234.

Private Scholarships and Grants

The College administers a number of programs which have been established by private individuals, companies, organizations and foundations. These scholarships and grant programs have varying eligibility requirements and are awarded to students according to their respective guidelines which are described in more detail in *Financial Assistance at ESF*. The following is a list of the programs: Alumni Memorial Awards, Alumni Educational Grants, Nelson Cortlandt Brown Scholarship Fund, Henry H. Buckley Student Aid Award, New York State College of Forestry Foundation, Inc., Portia Farrell Morgan Scholarship, Phyllis Roskin Memorial Award, and Student Association Grants.

Syracuse Pulp and Paper Foundation, Inc. Scholarships

Scholarships from this foundation are awarded to students majoring in paper science and engineering. The scholarship amount is $100 more than the recipient's annual tuition charge. Incoming transfer students entering the program should request a Pulp and Paper Scholarship application from the Office of Financial Aid. It is necessary to reapply each year for the scholarship.

State University Supplemental Tuition Assistance

A limited number of small grant awards are determined annually by the College for students with financial need.

EMPLOYMENT OPPORTUNITIES

College Work-Study Program (CW-SP)

The College participates in the Federal College Work-Study Program. This program provides part-time jobs during the academic year and full-time positions during the summer to students who need financial assistance to attend the College.

Other Employment

The college coordinates and maintains lists of part-time and summer employment opportunities. Interested students should contact the Coordinator of Career Services for additional information.

A part-time employment program is available to qualified veterans. More information is available from the Veterans' counselor at the College.

LOANS

National Direct Student Loans

These loans are available to students with financial need who are enrolled at least half-time. An aggregate of $6,000 is the maximum an undergraduate can borrow, and $10,000 is the aggregate a graduate student can borrow. Repayment and 3 percent interest begin 9 months after leaving college. Deferment and cancellation benefits are available for certain situations.

Insured Student Loans

This program is administered by the New York Higher Education Services Corporation (NYHESC) for New York State residents. These loans are available from a bank or other lending agent to students who are registered at least half-time. Undergraduates can borrow an aggregate of $7,500 for their undergraduate studies, and a graduate student can borrow an aggregate of $15,000. Repayment and 7 percent interest begin 9 months after leaving college (an additional 1 percent interest is paid at the time the loan is received). Applications are available at local banks or at the Office of Financial Aid.

Emergency Loans

The College is able to provide registered students interest-free, short-term loans. These loans are available because of the interest and support of the following donors: Alumni Association Short-term Loan Fund, C. Ives Gehring Memorial Fund, Milton Hick Memorial Fund, James D. Judson Memorial Fund, David B. Schorer Memorial Fund and Edward Vail Emergency Fund.

Students should contact the Office of Financial Aid when need arises for a short-term loan.

Student Life

HOUSING

The College of Environmental Science and Forestry does not operate its own residence facilities or food service. Students enter into a Room and Board Agreement with Syracuse University, which is adjacent to the State-operated College. Contracts for room and board made with Syracuse cover a full academic year (fall and spring semesters) and are not normally renegotiable during that time period.

Students have a choice of living centers at Syracuse University—large halls, apartment houses, cottages, fraternities and sorority houses, or cooperative units. Graduate student resident advisors live on each floor or in each unit and are available for counseling, advisement and referral services.

Syracuse University also has housing units available for married students and their families. While veterans are given preference, nonveterans too can usually find housing.

Students who wish to live off campus may contact Alternative Action Services (ALTERACTS), a student-run housing organization at Syracuse University. An extensive listing of available housing in the Syracuse area is provided free of charge.

FOOD SERVICE

All undergraduate students living in Syracuse University Housing (except those in University apartment, co-ops, and fraternities and sororities) are required to be on a University Board plan. Different Board plans exist to help meet varying nutritional needs of individual students. The College does not provide a food service program; however, a snack bar is available for the convenience of students. The Nifkin Lounge Snack Bar is located in the basement of Marshall Hall and is open from 8:30 a.m. to 3:30 p.m. during the academic year.

EXTRACURRICULAR ACTIVITIES

Students at the College of Environmental Science and Forestry have many extracurricular activities to choose from, both on campus and in the community.

At the College

ESF students elect class officers annually, and the *Student Council* is the official representative body governing extracurricular affairs.

Among the departmental organizations which offer students an opportunity to broaden their knowledge and to meet other students with similar interests are: *Archery Club* for those interested in field archery; a *Basketball Club; Bob Marshall Club*, an organization of students concerned about the future of the Adirondack Mountains; the *Forestry Club*, the traditional sponsor of the intercollegiate Woodsmen's Team; *Botany Club*; *Mollet Club*, an organization of landscape architecture students; the *Paper Recycling Club*; *the Papyrus Club*, organized by paper science and

engineering students as a way to keep up with new developments in the industry; the *Wood Products Engineering Club*, a group that sponsors guest speakers and noted lecturers; and the *Zoology Club*, which sponsors lectures, films and field trips.

Other groups on campus include *Saengerbund*, the College glee club; *Robin Hood*, the all-junior honor society; and *Alpha Xi Sigma*, senior honorary society. There are also student chapters of the *Wildlife Society*, the *Society of American Foresters*, the *American Fisheries Society*, the *American Water Resources Association* and the *Forest Products Research Society*.

The two major student publications at ESF are the *Knothole*, a weekly newspaper, and *The Empire Forester*, an annual yearbook which has won many awards in past years.

At Syracuse University

Students at the College of Environmental Science and Forestry have all the privileges of Syracuse University students; participation in student government, organizations, sports and other extracurricular activities is open to them.

Men and women at the College participate in all Syracuse University intercollegiate sports, club sports and intramurals. Archbold Gymnasium on the Syracuse University campus is the center of athletics and physical education. Additional indoor facilities are provided through Manley Field House which is the site of Syracuse University home basketball games. Facilities at Skytop recreation area include ski tows and a ski jump, a lodge and 22 tennis courts. The Women's Building offers instructional, social, and recreational facilities. All full-time undergraduate women are eligible to participate in intercollegiate competition in tennis, field hockey, volleyball, basketball, swimming and diving.

Students are provided with many opportunities for acquiring musical training and performing experience through the Syracuse University Band, (Symphonic Band, Wind Ensemble, Stage Band, Concert Band and Jazz Workshops), the Syracuse University Orchestra, and the Syracuse University Chorus.

Membership is allowed in all Syracuse University student groups including a wide variety of clubs, the International Student Association, religious and military organizations, and professional and honor societies.

In the Syracuse Area

The City of Syracuse and its surrounding countryside offer many cultural, educational and recreational opportunities. The city has several fine museums, including the Everson with its outstanding collection of works by local, regional and international artists; a local repertory theater; several points of historical interest; a professional symphony orchestra; and a Civic Center which attracts artists from around the world.

Eight parks lie within the city limits; numerous county and state parks, including Beaver Lake Nature Center and Montezuma Wildlife Reservation, are within a short drive.

In the summer, golf enthusiasts have 23 public courses to choose from; water sports fans travel to nearby Lake Ontario, Oneida Lake and the Finger Lakes. Winter sports, especially skiing and skating, abound in Central New York. Special annual events include the New York State Fair, the Scottish Games and Regatta Weekend.

COLLEGE SERVICES

Academic and Personal Counseling

The Office of Student Affairs is available throughout the students' college career as a place where they may seek, at any time, the advice of experienced counselors. This office should be the first contact when questions or personal problems arise. General advisement for international students is provided by the Office of Counseling and Scheduling at ESF and by the International Student Office at Syracuse University. The Director of Counseling and Scheduling is available as needed to provide information and guidance on general academic and specific program requirements. The College Registrar maintains the student's record of academic achievement during his enrollment at the College and handles the registration process. In addition, the Director of Financial Aid provides information on available scholarships, long-term State and Federal educational loans, work opportunities at the College and assistance with major financial problems.

Traditionally, the College faculty has placed emphasis on academic advisement both formally and informally to meet individual student needs and considers this close faculty-student association to be a major academic strength. During registration, the student is assigned to a faculty advisor for assistance, as needed, in curriculum decision, program development and elective decisions. In curriculum selection, special advisors are assigned to provide academic advice as needed. Faculty in the major departments are also available for academic guidance. In addition, many classes are small, permitting students ample opportunity to discuss their courses and professional aspirations with instructors. While advice and counsel are available on an individual basis, students at the College are encouraged early in their careers to become independent and responsible for their academic decisions.

Career Services

Selecting an appropriate career and securing meaningful employment is an ongoing process subject to many variables, and based on an individual's experience and abilities. Helping a student sort through options, become aware of opportunities, and develop skills necessary to gain one's desired occupation is the concern of the Career Services Office.

The objective of this office is to provide a variety of opportunities through resource materials, programs, and job development and counseling, to meet the individual needs of each student at his/her various stages of career readiness. Some services offered by the Career Services Office are workshops, seminars, lists of full-time, part-time, and summer jobs, recruiting programs, advanced study information, counseling, newsletters,

reference materials, an out-reach program in the Library, and an alumni job list.

Each year this office conducts a placement survey to monitor the success and progress of our college graduates. The reports are shared with the college community and made available to the public upon request.

Veterans' Counseling

Veterans can receive personal counseling on social, financial or academic problems through the Office of Student Affairs. Information and application forms for V.A. Educational Benefits, Tutorial Assistance, Work-Study Allowance and the ESF Veterans' Tuition Deferral Plan are available upon request. A Veterans Administration representative is available periodically for information pertaining to veterans' welfare and benefits while on campus.

Other Counseling

Full-time ministries are provided in all the major religious groups. They center their programs at Hendricks Chapel, except for Roman Catholics, who are served at St. Thomas More Chapel. The Dean of Hendricks Chapel coordinates religious activities, working with several full-time and part-time denominational chaplains and advisors. The program of St. Thomas More Chapel is under the direction of a chaplain.

Faculty act as advisors to extracurricular clubs and organizations at the College. The Office of Student Affairs also provides assistance and counseling in the area of student activities.

Resident advisors are located in all University dormitories and are available for assistance if needed.

As students reach the end of their undergraduate years, they often seek career guidance. Highly motivated students should consider the question of whether or not to continue their education in graduate school. At the College, this sort of counseling is handled by the departments or divisions in which the major work is taken and the Office of Career Services.

Health and Medical Facilities

Students may consult a physician for medical care or health advice at the Syracuse University Student Health Service. Full-time students are entitled to unlimited visits to the out-patient clinic and also 10 days of confinement per college year with ordinary medical care in the infirmary. Infirmary usage over 10 days will be at prevailing infirmary rates. Some laboratory examinations, if necessary for treatment or diagnosis of common illness, are provided without cost. Most common legal drugs are provided at a minimal charge.

A student accident or sickness insurance plan, available at Fall registration, not only supplements the usual infirmary privileges, but is also a health protection during the summer months when students are not under the care of the Health Service. Married students with dependents who are not covered by Health Service privileges are strongly urged to provide themselves and their families with special insurance made available to University students. *All international students are required to carry health and accident insurance.*

ROTC Opportunities

Students attending the SUNY College of Environmental Science and Forestry are eligible to participate in the Army or Air Force ROTC Program at Syracuse University.

ROTC at Syracuse University consists of both 4- and 2-year programs. Students attending the College of Environmental Science and Forestry for two years can gain admission to either the Army or Air Force program through participation in summer training. Both six week camps and on-campus programs are available to suit individual needs.

The ROTC programs offer academic instruction, alternate and supplementary career opportunities, leadership experience and financial aid.

For more information contact the appropriate ROTC Department at Archbold Gym, Syracuse University, Syracuse, New York 13210.

Speech and Hearing Clinics

The Gebbie Speech and Hearing Clinics provide remedial assistance to all regularly enrolled students who may be handicapped by hearing, speech and voice disorders. This service is free to students.

Psychological Services and Research Center

Students desiring an analysis of their aptitudes, abilities and interests may secure special testing programs at the Testing and Evaluation Service Center on the Syracuse University campus.

Reading and Language Arts Center

The Syracuse University School of Education, in cooperation with the College of Arts and Sciences and the Psychological Services and Research Center, maintains a reading and language arts center for research in the learning skills and for training teachers and specialists in reading and language arts. Representatives from the fields of medicine, speech and psychology cooperate in making diagnoses and in planning remediation. Large numbers of University students use this facility to improve their reading skills.

Alumni Association

The Alumni Office serves as the liaison between the College, the Alumni Association Board of Directors and more than 6,000 alumni. The Association supports educational programs through scholarships, publishes a quarterly newsletter and represents alumni concerns.

Undergraduate Rules and Regulations

The complete listing of guidelines for all undergraduate students attending ESF is found in a separate publication, the *Student Handbook*, which is distributed at registration. Also distributed at registration are copies of "Rules and Regulations of Conduct and Behavior" which pertain to all members of the College community. It is the student's responsibility to be familiar with these regulations and abide by them.

Academic Life

STUDENTS AND FACULTY

Education in the classroom, laboratory and field is a cooperative endeavor between students and faculty and is an enriching experience for both. This two-way communication is traditional at the College, so much so that deans and department chairmen, with considerable administrative duties, still meet classes and consider it a privilege to do so.

The teaching and research faculty number about 150. Selected professors are designated as graduate faculty, but they also teach undergraduate courses and are available for undergraduate consultation. Many of them serve as advisors to undergraduates, a practice which is particularly helpful to students seeking advanced degrees.

ACADEMIC ADVISEMENT

Upon arrival at the College, each student is assigned to a faculty advisor who can provide the student with information and advice on courses and programs both at the College and at Syracuse University. The success of this program rests largely upon the student to take the initiative in seeking assistance.

ATTENDANCE

In general, undergraduates are expected but not required to attend all of their scheduled classes. Faculty members may make regular class attendance a course requirement.

The College conforms with Section 224-2 of the State Education law which allows students who are unable to attend classes on a particular day or days because of their religious beliefs to be excused from examinations and study or work requirements. An equivalent opportunity to make up such requirements will be made available to those absent from classes for this reason.

CREDIT HOUR LOAD

A normal schedule for a full-time student at the College is defined as 12 or more credit hours per semester up to and including 20 hours.

GRADES AND GRADE POINTS

College academic records list credit hours, grades and quality points. For each course completed, one of the following grades will be awarded:

Grade	*Definition*	*Quality Points*
A	Excellent	4.0
A-		3.7
B+		3.3
B	Good	3.0
B-		2.7
C+		2.3
C	Passing	2.0
C-		1.7
D	Minimum Passing	1.0
F	Failure	0

GRADE POINT AVERAGE

The student must obtain a C average (2.0) to be in good academic standing. The student's cumulative average is determined by dividing the number of credit hours carried into the total number of grade points earned for those hours.

COLLEGE HONOR LIST

Students who have carried a minimum of 12 credit hours of coursework and who have achieved a minimum semester average of 3.0 are placed on the College Honor List for that semester.

PROBATION

A student whose cumulative or semester grade point average falls below 2.0 will, after review by the Undergraduate Academic Affairs Committee, either be placed on probation or academically dismissed.

FAILURES AND INCOMPLETES

A student who fails a required course must repeat it.

A student is allowed one semester in which to make up an incomplete; failure to do so results in an F.

GRADUATION REQUIREMENTS

To meet the academic requirements for graduation, a student must:

1. be in residence at the College during the year;
2. complete the total course requirements of the approved degree program;
3. have a minimum cumulative grade-point average of 2.00

COMMENCEMENT HONORS

Commencement honors are awarded to those students who have attained one of the following academic averages: *cum laude*, 3.0; *magna cum laude*, 3.34; *summa cum laude*, 3.83.

Areas of Study

The College offers the Bachelor of Science degree in the areas listed under the following Schools:

SCHOOL OF BIOLOGY, CHEMISTRY AND ECOLOGY

Environmental and Forest Biology with concentrations in plant science, forest pathology and mycology, entomology, fish and wildlife biology and management, zoology, ecology, pest management, or silvics.

Chemistry with concentrations in biochemistry and natural products chemistry, environmental chemistry, or natural and synthetic polymer chemistry.

SCHOOL OF ENVIRONMENTAL AND RESOURCE ENGINEERING

Forest Engineering

Paper Science and Engineering

Wood Products Engineering with options in building construction, or forest products in which emphases may be chosen in marketing, production systems engineering, or wood science.

SCHOOL OF ENVIRONMENTAL AND RESOURCE MANAGEMENT

Resource Management with concentrations in forest resource science, management science, environmental education and communications, urban forestry, world forestry, or applied resource management.

SCHOOL OF LANDSCAPE ARCHITECTURE

Environmental Studies

The College offers the Bachelor of Landscape Architecture degree through the School of Landscape Architecture.

Only those students who will have completed at least two years of freshman and sophomore lower-division coursework at a two-year or four-year college or university will be considered for admission to the upper-division, baccalaureate degree programs of the College. On the following pages, each program describes its lower-division and upper-division requirements. Students who have any questions concerning specific course requirements at the lower or upper division should contact the Office of Admissions. Please note the lower-division requirements vary from program to program.

THE SCHOOL OF BIOLOGY, CHEMISTRY AND ECOLOGY

The School of Biology, Chemistry and Ecology offers two curricula which support environmental science and forestry through the Department of Environmental and Forest Biology and the Department of Chemistry.

Environmental and Forest Biology

The environmental and forest biology curriculum is designed to provide biologists with a firm foundation in basic biology and the principles of forest ecosystems and environmental science. Also, the effective management and protection of forests and related natural resources are becoming increasingly dependent upon research and professional guidance by biologists for enhanced productivity of goods and services and for solutions to environmental problems. Therefore, the program is designed principally for students planning graduate study. Those planning to seek positions as biologists after receipt of the baccalaureate degree also have ample opportunities during the junior and senior years to meet a wide range of career goals through academic advisement and careful selection of courses.

The diversity of these goals is such that new opportunities appear each year in a dynamically changing array. The department is committed to meet these changes by maintaining up-to-date descriptions of current and emerging careers and their course requirements. Biologist positions are available in such areas as forestry, recreation, research, plant science, animal science, soil science, fish and wildlife management and biology, and pest management of insects and plant pathogens. Understanding the tolerance of living systems to environmental impacts caused by man's activities adds a new and increasingly important dimension to societal service which a well trained biologist can render.

Requirements

The curriculum is built around a core of required courses which provide the student with a general education, an orientation to forestry, and a basic background in the principles of the biological and the physical sciences. Its design develops breadth in biology as well as depth in a selected biological field. Thus, although individual curriculum tracks may vary, all students major in biology and each, with an assigned advisor, develops special career plans.

A total of 125 credit hours is required for the Bachelor of Science degree. In addition to the core courses specified below, at least 21 hours in biology must be completed. These courses should be compatible with the intended concentration of study and must be at the 300 level or above. Six of these 21 credit hours must involve subject matter in Plant Science (courses designated FBO) and six credit hours in Animal Science (courses designated FEN, FZO), both exclusive of the five-hour summer field requirement. The balance of the required hours are chosen in consultation with the advisor.

Lower Division Courses

Since training in residence begins normally at the junior level, the curriculum facilitates transfer of freshman and sophomore credits from other institutions. It is recommended that students seeking entry should have successfully completed a minimum of 60 credits which include:

Course Area	*Credit Hours*
General Chemistry with Laboratory	8
Organic Chemistry with Laboratory	8
General Physics with Laboratory	8
Mathematics, through Integral Calculus	6-9
English	6
Social Sciences—Humanities*	9-12
General Botany and Zoology **OR** General Biology with Laboratory	8
Biology Electives	3-6
TOTAL MINIMUM LOWER DIVISION CREDITS	60

*A course in technical writing and/or speech is recommended as part of the Social Science—Humanities group.

Upper Division Courses

Junior Year			*Credit Hours*
First Semester	FBO 315	Dendrology	3
	FBL 320	General Ecology	3
	FEN 350	Elements of Forest Entomology	3
	Electives		6
			15
Second Semester	APM 491	Introduction to Probability and Statistics	3
	ERM 345	Soils **OR** GOL 105 Earth Science	3
	FBL 330	Principles of General Physiology	3
	Electives		6
			15

Summer Field Experience—Must be met through one of four alternatives described on page 46 5

Senior Year			*Credit Hours*
First Semester	FBL 470	Principles of Genetics	3
	FBL 471	Genetics Laboratory	1
	Electives		11
			15
Second Semester	Electives		15
		TOTAL MINIMUM UPPER DIVISION CREDITS	65

A total of 125 credit hours is required to complete the B.S. degree in environmental and forest biology.

SUMMER FIELD SESSION ALTERNATIVES

The curriculum requires, preferably between the junior and senior year, that each student complete either a minimum of five credit hours at an academic field station or an authorized field experience under professional guidance. Several alternatives may fulfill this requirement:

Alternative 1

Students desiring program emphasis in Environmental Biology should select the Summer Program emphasis in Environmental Biology at the Cranberry Lake Biological Station on the Cranberry Lake Campus. A variety of six to eight courses is offered during each of two five-week sessions. Earning five credits at one session satisfies the field experience requirement; any additional courses taken in the second session may count as elective credits.

Alternative 2

Students desiring an experience in the principles and practices of professional forestry should attend the five-week Summer Session in Field Forestry at the Pack Forest, Warrensburg Campus. Field instruction at this Campus emphasizes subject matter in silviculture, surveying, mensuration, and forest management.

Alternative 3

Other biological field stations can be attended to earn the minimum of five credit hours. The field station and the course(s) selected must have prior advisor approval.

Alternative 4

FBL 420 Field Experience-Internship under professional supervision may be authorized when thoroughly planned and well documented. It must be related to and supportive of the indicated career goal. The student must receive advance agreement from a member within the Department of Environmental and Forest Biology faculty to guide and collaborate in a work plan for the summer. The plan must be submitted at least one month prior to course commencement and approved by the Curriculum Director.

Electives

General requirements for graduate study and a wide range of federal, state, municipal and private biology positions are met by the curriculum. Through skillful selection of electives, the student may prepare for special biological fields related to natural resources or the environment. Those training for biological positions in federal and state service should review Civil Service publications and become familiar with specific course requirements early enough to make timely electives choices. Students planning to

meet special requirements for Federal Civil Service positions in forestry may do so by electing 10 credits in forestry courses and attending the Summer Session in Field Forestry at the Warrensburg Campus. Students are urged to use some elective time to enhance their communications skills. Courses in technical writing, applied communications or a language (as approved by their faculty advisor) are useful.

Special Biological Fields

Plant Science. Students may prepare for a wide variety of opportunities in the botanically oriented professions. Essential to understanding plants are their biochemical and physiological processes; their interactions with the environment and with one another; with animals and other organisms; their genetic makeup, evolution and classification. Requirements may be satisfied for such professional areas as botany, plant ecology, tree genetics, plant physiology, horticulture, tree maintenance or plant quarantine.

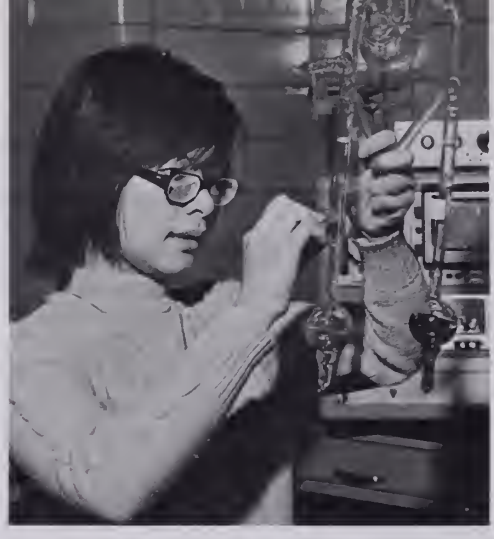
Forest Pathology and Mycology. Protection of vascular plants and wood products from invading organisms such as fungi is basic to forest productivity, effective wood product use, and the maintenance of environmental quality. Program strength is in the ecological, physiological, genetic and environmental aspects of disease. Students may train for positions in forest pathology, mycology, pest management, plant quarantine or diagnostic laboratories. Opportunities for employment exist with federal, state and private agencies.

Entomology. Insects play significant roles, both beneficial and detrimental, in their interactions with man, his resources and his environment. Several courses are available on insect life and functions that enable a student to fulfill requirements of civil service and a variety of other employers. Program strengths are in forest entomology, medical entomology, pest management, and environmental toxicology.

Fish and Wildlife Biology and Management. A basic and applied program in fish and wildlife biology, including management and behavior, is provided for the student whose objectives are to develop some professional skills in the biology and management of these natural resources.

Zoology. A basic and broad program is provided for the student whose objectives are to go on for graduate study or to further training in such subjects as physiology, soil invertebrate ecology, animal behavior or animal ecology. Some opportunities with federal and state agencies are available at the baccalaureate level.

Ecology. Students are offered the opportunity to develop ecological skills in a number of areas. However, one's career potential is enhanced when ecological study is combined with knowledge of a major taxonomic group



such as higher plants, microbes, or animals, including vertebrates or invertebrate forms such as insects, or with another unifying science such as physiology, biochemistry, genetics, or environmental chemistry.

Pest Management. Modern control of insects and disease dictate practices appropriate to maintaining an acceptable environmental quality. Through proper selection of courses, a student is able to achieve training that will result in wise selections of methods for an integrated approach to pest management. Training is more than adequate to prepare students for state examinations required for pesticides applicators certification.

Silvics. Manipulation of forest ecosystems for human benefit relies upon strong preparation in biology. Students may combine plant sciences, silviculture, pathology, entomology and other courses to lead either to graduate study in silviculture or to forestry positions in industry or in municipal, state or federal government.

Chemistry

The Department of Chemistry offers the following areas of concentration leading to the Bachelor of Science degree:

Biochemistry and Natural Products Chemistry

Environmental Chemistry

Natural and Synthetic Polymer Chemistry

Students in all options, by selecting proper electives, may be certified on graduation as having completed an American Chemical Society approved curriculum. All options are excellent grounding for professional work at the B.S. level or for advanced graduate study.

Lower Division Courses

For students transferring into the College as juniors, recommended courses consist of 68 credits or an associate degree and include:

Course Area	*Credit Hours*
Biology with Laboratory	8
General Chemistry with Laboratory	8
Organic Chemistry with Laboratory	8
Physics with Laboratory	8
Economics	3
English	6
Language, Literature or Communication	6
Electives	12-15
*Mathematics	6-9
TOTAL MINIMUM LOWER DIVISION CREDITS	68

Mathematics through integral calculus. An additional mathematics course beyond integral calculus is required for the B.S. degree.

Biochemistry and Natural Products Chemistry Option

This option is designed for students who wish to approach problems in the life sciences with the tools and point of view of the chemist. In addition to a major concentration in the several branches of chemistry, the student obtains a solid grounding in the fundamentals of physics, mathematics and biology. Professional electives can provide a minor concentration in botany, ecology, entomology, zoology, or physiology. Collaborative efforts of chemists and biologists are providing new solutions to problems of environment, natural resources and health.

Upper Division Courses

Junior Year			*Credit Hours*
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[1]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[2]Math or Elective		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[1]Professional Elective		2-3
	Elective		3
			16-17

Senior Year

First Semester	LIB 300	Library Research	1
	FCH 495	Introduction to Professional Chemistry	1
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	FCH 530	Biochemistry I	3
	FCH 531	Biochemistry Lab	2
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 497	Undergraduate Seminar	1
	FCH 532	Biochemistry II	3
	FCH 477	Wood Chemistry III	2
	Elective		3
	Elective		3
			17
		TOTAL MINIMUM UPPER DIVISION CREDITS	64

[1]A sequence of professional electives should be chosen in the junior year. In addition to the freshman biology courses, a student whose emphasis is in biochemistry must take 3 semester hours of genetics and at least one other 3 semester hour biology course. A student whose emphasis is in natural products must take 3 semester hours of biology in addition to the freshman biology courses and an additional hour of organic chemistry laboratory (FCH 496) and a second hour of FCH 384.

[2]One course of mathematics or applied mathematics beyond MAT 397, or equivalent, is required.

[3]Introduction to Polymer Science, FCH 450 (3 credit hours) is suggested.

[4]Petition by student to Department for replacement of this requirement will be considered to allow time for special interest.

A total of 132 credit hours is required to complete the B.S. degree in chemistry with the biochemistry and natural products option.

Environmental Chemistry Option

The environmental chemistry option is designed for those students who wish to obtain a solid fundamental background in chemistry which will enable them to make a strong contribution towards the identification and solution of problems in the areas of pollution, air and water quality, analysis and basic research in environmental chemistry. A large number of professional electives, available through course offerings of other departments such as biology and engineering, provide the important interface with other disciplines necessary for a working understanding of the complex problems inherent in environmental studies.

Upper Division Courses

Junior Year			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Statistics		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		3
	Elective		3
			17

Senior Year			
First Semester	LIB 300	Library Research	1
	FCH 495	Introduction to Professional Chemistry	1
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	FCH 510	Aquatic Environmental Chemistry	3
	[2]Professional Elective		2-3
	[3]Elective		3
	Elective		3
			16-17
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 410	Chemistry of Pollution	1-3
	FCH 497	Undergraduate Seminar	1
	FCH 477	Wood Chemistry III	2
	Electives		6
			15-17
		TOTAL MINIMUM UPPER DIVISION CREDITS	63

[1]A statistics course beyond MAT 397, or equivalent, is required. APM 491 is recommended, but MAT 521 or MAT 525 is acceptable.

[2]A wide variety of courses offered by the departments of chemistry, environmental and forest biology, forest engineering and resource management is available to supplement the environmental chemistry concentration.

[3]Biochemistry I, FCH 530, (3 credit hours) is suggested.

[4]Petition by student to Department for replacement of this requirement will be considered to allow time for special interest.

A total of 131 credit hours is required to complete the B. S. degree in chemistry with the environmental option.

Natural and Synthetic Polymer Chemistry Option

This option is designed for students interested in the structure and physical properties of man-made and natural materials, the giant molecules of wood, plastics, polysaccharides, proteins, rubbers and fibers. The recently discovered chemistry of these materials constitutes one-half the concern of the chemical industry and is the origin of a major revolution in our way of life and our understanding of nature. This special subject area is an advanced core of studies beyond the basic courses of the classical undergraduate chemistry curriculum.

Upper Division Courses

Junior Year			Credit Hours
First Semester	FCH 325	Organic Chemistry III	4
	CHE 332	Quantitative Analysis	2
	CHE 333	Quantitative Analysis Lab	1
	CHE 346	Physical Chemistry	3
	[2]Professional Elective		2-4
	Elective		3
			15-17
Second Semester	[1]Math or Elective		3
	FCH 380	Instrumental Methods	3
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	FCH 384	Spectrometric Identification of Organic Compounds	1
	[2]Professional Elective		2-3
	Elective		3
			16-17

Senior Year			Credit Hours
First Semester	LIB 300	Library Research	1
	FCH 495	Introduction to Professional Chemistry	1
	FCH 450	Introduction to Polymer Science	3
	FCH 551	Polymer Techniques	2
	FCH 475	Wood Chemistry I	2
	FCH 478	Wood Chemistry Lab	1
	[3]Elective		3
	Elective		3
			16
Second Semester	[4]FCH 498	Introduction to Research	5
	FCH 552	Polymer Processing and Technology	3
	FCH 497	Undergraduate Seminar	1
	FCH 477	Wood Chemistry III	2
	Electives		6
			17
		TOTAL MINIMUM UPPER DIVISION CREDITS	64

[1]One course of mathematics or applied mathematics beyond MAT 397, or equivalent, is required.

[2]A sequence of two or more professional electives in related disciplines with a minimum of 5 credits should be chosen in the fall of the junior year from the College of ESF offerings. Wood Products Engineering and Paper Science and Engineering courses are recommended.

[3]Biochemistry I, FCH 530 (3 credit hours) is suggested.

[4]Petition by the student to Department for replacement of this requirement will be considered to allow time for special interest.

A total of 132 credit hours is required to complete the B. S. degree in chemistry with the natural and synthetic polymer option.

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE ENGINEERING

The School of Environmental and Resource Engineering offers programs leading to the bachelor of science degree in forest engineering, paper science and engineering, and wood products engineering. Programs for advanced degrees (M.S. and Ph.D.) are also offered, and are described in the *Graduate Studies Bulletin*.

Specific requirements for the B.S. degree are described with the individual programs below. In each curriculum the core of required courses is supplemented by optional courses selected with the consultation of a program advisor. Applicants with associate degrees in engineering science, or science and mathematics, usually enter at the junior level. Graduates of two-year technology programs also may qualify for junior standing in a given curriculum if their previous studies include the appropriate courses, as indicated by the individual department listings below.

The curricula and research programs of the School are oriented toward multiple use of forest resources, wood products, paper and related fibrous materials. Environmental considerations are integrated into the appropriate courses. Among them are recovery and utilization of waste materials, pollution abatement, energy conservation and safety optimization. The principles and professional skills of engineering analysis and design are stressed in the relevant courses as well as through informal contact which is facilitated by the advantageous student/ faculty ratio. As in all programs of the College, emphasis on responsible use of renewable natural resources for the benefit of society underlies the professional career training.

Forest Engineering

The primary objective of this curriculum is to prepare qualified engineering graduates to operate with professional competence within the context of forest and natural resources development. The curriculum is based on the natural and engineering sciences. It utilizes elements of traditional engineering disciplines and develops its unique aspects from interweaving engineering design with an understanding of the natural environment and its renewable resource base including water, soil, timber, wildlife and amenity values. Studies in the humanities and social and economic sciences are integrated throughout the curriculum to help achieve a broad and balanced perspective of professional practice in forest engineering.

In this program students are instructed in the planning, design and construction of systems and facilities to serve the improved utilization of the natural resource base indigenous to the forest environment. Instruction focuses on the engineering activities of: locating and quantifying natural resources, harvesting and transporting the primary resources of water and timber, and, designing structures and facilities and pollution abatement

schemes in the planning and development of sites and regions for multiple use. Because of the special importance of continual measurement and evaluation of the broad-scaled parameters which affect this resource base, the forest engineering program offers unique preparation for students aiming toward professional careers involving the conceptualization, design and maintenance of geographically referenced resource information systems. This preparation includes elements of surveying, geodesy, photogrammetry, remote sensing and resource information system design. Additional program emphases such as water resources, construction, etc., may be achieved through the wise use of nondesignated technical electives and designated design electives.

Qualified graduates in search of advanced degree education enjoy ready acceptance to engineering graduate schools throughout the country. Graduates of the Forest Engineering curriculum may enter an established five-year program in either civil, industrial or mechanical engineering at Syracuse University. A bachelor of science degree in engineering will be awarded by Syracuse University upon completion of the requirements of the fifth year.

To enter this curriculum at the junior level, a transferring student must have acceptable college credit in the following coursework areas or be able to have suitable coursework substitutions for courses listed in the junior and senior years.

Lower Division Courses

Course Area	*Credit Hours*
Biology (Botany and Zoology) with Laboratory	8
General Chemistry with Laboratory	8
Physics (Engineers and Scientists) with Laboratory	8
Physics (Engineers and Scientists) with Laboratory	8
Calculus through Integral (Including Analytic Geometry)	6-12
English	6
Economics (Macro-and Microeconomics)	6
Engineering Drawing (Graphics)	1
Computer Programming (FORTRAN or APL)	3
Engineering Mechanics (Statics and Dynamics)	4
*Engineering Science Electives	3
Humanities or Social Science Electives	6
TOTAL MINIMUM LOWER DIVISION CREDITS	62

Students must meet these minimum requirements, and they are encouraged to exceed the minima in the elective areas, to facilitate scheduling during the upper division years.

Upper Division Courses

Junior Year		Credit Hours
First Semester	FEG 300 Introduction to Engineering Design	1
	FEG 371 Surveying for Engineers	3
	FBO 315 Dendrology I	3
	APM 391 Introduction to Probability and Statistics I	3
	MAT 585 Higher Math for Engineers and Scientists I	3
	CIE 327 Principles of Fluid Mechanics	4
		17
Second Semester	FEG 340 Hydrology	3
	FEG 350 Introduction to Remote Sensing	2
	FEB 363 Photogrammetry	3
	CIE 325 Mechanics of Deformable Bodies	3
	ERM 321 General Silviculture	3
	Elective Engineering Science, Humanities, or Social Science	3
		17
Senior Year		
First Semester	FEG 410 Structures	4
	FEG 422 Production Systems Engineering	4
	ERM 477 Environmental and Resource Management	3
	CIE 437 Soil Mechanics and Foundations I	3
	Elective Humanities, Social Science, or Technical	2-3
		16-17
Second Semester	FEG 437 Transportation Systems	4
	FEG 447 Hydrologic Controls	3
	ERE 488 Engineering Economics	1
	FEG 489 Forest Engineering Planning	3
	**Elective in Engineering Design Sequence	3
	Elective Humanities, Social Science, or Technical	3
		17
	TOTAL MINIMUM UPPER DIVISION CREDITS	67

*Recommended for the semesters in which the following curriculum requirements can be met through coursework such as, but not limited to:

Electrical Science I
Electrical Science II
Vibrations and Controls
Engineering Materials
Fundamentals of Thermodynamics
Advanced Dynamics
Principles of Mass and Energy Balance

**At least 3 credit hours elected in engineering design or synthesis as part of an advisor approved sequence which complements other required or elected coursework—

(FEG 410) Structures
(FEG 422) Production Systems Engineering
(FEG 447) Hydrologic Controls
(FEG 477) Survey Systems Design
(WPE 404) Design of Wood Structural Elements
(CIE 332) Structures II
(CIE 438) Soil Mechanics and Foundations II
(CIE 454) Treatment of Water and Waste Water
(WPE 472) Production Systems II: Synthesis
(MEE 472) Synthesis of Systems

A total of 129 credit hours is required to complete the B. S. degree in forest engineering.

Paper Science and Engineering

The curriculum in Paper Science and Engineering is designed to provide a broad base of study and to prepare students for a variety of careers in the paper and related industries. Excellent opportunities are provided for men and women qualified to fill positions as research chemists, process engineers, technical service representatives, line management personnel, and many others.

The program provides education in the physical sciences and chemical engineering, with specific emphasis on those aspects of these disciplines which relate to the manufacture of pulp and paper. This includes the chemistry and anatomy of wood, the conversion of wood to pulp and paper, and the chemistry and physics of paper and paper formation. Instruction in chemical engineering includes a foundation of unit operations basic to the pulp and paper industry, as well as specialized courses, such as water and air pollution engineering.

Qualified graduates who wish to continue their formal education find excellent opportunities for graduate studies, either in specialized paper science curricula at the College or elsewhere, or in general science and engineering programs throughout the country.

To transfer into this curriculum at the junior level, a student must have acceptable college credit in the following course areas. Deficiencies would have to be made up during the junior and senior years.

Lower Division Courses

Course Area	*Credit Hours*
Botany or Biology with Laboratory	4
General Chemistry with Laboratory	8
Organic Chemistry with Laboratory	8
Quantitative Analysis	3
Physics with Laboratory	8
Mathematics—Analytic Geometry and Calculus, Differential Equations Recommended	12
Computer Science	3
Economics	3
English	6
Engineering Drawing Recommended	1
Humanities or Social Science Electives	8
TOTAL MINIMUM LOWER DIVISION CREDITS	64

Upper Division Courses

Junior Year

			Credit Hours
First Semester	FCH 475	Wood Chemistry I	2
	FCH 476	Wood Chemistry II	2
	CHE 346	Physical Chemistry	3
	PSE 300	Introduction to Papermaking	3
	WPE 387	Wood Structure and Properties	2
	WPE 388	Wood and Fiber Identification Lab	1
	PSE 370	Principles of Mass and Energy Balance	3
	PSE 371	Fluid Mechanics	2
			18
Second Semester	PSE 372	Heat Transfer	2
	CHE 356	Physical Chemistry	3
	CHE 357	Physical Chemistry Lab	1
	PSE 301	Pulp and Paper Processes	3
	PSE 302	Pulp and Paper Processes Lab	1
	Elective		3
	[1]Engineering Elective		3
			16

SUMMER MILL EXPERIENCE: PSE 304 Mill Experience 2
(Twelve weeks of full-time pulp or paper mill employment approved by the Department between the junior and senior years.)

Senior Year			Credit Hours
First Semester	PSE 461	Pulping Technology	3
	PSE 465	Paper Properties	4
	PSE 473	Mass Transfer	3
	PSE 491	Paper Science and Engineering Project I	1
	ERE 440	Water Pollution Engineering	3
	GRA 380	Technical Drawing	1
			15
Second Semester	PSE 466	Paper Coating and Converting	3
	PSE 468	Papermaking Processes	3
	PSE 492	Paper Science and Engineering Project II	3
	ERM 465	Managerial Economics	3
	ERE 441	Air Pollution Engineering	3
			15
		TOTAL MINIMUM UPPER DIVISION CREDITS	66

[1]To be selected from ERE 375 (Elementary Corrosion) and ERE 377 (Process Control) or equivalent level, advisor-approved engineering courses.

A total of 130 credit hours is required to complete the B. S. degree in paper science and engineering.

Wood Products Engineering

The Department of Wood Products Engineering prepares students for a wide variety of professional occupations concerned with the use of wood as a primary building material. Two curriculum options are available: Building Construction and Forest Products.

As the only major construction material derived from a renewable natural resource, wood is receiving increased attention as an alternative to other materials which originate from and deplete nonrenewable resources. Thus, a principal aim of the departmental program is to teach students the fundamentals of efficient wood processing, distribution, or final use, whether as a piece of furniture or as a complete building.

To enter either option at the junior level, a transferring student must have acceptable college credit in the following coursework areas:

Lower Division Courses

Course Area	*Credit Hours*
General Chemistry with Laboratory	4
General Physics with Laboratory*	8
Mathematics—Analytical Geometry and Calculus	9
English*	6
Recommended Courses	
Accounting	6
Biology or Botany	3-4
Computer Science	3
Economics (Micro- and Macroeconomics)	6
Engineering Drawing (Graphics)	1
Environmental Geology	3
Electives	13
TOTAL MINIMUM LOWER DIVISION CREDITS	62

*Students planning to enter the forest products option need complete only 4 credits of physics, but they must complete 9 units of English. However, students who wish to emphasize wood science in the forest products option must have: general chemistry with laboratory (8); general physics with laboratory (8); and general botany with laboratory (4).

The A.S. or A.A.S. degree may also fulfill the requirements for admission. Students who lack the above background courses are nevertheless encouraged to consult the Admissions Office and the faculty of the department for an evaluation of their academic records.

Building Construction Option

The current pressures for new housing and urban reconstruction have led to this option which develops a deep awareness of the effects of construction on the environment, as well as the efficient use of materials, particularly wood. There is an increasing demand for technically trained specialists in the construction industry and supporting fields who have the skills to use efficiently the wide variety of wood-based building materials, with consideration to their place in respect to other materials and to the purpose of the end product.

The specialty electives are designed to allow the opportunity for concentration areas related to the individual's career objectives. It is felt the wide range of construction activities found in practice cannot be adequately serviced by a rigid program of study.

Illustrative electives are listed below:

Engineering	*Management*	*Environment*
Structural Analysis	Marketing	Urban Planning
Building Systems	Business Law	Solid Waste Disposal
Adv. Soil Mechanics	Accounting	Waste Water Treatment
Photogrammetry	Finance	Environmental Sanitation
Thermodynamics	Industrial Management	Land Use
Transportation	Operations Research	Landscape Architecture
Systems Analysis	Real Estate	

With careful planning and use of electives, students can obtain a B. S. degree in civil or mechanical engineering at Syracuse University with an additional year's work. Similar adjustments can be made to facilitate continuation in an M.B.A. program.

Upper Division Courses

Junior Year			*Credit Hours*
First Semester	WPE 387	Wood Structure and Properties	2
	FEG 371	Surveying for Engineers	3
	ACC 204	Financial Accounting Systems	3
		Probability and Statistics Course	3
	MEE 221	Statistics	3
			14
Second Semester	ERE 362	Mechanics of Materials	3
	ERE 364	Engineering Materials	3
	WPE 320	Polymeric Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	ACC 252	Introduction to Managerial Accounting	3
	Elective		3
			15
Summer Field Experience:	WPE 390	Field Trip	2
Senior Year			*Credit Hours*
First Semester	WPE 422	Composite Materials	3
	FEG 410	Structures	4
	CIE 437	Soil Mechanics and Foundations I	3
	ERE 496	Professional Development	1
		Management Elective Course	3
	Elective		3
			17
Second Semester	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Laboratory	1
	WPE 450	Construction Equipment	3
	FEG 342	Hydraulics in Construction	4
		Management Elective Course	3
	Elective		3
			16
		TOTAL MINIMUM UPPER DIVISION CREDITS	64

A total of 126 credit hours is required to complete the B. S. degree in wood products engineering with the building construction option.

Forest Products Option

The forest products option is designed to prepare students for employment in the wood products industry. This may be oriented either toward production in manufacturing plants or toward the distribution and marketing segments of the industry. Through careful selection of courses, students can develop an emphasis in marketing, production systems engineering, or wood science.

Students wishing to pursue a career in research related to wood and wood products are accommodated by selection of science courses to fulfill emphasis requirements.

With careful planning and careful selection of electives, students may fulfill the entrance requirements of many universities for a Master in Business Administration program and may be able to obtain an M.B.A. degree after approximately one additional full year of study.

Upper Division Courses

Junior Year			*Credit Hours*
First Semester	WPE 322	Mechanical Processing	3
	WPE 387	Wood Structure and Properties	2
	WPE 388	Wood and Fiber Identification Laboratory	2
	Computer Programming Course*		3
	Emphasis Courses*		3
	Electives*		3
			16
Second Semester	WPE 320	Polymer Adhesives and Coatings	2
	WPE 321	Adhesives and Coatings Laboratory	1
	WPE 326	Fluid Treatments	2
	WPE 327	Fluid Treatments Laboratory	1
	ERE 362	Mechanics of Materials	
	or		3
	LSA 343	Structural Materials and Elements	
	Emphasis Courses*		3
	Electives*		3
			15
Summer Field Experience: WPE 390 Field Trip			2

Senior Year		Credit Hours
First Semester	WPE 422 Composite Materials	3
	Probability and Statistics Course	3
	WPE 497 Seminar	2
	Emphasis Courses*	6
	Electives*	3
		17
Second Semester	WPE 404 Design of Wood Structural Elements	3
	Emphasis Courses*	9
	Electives*	3
		15
	TOTAL MINIMUM UPPER DIVISION CREDITS	65

*Specific courses selected for these requirements must have the advisor's approval.

A total of 127 credit hours is required to complete the B.S. degree in wood products engineering with the forest products option.

Emphasis Courses

A student desiring to emphasize MARKETING should select 24 credit hours from the following listing of courses.

First Semester			*Second Semester*		
ERM 206	Microeconomics	3	ERM 205	Macroeconomics	3
WPE 442	Light Construction	3	ERM 404	Economics of Wood-Using Industries	3
LPP 355	Intro. Legal System	3	LSA 343	Structural Materials and Elements	3
MAR 355	Marketing and Society	3	ERE 364	Engineering Materials	3
FIN 355	Money and Banking	3	WPE 444	Materials Marketing	3
ACC 204	Financial Accounting	3	ACC 252	Intro. to Managerial Accounting	3

A student desiring to emphasize PRODUCTION SYSTEMS ENGINEERING should select 24 credit hours from the following listing of courses:

First Semester			*Second Semester*		
MEE 221	Statics	3	MEE 351	Fundamentals of Thermodynamics	3
ECE 221	Electrical Science I	3	ECE 222	Electrical Science II	3
IOR 548	Engrg. Econ. Anal.	3	ERM 461	Oper. Cost. Cont.	3
IOR 575	Ind. Meth. and Syst. Engr.	3	IOR 326	Stat. Methods for Eng. II	3
WPE 498	Design Problem	3	IOR 527	Human Factors in Eng.	3
IOR 325	Statis. Methods for Eng. I	3	IOR 536	Material Handling	3
IOR 521	Motion and Time Study	3			
IOR 534	Stat. Quality Control	3			

A student desiring to emphasize WOOD SCIENCE should select 24 credit hours from the following listing of courses:

First Semester			*Second Semester*		
FBO 315	Dendrology	3	FBO 585	Plant Anatomy	3
CHE 346	Physical Chemistry	3	CHE 356	Physical Chemistry	3
PHY 361	Intro. Modern Phys.	3	FCH 520	Nucl. and Rad. Chem.	2
MEE 221	Statics	3	FCH 521	Nucl. Chem. Tech.	1
APM 360	Intro. Comp. Prog.	3	MEE 222	Dynamics	3
WPE 498	Design Problem	3	WPE 688	Tropical Timbers	2
			WPE 689	Tropical Wood Anatomy	1
			FBL 330	General Physiology	3

THE SCHOOL OF ENVIRONMENTAL AND RESOURCE MANAGEMENT

The School of Environmental and Resource Management prepares students for the critical role of managing forests and related resources and their associated environments for human benefit. Management in this sense embraces the integration of basic ecological and social principles into comprehensive programs of planning, manipulation and use of forest and open lands for the sustained production of timber, forage, water, wildlife and recreational values consistent with national needs and the protection and enhancement of environmental quality. It includes, further, the effective implementation of these programs via the administrative process in accordance with established policies and goals and in cooperation with individuals and organizations, both public and private.

Students completing the resource management curriculum are qualified for professional practice as foresters and environmental managers with public and private organizations or as private consultants serving a wide array of clients. The potential for a meaningful career in service to human welfare becomes significant when one recognizes the vast amount of land area covered by forests. Nearly 60 percent of New York State is classified as forest land, while roughly one-third of the land area of both the United States and the world is so classified. The goods and services that flow from this vast resource base are of critical and growing importance to the needs of modern society and influence, in a major way, the quality of the environment.

The program also offers opportunity for students to pursue special interests, to prepare for advanced study, or to develop their capabilities for service in a variety of fields pertinent to renewable natural resources and the environment, but not specifically forestry oriented.

The Management Curriculum

Though it represents the oldest area of professional instruction in the College, this is a newly-revised curriculum which was implemented with the entering class in 1973. A core of required upper division courses, totaling 42 semester hours, presents the basic principles and practices that underlie the purposeful management of forest and related resources for optimum production and use of any one, or more, of their potential products and services.

Extensive elective opportunities, totaling over one-fourth of the program, are available to help broaden the student's general education, to strengthen perceptions and integration of knowledge, to enable the student to enhance depth of understanding in areas of environmental and resource management of special interest, or as a base for subsequent study at the graduate level. Areas of concentration provide meaningful sequences in terms of subject matter coverage. Such areas currently include forest resource science, management science, environmental education and communications, urban

forestry, world forestry, and applied resource management within any of which emphasis may be focused on multiple-use forest management, or on single-use values such as timber, forage, watershed, wildlife, recreation and aesthetics.

Additional areas of concentration may be developed in cooperation with other disciplinary units of the College. Moreover, students need not select a given area of concentration, but may choose elective courses in accordance with their respective interests and needs, the only restriction being that such selections have the approval of the student's faculty advisor.

A significant feature of the elective component of the curriculum in environmental and resource management is that the spring semester of the senior year consists wholly of electives and thus is available for a variety of independent or group study activities. These may be conducted in whole or in part on any one of the College's several campuses, off campus at another institution, in cooperation with some resource management agency or firm, or in conjunction with an overseas academic program operated by the College. Proposals for off-campus study are subject to faculty review and are carried out with varying degrees of faculty guidance to ensure adherence to academic standards.

Considerable emphasis in the curriculum is placed on field instruction to provide students with intimate knowledge of how the forest ecosystem functions and how it is manipulated and used for a variety of owner objectives. Attendance at a five-week, six-credit hour Summer Session in Field Forestry is required prior to registration for the junior year. This session serves as the major avenue of entrance into the curriculum.

Close to half of the required upper division core courses are conducted wholly or primarily in the forest environment and entail substantial physical activity such as conducting field surveys, inventorying timber and other resources, thinning forest stands, and planting trees. As part of the conditions for admission to this program, applicants must be willing and able to function effectively in the field under a wide range of terrain and weather conditions. Any questions or concerns about this requirement should be directed to the Director of Admissions.

The curriculum is designed to facilitate the transfer of qualified students from liberal arts and science programs in community colleges and other institutions of higher learning. For students contemplating such transfer, it is required they have completed at least 64 semester credit hours or an associate degree, and further, that they have a minimum of 48 of these credits distributed among specific course areas as outlined below.

Lower Division Courses

Course Area	*Credit Hours*
Biology (Botany and Zoology) with Laboratory	8
General Chemistry with Laboratory	8
General Physics with Laboratory	8
Mathematics, through Integral Calculus	6
Economics (Macro- and Microeconomics)	6
*Introductory Sociology or Psychology	3
*Political Science (U.S. Institutions)	3
English	6
*Electives	16
TOTAL MINIMUM LOWER DIVISION CREDITS	64

*The professional resource manager must have a basic understanding of the complex interrelationships that exist within the forest ecosystems. It is equally important that such professionals have a knowledge of the social, cultural, and historic influences that impinge upon the protection, development, and use of forest land resources. Accordingly, prospective transfer students should choose elective courses that will serve to broaden and enhance their understanding in the social and political sciences, humanities, and communication skills.

Upper Division Courses

			Credit Hours
Summer:	[1]ERM 300	Summer Session in Field Forestry	6
Junior Year			
First Semester	ERM 331	Introduction to the Physical Environment	6
	ERM 332	Silvics-Silviculture	8
	ERM 322	Forest Mensuration	3
			17
Second Semester	ERM 360	Principles of Management	3
	ERM 370	Management of the Forest Enterprise	3
	Computer Science Course		1
	APM 391	Introduction to Probability and Statistics	3
	[2]Electives		6
			16

Senior Year

First Semester	APM 492	Forest Biometrics	3
	ERM 400	The Social Environment of Resource Management	3
	ERM 461	Management Models	3
	[2]Electives		6
			15
Second Semester	Electives		17
			17
		TOTAL MINIMUM UPPER DIVISION CREDITS	71

[1]SUMMER SESSION IN FIELD FORESTRY—five weeks, 6 credit hours: Required of all students *prior* to registration for the junior year.

[2]Elective hour requirements are free to the extent that (a) they are in courses selected with the approval of a faculty advisor and (b) at least nine such elective hours are centered in forest biology and environmental and resource engineering, but with no less than one elective course in each of these broad fields. Also, students who meet only minimum entrance requirements in sociology/psychology and political science will be required to elect at least one additional 3 credit hour course in each of these areas, preferably during the junior year.

A total of 135 credit hours is required to complete the B. S. degree in resource management.

THE SCHOOL OF LANDSCAPE ARCHITECTURE

The School of Landscape Architecture offers two programs at the undergraduate level; a four-year program leading to the B. S. in environmental studies and a five-year program leading to the Bachelor of Landscape Architecture.

Landscape Architecture

Education in the environmental design professions is witness to a great deal of activity within programs of formal professional study. Contemporary issues place a new focus on areas of knowledge and upon professional involvement responsive to the pace of change throughout society. The degradation of our natural environment, depletion of natural resources, pollution of air and water, pressures for new development, and the physical blight of urban areas all pose severe and complex threats to our society. Collectively, these conditions place environmental designers in ever challenging situations in which they must assess the social, technical, and artistic objectives inherent in such professional work. Specific issues are faced by those in the design professions whose skills focus on the improvement of our physical surroundings. This effort, academically and professionally, requires the development of skills broadly inclusive of a capacity for analysis and research, and the ability to innovate in the structuring of our physical surroundings and in planning for new uses of land.

Therefore, the social and environmental needs of a contemporary society define a professional area that is extremely comprehensive in both its purpose and practices. Human use of land requires that it be modified and adjusted to suit new purposes. The land itself, however, and the environmental factors of soil, sun, wind, water, and vegetation that characterize its natural state are the complex resultants of centuries with severe implications to adjustments. Similarly, the physical fabric of a neighborhood represents the complex web of social circumstances developed over lifetimes and is extremely vulnerable to casual modifications. Therefore, the professional must comprehend both the natural and the cultural spheres involved with the use of land. Further, particular skills are required to define and bring about a transition from a natural to developed state, or to revise previously developed areas in such a fashion as to achieve a good fit between man and nature and achieve a positive sense of place. Design and graphic skills are the language by which judgments are expressed and new forms developed compatible with those existing. Engineering and the natural sciences furnish the knowledge base for all materials and their properties. The social sciences inform as to people and their behavior, with architecture, history, mathematics, and computer science all contributing major elements to the comprehensiveness required in environmental design as a profession with particular attitudes, techniques, and practices. All such describe the craft of landscape architecture and its associated professional areas. Most

importantly, however, engagement with environmental design requires a commitment beyond that required for the development of knowledge and skills in a given craft. It requires the dedication of these to the public welfare. In so doing, it elevates the work and the behavior that characterizes its conduct beyond craft, beyond vocation, to profession.

Widespread concern for environmental quality has produced several trends in recent years that shape the directions of educational programs in environmental design. These constitute mandates from various publics that the physical environment be the subject of greater national attention, and that its use and manipulation be more closely scrutinized. From these expressions of concern there has developed extensive legislation and renewed efforts educationally regarding curricula offerings and the attitudes and practices associated with the development of effective, relevant professionals. At the School of Landscape Architecture, programs of study have been developed as a creative response to these trends and influences. They represent an effort to take full advantage of the School's institutional setting, faculty expertise, and geographic location. Without precluding varied innovative approaches that may be proposed regarding the acquisition of knowledge and skill in environmental design, all study at the School shares a common commitment to a general body of knowledge. As students perceive particular careers, the focus on given subjects may vary to seek different proportions and a specific emphasis. Overall, however, the predominant program is one of formal professional study emphasizing particular areas of knowledge and skills related to the art of designing the physical environment. The content and quality of this course of study is accredited by the American Society of Landscape Architects. It leads to the B.L.A. degree and beyond the university, to continued professional development through periods of internship and professional licensure. Normally, the internship period occurs through employment in public or private practice. Parallel and complementing this study track is the alternative B. S. degree. Students taking this degree frequently pursue methods other than design as a means of resolving the questions and issues of the physical environment and its condition. The interests and intentions of those pursuing this degree are extremely diverse, but clearly represent the widespread appeal of careers motivated by concern for the physical environment.

Each program of study within the School utilizes an interdisciplinary approach in which landscape architecture, architecture, engineering, planning, and the natural and behavioral sciences are represented. The program of formal professional study provides a structured sequence of coursework which emphasizes knowledge and skills associated with various forms of landscape architectural professional practice. The alternative course of study seeks different areas of emphasis or expression, with the intended purpose of continued study at the graduate level in landscape architecture or a related field. The specific structure and framework for both

programs of study consists of the following curriculum in environmental studies and landscape architecture. The major characteristics of the curriculum are in the provision of a broad content base from which to investigate the form and processes of the human and natural environments; content structured to provide a frame of reference from which to pursue various approaches toward environmental quality and problem solving; articulation with both two-year and four-year colleges and other institutions permitting immediate professional study following transfer (with minimum admissions requirements). The curriculum is designed to meet the educational standards of accrediting bodies for the first professional degree, The American Society of Landscape Architects and the Division of Professional Education of the New York State Education Department.

The curriculum is based on the following educational sequences. The sequences consist of three components:

The first two years of study must be taken at a two-year college or other institution. This course of study must include exposure to specific areas prerequisite to professional study as well as provide a broad academic background. After admission at the third year, a student commences the second component in the sequence. This consists of a course of study which examines the form and processes of the human and natural environments as well as the methods, technology, and processes of design. Successful completion of this 127-hour program qualifies a student to receive a bachelor of science degree in environmental studies. The education is broad but with sufficient training to focus the student's concerns for the physical environment and its significance. At this point, students may pursue graduate study, or apply to continue study toward the first professional landscape architectural degree.

The final component, depending upon a student's career objectives and performance, consists of graduate study or commencing the fifth year of the professional program. The fifth year is comprised of three major areas of study, beginning with a three-week course in plant materials in late spring. The fall semester is devoted to a unique program of off-campus study coupled with a concentration of professional course work in the final semester. The off-campus experiential studio is described and conducted by small groups of students with study topics correlated with locational opportunities throughout the world. Successful completion of this 33-hour program leads to the degree of Bachelor of Landscape Architecture, the first professional degree, awarded upon completion of a total of 160 credit hours of required and elective coursework.

Lower Division Courses

Course Area — *Credit Hours*

Written and Oral Communication 6
Required credit hours in this area should be taken in courses dealing with English comprehension, the basic skills of grammar and composition, and public speaking.

Graphics 3
A minimum of one semester's work preferably in a course in engineering drawing but mechanical drawing and/or architectural drafting may be selected.

Natural Sciences 6
Required credit hours in this area *must* include a course in Botany or Biology which deals with the basic biological processes of plant life. Additional hours to complete the required credit hour total may be taken from courses covering the basic principles of Ecology or that deal with the earth's surface such as Physical Geography, Earth Science, or Environmental Geology.

Social Sciences 3
Required credit hours in this area to be taken from coursework in History (U.S. preferably), Sociology, Social Psychology, or Social or Cultural Anthropology, Political Science, Economics.

Analytical Tools 6
A current math proficiency equivalent to one year of college math comprised of study, preferably in algebra, trigonometry, or solid geometry. Calculus is desirable but not required. Students with prior coverage in math who can demonstrate proficiency at time of admission may substitute elective hours for this prerequisite.

Beyond the scope of subjects and credits required on a prerequisite basis, students planning to transfer to the School of Landscape Architecture should consider the following as highly desirable in their preparatory coursework. Courses marked (*) will be required following transfer, if not completed during the first two years.

Written and Oral Communication 6
Natural Sciences 3
Analytical Tools
College Physics 3
*Elementary Plane Surveying 3
*Introduction to Computers 3
(This course should include introduction to programming utilizing BASIC, FORTRAN, or APL.)
Art/Design 3
Study in this category should be preferably include a course in studio art, dealing with three-dimensional design, i.e., sculpture, ceramics, or alternatively, art history or art appreciation.
Electives 20

TOTAL MINIMUM LOWER DIVISION CREDITS 62

Upper Division Courses

Junior Year			Credit Hours
First Semester	LSA 320	Introduction to Landscape Architecture and Design Theory	2
	LSA 326	Landscape Design Studio I	4
	FBL 320	General Ecology	3
	FEG 271	Plane Surveying	3
	MAT 185	Mathematics and Basic Prog.	3
	Elective		2
			17
Second Semester	LSA 327	Landscape Design Studio II	4
	LSA 343	Structural Materials and Elements	3
	LSA 345	Elements of Site Engineering	3
	EIN 311	General Geography	3
	Elective		3
			16
Senior Year			
First Semester	FEN 432	Insects and Site Planning	1
	FBO 432	Diseases of Woody Ornamentals	1
	LSA 432	Plant Materials Culture	1
	LSA 422	Landscape Design Studio III	4
	LSA 440	Site Development Systems	3
	EIN 451	Fundamentals of City and Regional Planning	3
	EIN 470	History of Landscape Architecture	3
			16
Second Semester	LSA 423	Landscape Design Studio IV	4
	LSA 425	Orientation for Experiential Studio	3
	EIN 411	Principles of Land Use	3
	EIN 471	Art History	3
	ARC 294	Introduction to Architecture	3
			16
		TOTAL MINIMUM UPPER DIVISION CREDITS	65

A total of 127 credit hours is required to complete the B.S. degree in environmental studies.

FIFTH YEAR *Credit Hours*

Summer Session:	LSA 533:	Plant Materials (Three-week course in Plant Materials)	3
First Semester	OFF-CAMPUS PROGRAM		
	LSA 524	Experiential Landscape Design Studio V	16
			16
Second Semester	LSA 522 or	Landscape Design Studio VI—Urban Design	4
	LSA 525 or	Landscape Design Studio VI—Site Design	4
	LSA 527	Landscape Design Studio VI—Regional Design	4
	LSA 545	Professional Practice Studio II	2
	LSA 547	Principles of Professional Practice	2
	Elective		3
	Elective		3
			14
		TOTAL MINIMUM FIFTH YEAR CREDITS	33

A total of 160 credit hours is required to complete the B.L.A. degree in landscape architecture.

At the end of the third year, students pursuing the above curriculum will state their degree intentions. Review of applications and admission to the B.L.A. program occurs at the end of the 4th year of study. Approval of the S.L.A. faculty is required for admission to the B.L.A. program. Students intending to conclude their study with the B. S. degree will substitute an elective for LSA 425.

Beginning with the 1979-80 academic year, implementation of separate curricula is intended for the B. S. and B.L.A. degrees. Following a common core of studies in the third year, students will engage either the B. S. option leading to the bachelor of science degree in environmental studies after successful completion of a 127 credit hour course of study; or, alternatively, the B.L.A. option leading to the Bachelor of Landscape Architecture degree after successful completion of a 160 credit hour program.

Course Offerings

Undergraduate students at the College of Environmental Science and Forestry not only have the academic resources of their own institution, but also the resources of nearby Syracuse University and State University Upstate Medical Center.

In addition to the many professional and basic science courses offered by the College, a wide range of offerings are taken either as required courses or are available as electives at Syracuse University. The required courses are in certain subject areas of chemistry, engineering, physics, mathematics, geology, business law, and personnel relations. The elective courses include most academic offerings of Syracuse University, and representative subject areas are the humanities, social sciences, life sciences, physical sciences, engineering, mathematics and the arts.

DESCRIPTION OF COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSES

The courses offered by the College are grouped by general subject areas, and the number of credit hours appears after the course title. A credit hour means one recitation (or lecture) hour per week. Three laboratory hours are equivalent to one lecture hour.

The semester and year after each course indicates when it will next be offered. The College reserves the right to alter the scheduled offering of a course when its enrollment is too small, or when there is no qualified faculty member available to teach it.

Course Numbering System

Code Levels:

100-199 Freshman courses

200-299 Sophomore courses

300-499 Junior and Senior courses designed primarily to serve as an undergraduate elective and/or as a requirement in an undergraduate curriculum with the number appropriate to the level where the course appears as a requirement or is normally scheduled as an elective in the major program.

500-599 Graduate courses designed expressly for graduate students in areas supporting their specialization or interdisciplinary program, or for fifth year professional students with a baccalaureate degree (e.g. B.L.A. students with B.S. in Environmental Studies), and available for undergraduate credit by selected upper division undergraduate students with superior academic records.

600-699 Graduate courses designed for beginning graduate students. Undergraduates are permitted admission only by petition with a

well-documented justification approved by the undergraduate advisor and curriculum director and the instructor of the course. (See the *Graduate Studies Bulletin* for these courses.)

ESF COURSES—SYRACUSE CAMPUS

APM—APPLIED MATHEMATICS

360. Introduction to Computer Programming (3)
The basic course in computer use offered by the College. It is intended to provide the student with the skill and understanding needed to utilize digital computer languages or problem solving. The course will cover instruction in FORTRAN IV, and an ASSEMBLY language plus some discussion of PL/1, ALGOL, APL, and use of software operating systems. This course or a demonstrated equivalent is a prerequisite to individual student use of the College computer facilities. Fall and Spring, 1978-79.

391. Introduction to Probability and Statistics (3)
Two hours of lecture, 3 hours of laboratory. Elementary probability, theoretical and sampling distributions, hypothesis testing, statistical estimation, analysis of variance, regression and correlation, nonparametrics and sampling concepts. Fall and Spring, 1978-79.
Prerequisite: Two semesters of calculus.

492. Forest Biometrics (3)
Two hours of lecture, 3 hours of laboratory. Analysis of variance including nested and crossclassification. Matrix approach to multiple linear regression and weighted least squares. Nonlinear regression. Sampling methods and design. Applications to forestry problems. Fall, 1978.
Prerequisite: APM 391 or equivalent.

EIN—ENVIRONMENTAL INFLUENCES (LANDSCAPE ARCHITECTURE)
(See also courses listed under GRA and LSA.)

371. History of American Landscape Attitudes (3)
Three hours of lecture-discussion per week. This course presents, through lectures, readings, and slides, uniquely American historical attitudes toward land and nature as shown through various cultural activities and disciplines, such as painting, architecture, landscape architecture, religion, philosophy, utopianism, exploration and recreation, land development and economics, and certain technological developments. Cultural expressions of the 19th century will be of primary interest, but formative attitudes from the Colonial period and certain 20th century results will be included. One-third to one-half of lecture periods are given over to student reports, criticism and discussion.
Prerequisite: Junior level or above and permission of instructor. Spring, 1979.

411. Principles of Land Use and Planning (3)
Three hours of lecture, reports, assigned readings. Explanation of factors which influence the use, development and control of land. Discussion of government's role in land development and control. Consideration of unique values of land competition for the use of space, planning for better land use, introduction to planning concepts and techniques and other topics. Spring, 1979.

451. Fundamentals of City and Regional Planning (3)
Three hours of lectures, assigned readings, written reports per week. Discussion of the meaning and purposes of city and regional planning. Examination of the historical development of urban places. Explanation of the principal elements of the comprehensive planning process, including goal formulation and decisionmaking, social and advocacy planning, planning for community facilities and planning administration. Discussion of the methods and objectives of city and regional planning. Fall, 1978.
Prerequisite: Permission of instructor.

470. Art History
Three hours of lecture per week. Informal lectures will emphasize and review assigned text and other readings and handout notes. Slides will be shown regularly; reports, quizzes and examinations. Evolutionary nature of the main cultural periods of Western man and fine art as man's selected environment will be the course emphasis. Spring, 1979.
Prerequisite: Permission of instructor.

471. History of Landscape Architecture (3)
Three hours of lecture per week. Informal lectures and class participation, reports, assigned text and assigned reserve shelf reading, optional text and handout notes, quizzes and exams. Slides. Historical study and style analysis of Western man's efforts to design his environment and his changing attitudes and relationships to environment. Also, non-Western coverage where significant or influential on Western Man. Study of historical personalities as well as periods that are of environmental concern up into the modern period. Fall, 1978.
Prerequisites: Permission of instructor.

ERE—ENGINEERING (ENVIRONMENTAL AND RESOURCE ENGINEERING)

100. The Engineer and the Environment (1)
One hour of lecture per week. Introduction to engineering practice in relation to environmental considerations and the needs and resources of society. Historical development of engineering and technology. Mission and content of engineering curricula. Representative case studies and project assignments. Open to all students. Spring, 1979.

320. APL For Engineers and Scientists (2 or 3)
Programming and operation of time-sharing digital computer systems via the APL language. Analysis, modeling and solution of basic problems in environmental science and engineering. Students desiring 3 credits will complete an original, substantial term project. Fall or Spring, 1978-79.
Prerequisites: Calculus, physics or permission of instructor.

321. Analog Computation for Engineers and Scientists (1 or 2)
Programming and operation of electronic analog computers. Analysis, modeling and simulation of dynamic phenomena and systems in environmental science and engineering. Students desiring 2 credits will complete an original term project. Fall or Spring, 1978-79.
Prerequisites: Calculus, physics or permission of instructor.

350. Wood Preservation (2)
Two hours of lecture per week with some demonstrations. A survey of basic wood-water relationships, shrinking and swelling, elementary wood structure, wood permeability, capillary forces, heat transmission, agencies of wood deterioration, wood preservation processes, wood fire performance, fire tests, and fire retardant treatments. Not open to WPE students. Fall, 1979.

362. Mechanics of Materials (3)
Three hours of lecture. Theories of stress, deformation, and stability of common structural materials subjected to various force systems. Spring, 1979.
Prerequisite: Integral calculus, statics.

364. Engineering Materials (3)
Two hours of lecture and one 3-hour laboratory a week. An introduction to the study of materials science emphasizing the structure and properties of materials used in the construction industry in general. Lab work includes fabrication, testing and evaluation of actual systems. Spring, 1979.
Prerequisites: Junior standing, physics, chemistry and engineering mechanics.

375. Elementary Corrosion (1)
One hour of lecture per week. Basic electro-chemistry, film formation and passivation, galvanic corrosion and pitting, cathodic and anodic protection, protective coatings and

inhibitors. Application of the above in the home, car, field, at sea, and in industrial plants. Spring, 1979.

Prerequisite: High School chemistry.

377. Process Control **(2)**

Two hours of lecture per week. The study of the basic principles of process control as applied both with or without electronic computers. The emphasis is on sensing and control elements, signal transmission, and noncomputerized controls. This course complements computer courses but does not go beyond the transmission of signals to computers and the response to return signals. Spring, 1979.

Prerequisite: College level physics.

420. Computer Applications in Science and Engineering **(3)**

Principles and methods of mathematical modeling for analog and digital computer solution. Applications to data reduction and correlation, statistical, analysis, process and equipment simulation, optimization and control, and computer-assisted instruction. Typical examples, class problems and student projects. Current status and future projection of computation equipment, software and operating techniques.

Prerequisites: Calculus, computer programming, and Junior standing; or permission of instructor. Fall or Spring, 1978-79.

440. Water Pollution Engineering **(3)**

Two hours of lecture and 3 hours of laboratory. Introduction to the physical, chemical and biological parameters of waste water treatment processes and to the principles of the unit operations involved. Study of the design parameters and design procedures of waste water treatment systems. Fall, 1978.

Prerequisites: PHY 211 and CHE 356 or equivalent.

441. Air Pollution Engineering **(3)**

Three hours of lecture and discussions. Study of the chemical, physical and meteorological principles of air pollution and its control. Local and global effects of air pollution. The atmospheric survey. Examination of the operating principles and design parameters of the various air pollution control systems. Air quality and emission standards. Spring, 1979.

Prerequisites: PHY 211 and CHE 356 or equivalent.

488. Engineering Economics **(1)**

One hour lecture, 3 hours lab; first half of semester. This course provides students with the tools to understand the economic aspects of engineering and to evaluate engineering proposals in terms of worth and cost. Coverage extends through alternatives analysis, using rate of return, present worth, average annual cost and other methods, as well as evaluation of public activities, focusing on benefit-cost analysis. Spring, 1979.

496. Special Topics **(1-3)**

Lectures, readings, problems and discussions. Topics as announced in the areas of environmental or resource engineering. Fall and/or Spring, 1978-79.

ERM—RESOURCES MANAGEMENT (ENVIRONMENTAL AND RESOURCE MANAGEMENT)

100. Introduction to Forestry and Environmental Management **(3)**

Two 1½ hour meetings per week. An introduction to environmental and resources management. Emphasis is placed on the breadth of the field and on the important interrelations among the social, physical and managerial aspects within which the environmental manager operates. Specific topics include: resources, institutions, values, the physical environment, the organism, the biological system, goals, management problems, information and analysis and dealing with people. Fall, 1978.

201. Social Sciences I—Socio-Cultural Processes (6)

Six hours of lecture and discussion. Introduction to the concepts, theories and terminology of psychology, anthropology and sociology, which are relevant to the understanding of the interrelationships of human social groups with their environments and resources. Human social and cultural behavior as possible reflections of adaptations to past environments; human cultural and social organization as adaptations to resources of present-day environments; human ecology as it relates to human economic and political systems. Spring, 1979.

202. Social Sciences II: Economic Processes (6)

Five 1-hour lectures and one 1-hour discussion per week. The course has two major subdivisions: macroeconomic processes are concerned with the composition, measurement and determination of national income, with the financial institutions of the United States and with fiscal and monetary policies; microeconomic processes are concerned with pricing of output and resource allocation, the theory of consumer demand, the theory of the firm and industrial organization, the role of labor unions in the United States and microeconomic policies of the Federal Government. Fall, 1978.

205. Introduction to Macroeconomics (3)

Three hours of lecture and discussion Composition, measurement and determination of national income. Financial institutions of the United States. Monetary and fiscal policies. The theory of economic growth and problems in attaining adequate levels of economic growth. Spring, 1979.

206. Introduction to Microeconomics (3)

Three hours of lecture and discussion. Pricing and resource allocation. Supply and demand. Theory of the firm and industry. The role of labor unions in the American economy. Problems in antitrust policy. The theory of international trade. Fall, 1978.

300. Summer Session in Field Forestry (6)

Fundamental training in forestry disciplines demonstrating elements of resource inventory, ecology and utilization within the context of total resource management. Course consists of five 6-day weeks of field exercises, reports and projects in areas of surveying and cartography, forest and tree measurements, dendrology, ecology and utilization of forest goods and services. Daily exercises develop understanding through active physical participation by students. Two repeating sessions per summer held at Warrensburg Campus. A service charge is required covering individual expenses while in residence at Pack Demonstration Forest, Warrensburg, New York. Summer, 1979.

321. General Silviculture (3)

Two hours of lecture and one 3-hour laboratory first half of semester, 3 hours of lecture last half of semester. Survey of silvical principles and concepts and practice of silviculture for the production of goods and services from the forest. Designed for students in curricula other than resources management. Not available for resources mangement majors. Fall, 1978.

Prerequisite: Junior standing.

322. Introductory Forest Mensuration (3)

Two hours lecture and discussion, one 3-hour laboratory. Principles and methods of estimation and measurement of forest trees and products, singularly and in the aggregate; of trees, forest products, forest stands, forest growth in time area and value. Determination by graphical and mathematical analysis of volume, growth, and valuation of wood products and other nonwood products and services of the forest through laboratory problems. Fall, 1978.

Prerequisites: Summer Field Session or permission of instructor.

331. Introduction to the Physical Environment (6)

Lectures, discussions, field and laboratory work blocked in time and subject matter with ERM 332, Silvics-Silviculture. Study of the environmental media: air, soil and water, through examination of the flow of energy and matter within and between these components of the environment. Drawing together information from geology, physical geology, soil science, water

science and meteorology, this course provides understanding of these areas, their interactions and the interface with the biological system. Fall, 1978.

Prerequisite: Junior year standing in ERM curriculum or equivalent. Course should be taken concurrently with ERM 332, Silvics-Silviculture, because of the blocking of these two courses.

332. Silvics-Silviculture **(8)**

Three 1-hour lectures and five 3-hour labs or field trips per week. Fundamentals of silvics and practices of silviculture enabling manipulation of forests to attain objectives of the forest owner. Emphasis is placed on the biological interrelationships within the forest community, including site factors and forest stand dynamics, and the consideration of these in silvicultural operations. Fall, 1978.

Prerequisites: Summer Session in Field Forestry, Physical Environment (taken concurrently) or permission of instructor.

335. Regional Silviculture **(3)**

Three hours per week of classroom study. Topics cover regional factors that influence silvicultural methods commonly used in different forest types. Provides study of various silvicultural systems used in operating forest properties in various regions, with attention to geographical differences in land use, market opportunities, species characteristics, and economic conditions. Spring, 1979.

Prerequisite: ERM 332 or ERM 321.

345. Soils **(3)**

Three hours of lecture/discussion. Introduction to the fundamentals of soil science with particular reference to forestry, but including other land uses. Spring, 1979.

351. Meteorology and Fire Behavior **(3)**

Lectures and recitations in atmospheric physics and the physics and chemistry of combustion lead to discussions of fire behavior and the strategy and tactics of fire suppression. Fall, 1979.

Prerequisite: PHY 103 and 104 (Calculus helpful but not required).

360. Principles of Management **(3)**

Three hours of lecture and recitation. Basic principles and concepts of management which are universally applicable to any organization, business enterprise or public agency. The various approaches to management including the classical, behavioral and quantitative concepts with emphasis upon the integrative approach, now required to meet modern society's changing life styles and values and the new awareness of the public regarding environmental matters and natural resources management. Spring, 1979.

363. Forest Information Systems **(4)**

Data needs, as specified by management goals and resource constraints, and the manner in which these needs influence acquisition, storage, retrieval and prediction. Spring, 1979.

364. Soil and Water Conservation **(3)**

Three lectures per week. An integrated historical survey of water and related land resource conservation in the United States. Interrelationships of planning, administration, and evaluation of policies, programs and projects by all levels of government and private units. Spring, 1979.

370. Management of the Forest Enterprise **(3)**

Two hours of lecture and 1 hour of discussion/laboratory. This course is concerned with the management alternatives, both of a technical and social nature, that are available in the planning for and the production of timber, recreation, wildlife, forage, and water from the forest and with the criteria for choice to meet management objectives. Spring, 1979.

371. Range Management **(2)**

Two hours of lecture. Range ecology, animal husbandry, management practices and administrative aspects of range resources. Spring, 1979.

372. Planning and Developing Access for Forest Use (3)
Two hours of lecture, and one 3-hour laboratory/discussion. Planning and developing suitable access necessary in producing a wide range of goods and services derived from forest land. Overland and aerial access systems including costs, consideration of user characteristics, aesthetics, standards, maintenance and evaluation of alternatives in location and development. Fall, 1978.
Prerequisite: Senior standing or permission.

373. Timber Harvesting (3)
Two hours of lecture and one 3-hour lab/discussion. Harvesting as a production system including equipment, equipment mixes, costs and manpower in serving and logmaking and primary and secondary transportation. Evaluation of various systems as to environmental impacts. Wood as a raw material to the primary processing system and trees as inputs to the harvesting system. Spring, 1979.

400. The Social Environment of Resource Management (3)
Three hours of lecture and discussion. This course describes the institutional framework within which the resource manager practices his profession. It intends to show how economics, law, public policy, pressure groups and financial considerations constrain the professional judgment of the resource manager and the goals and objectives of the institution employing him. Fall, 1978.
Prerequisites: Silvics-Silviculture, Principles of Management, Management Models, Information Systems; Senior standing.

402. Legal Aspects of Surveying (3)
Three credit hours of lecture and discussion. Fundamental principles of real property law with special reference to boundary survey, conveyances, rules of evidence, title insurance, rights, duties, and liability of professional land surveyors. Case material and appropriate New York State statutes will be discussed. Fall, 1978.

404. Economics of Wood-Using Industries (3)
Three hours of lecture and discussion. Structure and organization of selected wood-using industries. Analysis of decisionmaking by the firm. Principles of production and marketing including demand and cost analysis and pricing. Special issues and current problems of the industries, and introduction to the newer mathematical and statistical tools for meeting them. Spring, 1979.
Prerequisite: ERM 204 or equivalent.

405. World Forestry Resources: Problems and Prospects (3)
Three hours of lecture and discussion plus guided readings, pertaining to world forest resources and the problems and opportunities associated with their use and development. Major topics include: world forest resources; production and trade; principal wood-producing countries; forestry and the problems of underdevelopment; and special areas and topics of interest to world forestry. Spring, 1979.
Prerequisite: Upper division status. Senior status preferred.

429. Environmental Impact: Principles and Strategy (3)
Three hours of lecture and discussion. Principles and theory of environmental impact and statements of impact as required by Federal law. Administrative procedures for review and evaluation. Procedural strategy and effective constitution before various governmental levels. Means of obtaining and sources of authoritative information. Spring, 1979.
Prerequisite: Senior standing.

433. Commodity Production Silviculture (3)
Six hours per week of lecture and study, or field work. Classroom instruction and exercises will introduce topics, followed by field exercises stressing application of silvicultural methods for growing wood products, mostly in hardwood stands. Topics will cover concepts, techniques, diagnostic methods, and field application for thinning, reproduction methods for even- and uneven-aged stands, assessing site and stand capabilities, and measuring and evaluating stand

growth and development following management, where producing wood and other commodities represents a primary goal. Offered one day per week as a block of instruction and exercise. Spring, 1979.

Prerequisite: ERM 331-332, ERM 335, and one mensuration course beyond Summer Camp. Senior standing required.

434. Greenspace Silviculture **(3)**

Two hours of lecture, 1 to 3 hours seminar or field trip per week. Concepts, techniques, and field practice of evaluating and manipulating vegetation systems, including site conditions, woody and herbaceous vegetation, and use impacts, primarily for on-site values in park, recreation, wildlife and multiple-use lands, roadsides, utility rights-of-way, protection areas, etc. Fall, 1978.

Prerequisites: At least one ecology and/or silvics course. Senior standing or permission of instructor.

435. Integrated Use Silviculture **(3)**

Development of silvicultural decisions in management of woodlands to achieve results under various integrated use objectives. Four hours of lecture and seminar during first half of semester; six hours of field practice thereafter each week. Trips to forest areas. Several technical reports and a cultural plan prepared prescribing treatment to attain various ownership objectives. Spring, 1979.

Prerequisite: ERM 331 and 332 or permission of instructor. Senior standing.

440. Forest Hydrology **(3)**

Two hours of lecture; 3 hours of laboratory. The relation of forest and range vegetation to its environment, and its effect upon soil and water. Measurement of precipitation, runoff, erosion and other variables. Fall and Spring, 1978-79.

441. Forest Influences **(2)**

Half time for four weeks. Cranberry Lake Biological Station. Field observation of the effect of the presence of forest vegetation on easily quantified parameters of climate and the hydrologic cycle. Basic measurements of precipitation, radiation, temperature, interception, soil moisture, groundwater, and streamflow. Summer, 1979.

442. Practice of Watershed Management **(3)**

Two hours of lecture, 3 hours of laboratory. The impact of the multiple use of forest and range lands on water yield and soil stability. Regional problems and potential solutions. Spring, 1979.

Prerequisite: ERM 440.

446. Forest Soil Classification, Survey, and Interpretation **(3)**

Two hours of lecture/discussion, one 3-hour laboratory period. Detailed examination of soil genesis and classification, and the survey and description of the soilscape. Interpretations are made for various land uses, especially forestry. Spring, 1979.

Prerequisites: ERM 331 or 345 or an introductory soils course.

452. General Meteorology **(3)**

Three hours of lecture. Examination of the physical processes of the atmosphere as they relate to the exchange of heat, moisture and momentum in the earth-atmosphere system. Emphasis on the meteorological and micrometeorological basis of climate and its interaction with the biological world. Spring, 1979.

Prerequisite: Junior standing or permission of instructor.

453. Biometeorology **(2)**

Two hours of lecture/discussion covering the fundamentals of organism-physical environment interaction. Spring, 1979.

455. Forest Tree Improvement **(3)**

Two hours of lecture, 3 hours of laboratory or field work. General principles and methods of tree improvement practiced in this country and abroad. Tree selection, techniques of vegetative

propagation, hybridization, polyploidy, establishment of seed orchards, clonal and offspring testing and other problems. Spring, 1979.

Prerequisites: FBL 470 and 471 strongly advised.

456. Management of the Forest Business (3)

Three hours of discussion. Overview of major business management principles and methods of operation in forestry enterprises. Emphasis is on general business concepts which forest managers must use. Actual case studies are basis of instruction. Complementary to RMP 611. Fall or Spring, 1978-79.

461. Management Models (3)

Two hours of lectures, 3 hours of laboratory. Introduction to the various models used in managerial decisionmaking. Emphasis is on the characteristics of the various models: their formulation, assumptions, uses and limitations. The major topics covered will include: the role of models in management; simple optimization; constrained optimization; multi-valued choices; time adjustment of value; simulation; and models in nondeliberated decisions. Integration of the deliberative and intuitive models is stressed. Fall, 1978.

464. Applied Communications (3)

Two hours of lecture, 3 hours of laboratory during first part of course. Major media production project required. Course objective is to acquaint students with the basic principles of instructional communications in the teaching-learning process. Various media including television, motion pictures, exhibits, illustrated lectures, slide talks, newspapers, etc., are examined with emphasis on their utilization in environmental education. Also, consideration is given to instructional design for meeting predetermined learning objectives in various publics—lay and professional adult audiences, school children, etc. Spring, 1979.

465. Managerial Economics (3)

Three hours of lecture and discussion. Analysis of decisionmaking by the firm. Review of principles employed in modeling, predicting, risk assessment, evaluation and selection of alternative actions. Emphasis on economic and financial decisions and on the delineation of systematic processes of decision. Spring, 1979.

Prerequisite: Not available to Resource Management undergraduates except with permission of instructor.

471. Resources Management (3)

Three hours of lecture/discussion/recitation/case studies. The interrelationships between man and forest land resources and the multiple services which these resources provide; the extent and nature of responsibilities of the resource manager to the community and to society in his stewardship of natural resources. Spring, 1979.

472. Fundamentals of Outdoor Recreation (3)

Three hours of lecture per week. Introduction to the programs and practices of Federal, state and local agencies and private organizations involved in planning, administration and management of outdoor recreation areas. Emphasis is on major recreational issues and conflicts faced by area managers, and how they integrate solutions into their plans. Spring, 1979.

473. Planning and Development of Forest Recreation Areas (3)

Three hours of lectures or equivalent laboratory and assignments per week. Planning and designing forest recreation areas, structures and facilities. Development of construction plans for camp and picnic sites, for waterfront areas and for trails. Emphasis is)n the functional relationship between planning and design, management and maintenance. Field trips required. Fall, 1978.

Prerequisite: ERM 472 and permission of instructor.

475. Sociology and Psychology of Leisure Behavior (3)

Three hours of lecture and discussion. Introduction to theory and research findings dealing with the sociological and psychological aspects of leisure behavior; field work and lectures

demonstrate applications, particularly with regard to leisure behavior. Spring, 1979.

Prerequisites: ERM 472, Fundamentals of Outdoor Recreation, and an introductory course in sociology or psychology, or instructor's permission.

477. Resource Policy and Management **(3)**

Three hours of lecture supplemented by 1 hour of discussion and/or lecture. Public and private forest policy formation; principles of modern management; overall management and operation of a productive forest property. Primarily for forest engineers. Not available to Resource Management undergraduates. Fall or Spring, 1978-79.

Prerequisite: Mensuration and silviculture or by permission of the instructor.

478. Marketing of Forest Products **(3)**

Three hours of discussion and analysis. Case study analysis of product, pricing and market research policies and problems of market structure in the lumber, pulp and paper and other major wood-using industries. Spring, 1979.

480. Urban Forestry **(3)**

Two hours lecture and 3 hours of laboratory or field trip per week. Introduction to urban forestry: its professional status and potentials. Elements of urban physical geography . Nature and functions of various kinds of urban greenspace; their physical and social interactions as an integrated system, and management within the broader context of urban processes. Field practice in evaluating urban greenspace resources. Spring, 1979.

Prerequisites: Senior status. ERM core courses or permission of instructor. For students in other schools ERM 434 is desirable.

496. Special Topics in Environmental and Resource Management **(1-3)**

Guided readings, lectures, discussions, tutorial conferences, or special coursework designed to help the undergraduate student apply scientific analysis of a social, biological, or physical nature to questions within his area of interest. Questions and analyses would include those dealing with forest resources management and administration; forest cultural practices; land use and land use planning; hydrology and watershed management; outdoor recreation; resource economics; world forestry; and others. Fall and Spring, 1978-79.

Prerequisite: Consent of instructor.

497. Resources Management Seminar **(3)**

Three hours of group discussion and analysis. Current literature, plans and principles, and new developments in forest management. Fall or Spring. Staff.

498. Special Studies in Environmental and Resource Management **(1-3)**

Independent research in environmental and resource management for selected undergraduate students. Selection of subject areas determined by the student in conference with appropriate faculty member. Final written report is required for departmental record. Fall or Spring, 1978-79.

Prerequisite: Consent of instructor and department chairman.

499. Independent Study in Resources Management **(7-17)**

Independent study of some significant aspect of environmental and resources management. The selection of the topic will be determined by the student in consultation with his advisor. Guidance will be provided by a faculty committee. Limited to Spring semester seniors in Resources Management. Spring, 1979.

EST—ENVIRONMENTAL STUDIES

100. Introduction to Environmental Studies **(3)**

Lecture and discussion on the nature of man, his social, cultural, economic and political institutions and how these condition his views of the environment. Fall, 1978.

497. Undergraduate Seminar **(1)**
Seminars on problems of environmental concern. The subject of the seminar will be announced prior to registration. Fall and/or Spring, 1978-79.

498. Undergraduate Problem **(1-3)**
Interdisciplinary research designed to solve environmental problems. Selection of subject matter to be determined by students in conference with the Undergraduate Environmental Studies Advisory Group. Problem analysis and programs for solution in the form of a final report required. Fall and/or Spring, 1978-79.
Prerequisite: Consent of instructor.

FBL—BIOLOGY (FOREST BIOLOGY)

320. General Ecology **(3)**
Two hours of lecture, 3 hours of field trips during the first half of the semester. Three hours of lecture during the second half of the semester. Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments, ecological factors, energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. The ecological impact of man is reviewed. Fall, 1978.
Prerequisite: A year course in biology or equivalent.

330. Principles of General Physiology **(3)**
Three hours of lectures. Introduction to the dynamics of living systems with emphasis on the universality of the biological world. Spring, 1979.
Prerequisite: One semester of organic chemistry.

400. Forest Techniques for Biologists **(1)**
Full-time for one week. Cranberry Lake Biological Station. Techniques of forest stand inventory and measurements; mensurational analysis; stand manipulation, harvesting, regeneration, and protection. Summer, 1979.

405. History of Natural Science **(1)**
One hour of lecture. A review of the history of western science from pre-Ionian times to Darwin, with evaluation of the impact of culture and religion on scientific progress. Spring, 1979.

420. Field Experience—Internship **(5)**
Full-time for at least 5 weeks, or equivalent, of employment with an Agency or Professional involved in field activity. A resident faculty member is required to serve as course evaluator. Approval of Curriculum Director is necessary. See your advisor for detailed procedural information. Summer, 1979.

421. Ecology of Freshwaters **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Experimental and observational studies of environmental and biotic interactions influencing productivity of freshwaters. Basic concepts at the organismic, population, and community level. Summer, 1979.

470. Principles of Genetics **(3)**
Three hours of lecture and discussion. A general course covering concepts of genetics and evolution base to upper division biology and biochemistry courses. Includes the inheritance and analysis of Mendelian and quantitative traits, the chemical nature of the gene and its action, the genetic structure of populations and their evolution. Numerical methods for characterizing and analyzing genetic data are introduced. Fall, 1978.
Prerequisites: Forest Botany 100 and Forest Zoology 100 or a 1-year college introductory biology course.

471. Principles of Genetic Laboratory **(1)**
Three hours of autotutorial laboratory. Experiments with plants and animals and computer simulation exercises demonstrate the basic principles of inheritance of Mendelian and

quantitative traits and changes in populations caused by major forces in evolution or by breeding procedures. Numerical methods for characterizing quantitative traits and for testing hypotheses are introduced. Fall, 1978.

Corequisite: FBL 470 or equivalent.

472. Introduction to Quantitative and Population Genetics (1)

Ten lecture-discussions and four autotutorial laboratories the second half of the semester (incl. Lecture-Lab Modules 5 and 6 of FBL 370 and 371). Basic genetic concepts of quantitative inheritance, the structure of populations and evolution. Laboratory experiments and computer simulations are used to demonstrate these concepts. Numerical methods for characterizing and analyzing genetic data are introduced. Fall, 1978.

Prerequisite: An introductory genetic lecture-laboratory course deficient in these areas of genetics and permission of instructor. (Not open to students taking FBL 470 and 471.)

496. Topics in Biology (1-3)

Experimental, interdisciplinary, or special coursework in biology for undergraduate students. Subject matter and method of presentation varies from semester to semester. May be repeated for additional credit. Fall or Spring, 1978-79.

497. Undergraduate Seminar (1)

Literature surveys and seminars on topics of biological interest and importance. Subject to be generated by faculty and students and to be announced prior to registration. Fall and Spring, 1978-79.

498. Research Problem in Biology (1-3)

Independent research in topics in Forest Biology for the superior undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall, Summer and/or Spring, 1978-79.

Prerequisite: Consent of instructor.

FBO—BOTANY (FOREST BOTANY AND PATHOLOGY)

100. General Botany (4)

Prerequisite to all other courses in Botany. Two hours of lecture and 4 hours of lecturelaboratory in the Autotutorial Learning Center. An introduction to plant biology with special emphasis on the structure and function of the green plant. Fall, 1978.

310. Classification of the Plant Kingdom (3)

Two hours of lecture and 3 hours of lab. Introductory study of the plant kingdom with emphasis on the angiosperms. Spring, 1979.

315. Dendrology I (3)

Two hours of lecture and one 3-hour laboratory/field trip each week. Field study, identification, natural history, and elementary silvics of important forest trees of North America. Fall, 1978.

330. Nutritional Physiology of Plants (3)

Two hours of lectures. Descriptive aspects of the fundamental activities of plants. Subjects to be covered include cell structure, water and mineral metabolism, organic nutrition and a brief introduction to biological control mechanisms. Will not satisfy the plant physiology requirement of botany majors. Fall, 1978.

Prerequisite: FBO 100 or equivalent.

360. Forest and Shade Tree Pathology (3)

Two hours of lecture and 3 hours of autotutorial laboratory. Major diseases of forest, shade and ornamental trees and deterioration of forest products will be discussed with emphasis on

disease identification, principles of disease development, effects of disease on the host and practical control measure. Spring, 1979.

415. Dendrology II **(1)**
One 3-hour field trip/laboratory each week. A continuation of Dendrology emphasizing trees and shrubs ecologically important in the central New York region and economically important in North America. Fall, 1978.

417. Adirondack Flora **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Field study of the summer flora of the Adirondack Mountains. Summer, 1979.

422. Ecology of Forest Communities **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Study of the structural and functional characteristics of selected Adirondack forest ecosystems; techniques of vegetational analysis. Special requirement: students must be prepared to go on one over-night camping trip to an isolated study area. Summer, 1979.

425. Plant Ecology **(3)**
Two hours of lecture and discussion and one laboratory session per week. A first course in plant community ecology dealing with the dynamics of community development and change and the process of community analysis and description. Spring, 1979.
Prerequisites: FBL 320.

427. Bryoecology **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Study of the bryoflora of the major ecosystems of the Adirondack Mountain region. Summer, 1979.

428. Wetland Plant Ecology **(1)**
Full-time for 1 week. Cranberry Lake Biological Station. Study of wetland plant community dynamics and environmental relationships in the Adirondack Mountain Region. Summer, 1979.

432. Diseases of Woody Ornamentals **(1)**
Three hours of lectures per week for 4 weeks. Major diseases of the common shade and ornamental trees will be discussed with emphasis on methods of control. Not open to students who have had FBO 360. Fall, 1978.

460. Field Problems in Forest Pathology **(1)**
Full-time for 1 week. Cranberry Lake Biological Station. Field study of important tree diseases in the Adirondacks, including heartrots, root-rots, cankers, rusts, foliage diseases, mistletoe, and physiological diseases. Also field study of mycorrihizae and other tree-root mutualisms. Summer, 1979.

461. Principles of Forest Pathology **(3)**
The equivalent of 3 credit hours per week as lecture, discussion or laboratory. Concepts and principles of tree diseases in relation to forest practices and practical experience in disease diagnosis and impact evaluation. Fall, 1978.
Prerequisite: FBO 360 or consent of instructor.

465. Field Mycology **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. An introduction to the collection and identification of the Adirondack fungal flora. Field techniques and laboratory identification of the major fungi found in selected ecosystems. Summer, 1979.

490. Plant Propagation **(1)**
One combined lecture-demonstration-laboratory/week plus supervised greenhouse assignments. Instruction in principles and practices of plant propagation and in related greenhouse operations. Fall and Spring Semesters, 1978-79.
Prerequisite: Senior status in biology curriculum.

FCH—CHEMISTRY

221. Organic Chemistry I **(3)**
Two hours of lecture, 1 hour of recitation. A survey of representative classes of carbon compounds with an emphasis on structure, nomenclature and fundamental reactivity and other important properties, uses and characteristics. Fall, 1978.
Prerequisite: One year of freshman chemistry.

222. Organic Chemistry Laboratory I **(1)**
One 3-hour laboratory period. Laboratory techniques in organic chemistry. Melting points, distillation, recrystallization, extraction, column and thin layer chromatography. Qualitative functional group analysis. Fall, 1978.
Prerequisite: One year of freshman chemistry.
Corequisite: FCH 221 or equivalent.

223. Organic Chemistry II **(3)**
Two hours of lecture, 1 hour of recitation. A study in depth of the reactivity characteristics of the various classes of carbon compounds. The relation of chemical reactivity and physical properties to electronic and three-dimensional characteristics of carbon compounds. Spring, 1979.
Prerequisites: One year of freshman chemistry and 1 semester of organic chemistry.

224. Organic Chemistry Laboratory II **(1)**
One 3-hour laboratory period. Continuation of FCH 222. Simple physical, quantitative and instrumental techniques applied to organic chemistry. Gas chromatography, polarimetry, kinetics. Introduction to synthesis. Spring, 1979.
Prerequisite: FCH 222 or equivalent.
Corequisite: FCH 223 or equivalent.

225. Organic Chemistry I **(3)**
Two hours of lecture, 1 hour of recitation. A survey of representative classes of carbon compounds with emphasis on structure, fundamental reactivity and other important properties and characteristics relevant to biological systems. Nonchemistry majors. Fall, 1978.
Prerequisites: One year of freshman chemistry.

226. Organic Chemistry II **(3)**
Three hours of lecture and discussion. The structure and reactivity of organic compounds, utilizing natural products as examples, will be studied in order to develop an organic chemical background for further study of biological chemistry. Spring. Nonchemistry majors. 1979.

325. Organic Chemistry III **(4)**
Two hours of lecture, one 6-hour laboratory period. Classical and recent literature synthesis of organic compounds, employing advanced techniques. Fall, 1978.
Prerequisite: Two semesters of elementary organic chemistry.

380. Instrumental Methods of Analysis **(3)**
Two hours of lecture and one 3-hour laboratory. Lecture includes theory, applicability and limitations of a number of current methods of instrumental analysis. Laboratory sessions provide practice with several of these techniques. Spring, 1979.
Prerequisites: General chemistry and quantitative analysis.

384. Spectrometric Identification of Organic Compounds **(1-2)**
Two hours of lecture and discussion. The first half semester (1 credit) will deal with common classes of organic compounds; the second half semester (1 credit) will deal with more complex structures. The use of complementary information from mass, infrared, nuclear magnetic resonance and ultraviolet spectrometry will be applied to identification of organic natural products. Spring, 1979.
Prerequisites: Organic chemistry; 1 semester of advanced organic chemistry for second credit.

410. Topics in the Chemistry of Pollution (1-3)
Discussion of some specific areas of current concern to the environmental chemist. Lectures by staff members supplemented by outside speakers from industry and governmental agencies. Three hours of lecture per week. This course is taught in modules. Spring, 1979.
Prerequisite: Organic Chemistry and permission of instructor. Spring, 1979.

450. Introduction to Polymer Science (3)
Three hours of lecture. Introduction to the chemistry, physics and properties of synthetic polymers. Description and classification of polymers. Polymer synthesis. Polymer solutions. Polymer solid states, including discussion of rubber elasticity, glass transition, crystallization, viscoelasticity. Structure and properties of fibers, films, elastomers, foams. Fall, 1978.
Prerequisites: One year of organic chemistry and 1 year of physical chemistry.

475. Wood Chemistry I (2)
Four hours of lecture first half of semester. Introduction to carbohydrate chemistry. Chemistry of cellulose, hemicelluloses and lignin. Cellulose derivatives. Wood extractives. Bark chemistry. Distribution of the cell wall constituents in wood. Fall, 1978.
Prerequisites: FCH 221—224 or equivalent.

476. Wood Chemistry II (2)
Four hours of lecture second half of semester. Interaction of cellulose with water and alkali. Effect of acids on cellulose, hemicelluloses and lignin. Sulfonation and oxidation of lignin. Action of alkali on cellulose, hemicelluloses and lignin. Topochemistry of the major wood delignification reactions. Wood defects. Chemical by-products from wood. Manufacture of cellulose acetate and rayon. Fall, 1978.
Prerequisite: FCH 475.

477. Wood Chemistry III (2)
Chemistry of pectin and starch. Photosynthesis, with emphasis on the chemical, dark phase. Biosynthesis of sucrose, starch and plant cell wall polysaccharides. Biosynthesis of aromatics, with emphasis on lignin. Effects of growth hormones on structure and chemistry of plant cell walls. Spring, 1979.
Prerequisite: FCH 475.

478. Wood Chemistry Laboratory (1)
Gravimetric and spectrophotometric determination of lignin in wood. Determination of number-average and weight-average molecular weights of ethylcellulose. Separation of larch arabinogalactans A and B and estimation of their molecular-weight and molecular-weight distribution by gel permeation chromatography. Fall, 1978.

495. Introduction to Professional Chemistry (1)
The professional chemist and his relationships with industry, government and universities. Employment opportunities for the chemist, professional organizations, and unions will be discussed. The selection of a senior research topic and a literature survey will be required. Fall, 1978.
Prerequisite: Senior status.

496. Special Problems in Chemistry (1-3)
An opportunity for a special problem, technique development, independent or unstructured study in an area related to the chemical profession. The work may be technical, professional or interdisciplinary. Advisors outside this department may be solicited. A brief proposal must be presented for approval with specific arrangements outlined including faculty advisor and objectives of the study. Evidence of competence and appropriate effort is required for credit. A written report will be expected. Fall and Spring, 1978-79.
Prerequisite: Upper division status.

497. Undergraduate Seminar (1)
One hour per week. Literature surveys and seminars on topics of current research interest and recent advances in chemistry. Spring, 1979.

498. Introduction to Research **(5)**
Eighteen hours of laboratory per week, library search and report writing. Solution of a selected research problem using special laboratory techniques. Typewritten report on data, procedures, results and conclusions. Spring, 1979.

FEG—FOREST ENGINEERING

271. Plane Surveying **(3)**
Two hours of lecture and recitation, 3 hours of field or office practice. A comprehensive development of the principles of plane surveying. Use of modern instruments and methods, computations related to topographic mapping and site development. Fall, 1978.
Prerequisite: Plane trigonometry, or permission of instructor.

300. Introduction to Engineering Design **(1)**
One hour of lecture and discussion. An introduction to methodologies for general problem analysis and engineering design for resource utilization. Emphasis is placed on the relationship of engineered solutions of forestry problems and their effects on the entire resource environment. Fall, 1978.
Prerequisite: Junior standing.

340. Hydrology **(3)**
Two hours of lecture and 3 hours of laboratory and discussion per week. Analysis of the waters of the earth; their occurrence, circulation and distribution; chemical and physical properties; and interaction with their environment, including their relation to living things. A system's perspective is developed towards the solution of typical hydrologic problems. Spring. 1979.
Prerequisite: CIE 327, Principles of Fluid Mechanics; APM 391, Introduction to Probability and Statistics; and APM 360, Introduction to Computer Programming or equivalent.

342. Hydraulics in Construction **(4)**
Three hours of lecture, 3 hours of laboratory. The physical, mechanical, thermal and hydraulic properties of fluids relevant to the construction industry. A study of solutions to hydraulic problems in contemporary construction activities. Not open for credit to forest engineering students. Spring, 1979.
Prerequisites: Physics and differential calculus.

350. Introduction to Remote Sensing for Engineers **(2)**
Two hours of lecture and 3 hours of laboratory per week. The fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys and site development analyses. Oriented for multidisciplinary participation. Spring, 1979.
Prerequisite: Junior standing and FEG 363 (which may be taken concurrently with FEG 350).

352. Introduction to Remote Sensing **(3)**
Two hours of lecture and 3 hours of laboratory per week. Qualitative and quantitative introduction to the fundamentals of acquiring, analyzing and utilizing remote sensing data in the performance of natural resource inventories, environmental quality surveys, site development studies and land use analyses. Oriented for multidisciplinary participation. Spring, 1979.
Prerequisite: Junior standing, physics and calculus or consent of instructor.

363. Photogrammetry **(3)**
Two hours of lecture and discussion, 3 hours of laboratory. Basic photogrammetric and photo interpretation concepts as a means of acquiring reliable data for engineering and management planning. Potentials, limitations, instrumentation and unique requirements are considered. Fall and Spring, 1978-79.
Prerequisite: FEG 271 (or FEG 371 concurrent).

371. Surveying for Engineers **(3)**

Two hours of lecture and recitation, 3 hours of laboratory. The principles of plane surveying for engineers. Subject areas to be treated include linear and angular measurements in both the horizontal and vertical planes; error analysis; horizontal and vertical control and associated computations; areal and volumetric computations; circular and parabolic curves; state plane coordinates; astronomical observations for direction of lines; and consideration of potential computer relationships. The laboratory is essentially the same as FEG 271, but with additional work. Field work and computations culminate in a topographic map. Fall, 1978.

Prerequisite: Differential and integral calculus.

410. Structures **(4)**

Three hours of lecture, 3 hours of laboratory. Engineering principles in the analysis, planning, design, construction and maintenance of forest structures such as timber bridges, trusses, towers, dams, water supplies, sewage systems and other facilities. Properties of timber, concrete, steel and other structural materials. Fall, 1978.

Prerequisite: CIE 325 or concurrent registration.

422. Production Systems Engineering **(4)**

Four hours of lecture per week. An introduction to concepts of production systems and procedures for planning, designing and managing production and large-scale physical systems with an emphasis on the coordination of resources to achieve well-defined objectives. Topics include: the concept of systems analysis as a design process; linear and dynamic programming; and select mathematical and economic techniques applicable to resource engineering and management. Fall, 1978.

Prerequisite: ERM 206, FEG 300, APM 391, MAT 585.

437. Transportation Systems **(4)**

Three hours of lecture and 3 hours of laboratory. Interrelationships among natural features, transportation types, design and management objectives to provide the most effective system within the given framework. Basic engineering principles in the planning location, design, construction and maintenance of suitable transportation systems to serve various aspects of forest resource management. Spring, 1979.

Prerequisites: FEG 371 and FEG 432 or equivalents.

447. Hydrologic Controls **(3)**

Three hours of lecture and discussion. A continuation of FEG 340, emphasizing the application of hydrologic principles. Basic hydraulics of controlling structures, open channel flow, sedimentation, filtration systems, reservoirs and water law as applied to forest and range land hydrology. Spring, 1979.

Prerequisites: FEG 340, FEG 430 or FEG 432, CIE 327 or equivalents as evaluated by the instructor.

460. Measurement Errors and Adjustment Computations **(3)**

Two hours of lecture, one 3-hour lab each week. The study of measurement errors and the adjustment of observations oriented toward geodesy and photogrammetry. Topics include error definitions, weighted observations, method of least squares, matrix algebra in adjustments, variance-covariance matrix, the error ellipse, the general case of adjustment, and the design of survey networks. Fall or Spring, 1978-79.

Prerequisite: Calculus, APM 391 or equivalent.

464. Photogrammetry II **(4)**

Two hours of lecture, 1 hour of recitation, 3 hours of laboratory each week. General analytic photogrammetry including interior and exterior orientation systems, intersection, space resection and orientation. Correction of photo coordinates for film deformations, lens distortions, atmospheric refraction and earth curvature. Introduction to photogrammetric plotters including the completion of a topographic mapping project. Planning photogrammetric projects, establishing product specifications, cost models, optimal components of photogrammetric systems, design of optimum procedures for the photogrammetric project. Spring, 1979.

Prerequisite: FEG 363 or equivalent.

474. Geodesy **(4)**
Three hours of lecture, 3 hours of laboratory. An introduction to Geodesy, including ellipsoidal geodesy, the direct and inverse problems, spherical triangles, conformal maps, astronomic methods of position determination, time, gravity field of earth. Fall, 1978.
Prerequisite: Calculus through MAT 328 and FEG 371 or equivalent.

477. Survey Systems Design **(3)**
Three hours of lecture and discussion. A study of the development and present status of Land Surveys, including the U.S. Public Land System, plane coordinate system, land use and resource systems such as New York's LUNR system. The impact of survey upon land use. The design of future systems. Spring, 1979.

486. Cartographic Surveying **(3)**
One hour of lecture and 6 hours of field or laboratory exercise each week. Lecture topics will include earth ellipsoid, state plane coordinates, position and azimuth determination, parametric equations of ellipsoid, data reduction techniques, field techniques and specifications and design of control surveys. A topographic mapping project will be planned and the necessary ground control established. Fall, 1978.
Prerequisite: FEG 371 and FEG 363 or equivalent.

489. Forest Engineering Planning **(3)**
Two hours of lecture and 3 hours of laboratory. A synthesis of the fundamental areas of forest engineering in the planning of the physical development of the forest resources. Specific design studies will be made emphasizing the interrelationship of man, forest resources and their multiple services. These studies will lead to the development and application of planning to simulated realistic conditions. Spring, 1979.

498. Research Problem in Forest Engineering **(1-3)**
Independent research in topics in Forest Engineering for the highly motivated undergraduate student. Selection of subject area determined by the student in conference with appropriate faculty member. Tutorial conferences, discussions and critiques scheduled as necessary. Final written report required for departmental record. Fall and Spring, 1978-79.
Prerequisite: Consent of instructor.

FEN—ENTOMOLOGY (FOREST ENTOMOLOGY)

300. Principles of Forest Entomology **(2)**
Elements of insect classification, living requirements and control manipulations that are prerequisite, with further study, to an understanding of insects in relation to applied aspects of forestry. One hour of lecture, 3 hours of laboratory field work. Spring, 1979.

350. Elements of Forest Entomology **(3)**
Two hours of lecture, 3 hours of laboratory/field work. General classification of insects, morphology, physiology, ecology behavior and basic principles of population control. Emphasis through illustration is on the role of insects in the forest environment. Fall, 1978.
Prerequisites: FBO 100 and FZO 100.

402. Forest and Shade Tree Entomology **(3)**
Two hours of lecture, 3 hours of laboratory/field trip. Important forest and shade tree insects; detection, evaluation, prevention and control of their damage; their relation to silviculture and management of forests and shade trees. Spring, 1979.
Prerequisite: FEN 350 or FEN 300.

404. Wood Deterioration by Insects **(3)**
Three hours of lecture, discussion and demonstration. Biology, identification, ecology of insect and wood interrelations; prevention of injury and control of insects injurious to forest products and wood in use. Spring, 1979.
Prerequisite: FEN 350, FEN 300 or consent of instructor.

432. Insects and Site Planning (1)
Three hours of lecture per week for 4 weeks. An introduction to insect pests of shade trees; other woody ornamentals, wood structures and man; cultural methods for dealing with insect problems. (No credit for students who have already taken FEN 300, FEN 350, or who are Biology majors.) Fall, 1978.

450. Forest and Aquatic Insects (2)
Half-time for 4 weeks. Cranberry Lake Biological Station. The forest and aquatic insects of Cranberry Lake Region and their role in these environments and habitats. Insect collection required. Summer, 1979.

451. Pest Management—Theory and Practice (2)
Two hours of lecture for 9 weeks; then one lecture hour and one 3-hour laboratory for 4 weeks. A review of history and governmental policy of pest management, as well as basic instruction in theory and practicum. Spring, 1979.

452. Principles of Chemical Control (3)
Two hours of lecture; one 3-hour laboratory. A study of the chemistry, toxicology, handling and application of chemicals used to manage pest populations. A primer for the State Pesticide Application examinations. Fall, 1978.
Prerequisite: FEN 451.

460. Insect Behavior and Ecology (2)
Half-time for 4 weeks. Cranberry Lake Biological Station. Descriptive, comparative and experimental behavior of aquatic and terrestrial insect species of the Cranberry Lake Region. Field project, involving field study and paper required. Ecology of forest insects and field techniques used in their study. Emphasis on functional roles played by insects in forest ecosystems. Summer, 1979.
Prerequisite: FEN 350 or equivalent; background in introductory biology and ecology.

490. Medical Entomology (3)
Two hours of lecture, 3 hours of laboratory. Study of arthropods affecting man, domestic animals and wildlife with emphasis on their biology, control and relationship to vertebrate disease. Spring, 1979.
Prerequisite: A beginning course in biology, entomology, zoology or consent of instructor.

FZO—ZOOLOGY (FOREST ZOOLOGY)

100. General Zoology (4)
Prerequisite to all other courses in Forest Zoology. An autotutorial course with 2 hours of lecture and recitation, 4 hours in the learning center. A brief survey of major phyla with emphasis on morphology, taxonomy, evolution and ecology followed by an introduction to the process of maintenance, perpetuation and adaptation by animal species. The importance of other animals to man and the ecosystem is emphasized. Spring, 1979.

200. Wildlife Conservation (3)
Two hours of lecture, 1 hour of recitation. Introduction to the biological principles of conservation including the relationship of natural resources to modern society. The wildlife resource and its conservation will be emphasized. It is not designed for students concentrating in the area of Forest Wildlife Management. Fall, 1978.
Prerequisite: One semester of biological science.

352. Wildlife Ecology (3)
Two hours of lecture, 3 hours of laboratory. A study of the principles governing forest and range wildlife and of the biological mechanisms involved. Spring, 1979.
Prerequisite: FBL 320 or permission of instructor.

381. Vertebrate Anatomy, Histology and Physiology I **(4)**
Three hours of lecture, 3 hours of laboratory. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on the skeletal, muscle, nerve and endocrine systems. Fall, 1978.
Prerequisite: General zoology or general biology.

382. Vertebrate Anatomy, Histology and Physiology II **(4)**
Three hours of lecture and 3 hours of laboratory. Vertebrate macroanatomy, microanatomy and physiology with special emphasis on digestion, metabolism, nutrition, circulation, respiration, excretion and body defense and destructive systems. Spring, 1979.
Prerequisite: FZO 381 or some other course in anatomy.

411. Invertebrate Zoology **(4)**
Three hours of lecture, 3 hours of laboratory. Structure, function, classification and evolution of invertebrates. Emphasis on ecological role of invertebrates in specific habitats. Fall, 1978.

413. Biology of Birds and Mammals **(4)**
A course surveying the taxonomy, anatomical-behavioral-physiological adaptations and natural history of birds and mammals. Techniques for the field study of a vertebrate species will be discussed. Fall, 1978.

416. Ichthyology **(3)**
Two hours of lecture, 3 hours of laboratory. An introduction to the anatomy, physiology, ecology, behavior and taxonomy of fishes. Spring, 1979.

423. Microcommunity Ecology **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Study of terrestrial invertebrate microcommunities; descriptive and comparative assay of microhabitats incorporating experimental and field techniques. Summer, 1979.

424. Vertebrate Ecology **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Utilization of unique Adirondack forms and communities to study population dynamics, behavior, systematics and ecological role of vertebrates; standard field and laboratory techniques. Summer, 1977.

426. Ecology of Adirondack Fishes **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Study of the ecology of fishes, with detailed individual investigation of the ecology of Adirondack fishes. Summer, 1979.

427. Field Ornithology **(2)**
Half-time for 4 weeks. Cranberry Lake Biological Station. Field study of the ecology, distribution and behavior of birds of the Adirondack region. Techniques used in conducting field studies in avian biology will be emphasized. Summer, 1979.

440. Fishery Biology **(4)**
Three hours of lecture and 3 hours of laboratory per week. Introduction to models of growth, mortality, production, and exploitation; aspects of fish ecology and behavior related to the dynamics and management of fish populations. Fall, 1978.
Prerequisites: FZO 416 or equivalent.

456. Wildlife Ecology and Management I **(3)**
Two hours of lecture, 3 hours of laboratory for students pursuing careers as wildlife biologists. A study of the ecological principles governing wild animal populations and the relationship of these to manipulation of said populations. Spring, 1979.
Pre- or corequisites: FBL 320 and LIB 300.

457. Wildlife Ecology and Management II **(3)**
Two hours of lecture, 3 hours of laboratory. Occasional day-long field trips. A study of wildlife management techniques, management schemes and programs. Fall, 1978.
Prerequisites: FZO 456.

470. Principles of Animal Behavior (3)
Three hours of lecture per week. A study of the basic principles of animal behavior, stressing exogenous and endogenous mechanisms of control. Fall, 1978.
Prerequisite: General zoology.

475. Behavioral Ecology (2)
Half-time for 4 weeks. Cranberry Lake Biological Station. Study of the behavioral adaptations of animals to their environment. Emphasis will be placed on animal orientation and social behavior. Habitat selection and interspecific interactions will also be considered. Credit may not be received for both FZO 475 and FZO 470. Summer, 1979.

GFO—GENERAL FORESTRY

032. Orientation (0)
One hour of lecture and discussion per week designed to introduce new undergraduate students to the College and its academic and social environs. Fall, 1978.

GRA—GRAPHICS (LANDSCAPE ARCHITECTURE)

(See also courses listed under EIN and LSA.)

380. Technical Drawing (1)
One 3-hour drafting room period. Elements of perspective, isometric, oblique and orthographic projection. Practice in freehand and instrument drawing. Fall, 1978.

381. Technical Drawing (2)
Two 3-hour drafting room periods. Elements of perspective, isometric, oblique and orthographic projection. Practical applications of these principles in machine and architectural drawing, including piping and electrical drawings. Spring, 1979.

482. Advanced Media (1-3)
Three hours of studio per week. Discussions, demonstrations, critiques and individual study. Study oriented toward perception and self-expression, use and possibilities of various media, as selected by student and instructor. Fall and Spring, 1978-79.
Prerequisite: Prior art media training or experience and permission of instructor.

LIB—LIBRARY (COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY COURSE)

300. Library Research (1)
15 hours of class time per semester (usually the first 5 weeks.) Introduction for students at all levels to basic library material and the research process leading to preparation of a bibliography. Fall and Spring, 1978-79.

LSA—LANDSCAPE ARCHITECTURE

(See also courses listed under EIN and GRA.)

310. Elements of Landscape Architecture and Environmental Design for Architecture Students
Two hours of lectures, discussions and assigned readings per week. A successive presentation of a landscape architectural philosophy toward the physical environment and environmental design. Presentation of operational systems involved in the physical environment from technical, functional and symbolic points of view. Fall, 1978.
Prerequisite: Enrollment in School of Architecture or permission of instructor.

311. Elements of Landscape Architectural Practice for Architecture Students (2)
Two hours of lectures, problems and assigned readings per week. An introduction to the design elements of Landscape Architecture in contemporary application and practice. Spring, 1979.
Prerequisites: LSA 310; enrollment in School of Architecture or permission of instructor.

320. Introduction to Landscape Architecture and Design Theory (2)
Two hours of lecture per week. Lecture and class discussion, notebooks, reports, assigned text reading and assigned reserve shelf reading, research reading, weekly quizzes and exams, slides, movies and field trips. Course describes the field of Landscape Architecture, its philosophy, design theory and interdisciplinary relationships. Fall, 1978.
Prerequisite: 3rd year status or permission of instructor.

326. Landscape Design Studio I (4)
Nine hours of laboratory and 1 hour of lecture per week. Lectures, studio problems, criticism, quizzes, exams, reports, composing and rendering two- and three-dimensional techniques used to stimulate the physical environment. Course presents a theory of abstract design and offers studio time in which to apply theory to graphic problems. Topics presented are the mechanics and terminology of design and the stimulation of natural and man-made environments. Fall, 1978.

327. Landscape Design Studio II (4)
One hour of lecture, 9 hours of studio per week. Studio assignments, drafting, readings, discussions and field trips. An introduction to the visual-mental concepts basic to landscape architectural design. Various abstract and realistic problems to graphically illustrate elements of the physical environment and their effect upon man. Special attention to the spatial context of these elements and spatial sequences characteristic of the natural and man-made environments. (Student field trip expense $125—$150.) Spring, 1979.
Prerequisites: LSA 326, 320 or permission of instructor.

343. Structural Materials and Elements (3)
Three hours of lectures, problems and assigned readings per week. Study of the physical properties of materials and structural elements commonly used in landscape architecture. Topics include elementary statics and strength of materials, wood, metal, plastics, concrete, masonry, retaining walls, dams, foundations. Spring, 1979.

345. Elements of Site Engineering (3)
Two hours of lectures and 3 hours of studio per week. Lectures, problems, drafting, modeling and assigned reading. The study of land form and its technical expression through grading plans, sections, profiles, layout plans and earthwork quantity computation. Principles of soil mechanics and land drainage and their application to surface and subsurface drainage systems. Spring, 1979.
Prerequisites: FEG 271.

422. Landscape Design Studio III (4)
Twelve hours of studio per week. Studio problems, research, drafting and field trips. The processes and methods of design considerations of variances upon the natural physical environment, ranging from broad regional areas to specific site concerns. Fall, 1978.
Prerequisites: LSA 320, 326 and 327 or permission of instructor.

423. Landscape Design Studio IV (4)
Twelve hours of studio per week. Studio problems, research and drafting. Interaction of cultural influences with the physical environment, with attention focusing on the resulting forms. Observations and illustrations of people and places as inputs into the design process. Spring, 1979.
Prerequisite: LSA 422 or permission of instructor.

425. Orientation for Experiential Studio (3)
Three hours of lecture and recitation. Investigation and documentation of an area of specialty, discussion, readings and research. Fall and Spring, 1978-79.
Prerequisite: Permission of instructor.

432. Plant Materials Culture (1)
Three lectures per week for 5 weeks. Grasses, arboriculture, propagation, transplanting, planting plans and specifications. Fall, 1978.
Prerequisite: Permission of instructor.

440. Site Development Systems **(3)**
Three hours of lectures, problems and assigned reading per week. Study of various engineering systems as they relate to the design and development of land. Topics include pedestrian ways, utilities (water, solid waste, sewage, electric, gas), road location and design, shore protection, swimming pools. Fall, 1978.
Prerequisite: Surveying.

490. Social Behavior and the Designed Environment **(3)**
Three hours of class per week. Lectures, readings, discussion and project. An examination of the concepts of individual and social behavior in relation to the physical design of the environment, focusing on perceptual and cognitive evaluations as determinants of spatial meaning. Fall and Spring, 1978-79.

495. Selected Readings in Environmental Studies **(1-3)**
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions, 1978-79.
Prerequisite: Permission of instructor.

496. Special Topics in Landscape Architecture **(1-3)**
One to 3 hours of class meetings per week. Special topics of current interest to undergraduate students in landscape architecture and related fields. A detailed course subject description will be presented as a topic area is identified and developed. Fall and Spring, 1978-79.
Prerequisites: Permission of instructor.

498. Introductory Research Problem **(1-3)**
Guided study of a selection of problems relating to landscape architecture and environmental design. Emphasis on study procedure and methods employed. Enrollment at periodic intervals throughout the semester. Fall and Spring, 1978-79.
Prerequisite: Permission of instructor.

522. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Studio problems, research, drafting and field trips. Concentration on complex urban problems. Concern for social and psychological considerations of the individual and large groups of people, their interaction and resultant forms of the environment. Spring, 1979.
Prerequisite: Permission of instructor.

524. Experiential Landscape Studio Design **(16)**
Forty-eight hours per week. The articulation of the study proposal established in LSA 425, as approved by faculty, through research, readings, field study with graphic and written documentation and group discussion. Academic study in an off-campus location in an area of landscape architectural significance, as described and delineated in a student-prepared proposal approved by the faculty. Not available for Graduate Credit. Fall or Spring, 1978-79.
Prerequisites: LSA 425 or equivalent and LSA 423 or permission of instructor.

525. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Investigation of a problem in landscape architecture as proposed by the student and conducted in conjunction with faculty advisor. Spring, 1979.
Prerequisite: Permission of instructor.

527. Landscape Design Studio VI **(4)**
Twelve hours of studio per week. Studio problems, research, reports and field trips. Concentration on regional landscape problems, the techniques of their analysis and derivation of their significance to the practice of landscape design. Spring, 1979.
Prerequisite: Permission of instructor.

529. The Major Elements of Environmental Design **(3)**
Lectures, readings, discussions and studios. The course presents an introductory survey of environmental design methods and associated skills and techniques. While studio work is part of the course, no design background is required. Fall, 1978.

532. Woody Plant Materials **(3)**
Three hours of lecture per week. Field study, lectures, slide presentations and readings. An elective course providing opportunity for extension of basic knowledge in the identification and design of woody plant materials in professional practice. Fall or Spring, 1978-79.
Prerequisites: LSA 533 and LSA 432 or permission of instructor.

533. Plant Materials **(3)**
Field trips and discussion. Ornamental woody plant identification. Observation and sketches of outstanding examples of planting design. Three weeks. Summer Session, 1979.
Prerequisite: Permission of instructor.

545. Professional Practice Studio II **(2)**
Three hours of studio, 1 hour of recitation per week. Studio problems, research, discussion and recitation sessions on the processes and methods of office practice. Emphasis on all aspects of site-development. Spring, 1979.
Prerequisite: Permission of instructor.

547. Principles of Professional Practice **(2)**
Two hours of lecture per week. Lectures, assigned readings, reports, cost estimates, specifications, contracts, professional ethics, registration laws, professional practice. Spring, 1979.
Prerequisite: Upperclass standing.

595. Selected Readings in Landscape Architecture **(1-3)**
Exploration of selected readings in depth with individual independent study upon a plan submitted by the student and related to credit hours assigned. Upon approval of the instructor, the student may systematically investigate some subject area encountered in regularly scheduled courses or may initiate research on a variety of subject areas of determined relevance. Fall, Spring and Summer Sessions, 1978-79.
Prerequisite: 5th year status or permission of instructor.

598. Research Problem **(1-3)**
Independent study of selected areas of environmental interest. Emphasis on a self-disciplined study, development of procedures and techniques to be employed in environmental design and planning. Engagement with specific sites and problems as proposed for study by individual communities. Fall and Spring, 1978-79. Enrollment at periodic intervals throughout the semester.
Prerequisite: Permission of instructor.

PSE—PAPER SCIENCE AND ENGINEERING

300. Introduction to Papermaking **(3)**
Three hours of lecture. Historical and commercial consideration of the paper industry. Technology of papermaking with emphasis on stock furnish, stock preparation and paper machine operation. Introductory discussions of papermaking materials and formation and reactions of a fibrous web. Fall, 1978.

301. Pulp and Paper Processes **(3)**
Three hours of lecture. Technological consideration of pulping and bleaching of woody raw material. Includes consideration of wood procurement and preparation, pulping and bleaching processes, pollution abatement and other ancillary operations. Spring, 1979.
Prerequisites: FCH 475 and 476, CHE 332, PSE 300, (or concurrent).

302. Pulp and Paper Processes Laboratory (1)
One 3-hour laboratory. Study and practice in the techniques of laboratory procedures normally encountered in the pulp and paper industry. Laboratory exercises selecting and using standard testing methods. Field trips to observe commercial equipment of the pulp and paper industry. Spring, 1979.
Prerequisite: PSE 301 (or concurrent).

304. Mill Experience (2)
Twelve weeks full-time pulp or paper mill employment approved by the Department between the junior and senior years. The student must submit a comprehensive report to fulfill this requirement. An adaptability rating chart furnished by the Department is prepared by the mill for each student employed. Summer, 1978.

370. Principles of Mass and Energy Balance (3)
Three hours of lecture. Study of the properties of steam and solving problems connected with material and energy balances. Fall, 1978.
Prerequisites or concurrent: MAT 227, Physics, CHE 346.

371. Fluid Mechanics (2)
Two hours of lecture and/or demonstration. The study of momentum transfer. Flow of liquids and gases in pipelines, ducts and open channels. Newtonian and non-Newtonian flow. Pulp and blower characteristics and selection. Flow measurements and flow system design with economic considerations. Fall, 1978.
Prerequisites: PHY 211, 212, or equivalent.

372. Heat Transfer (2)
Two hours of lecture and/or demonstration. The study of heat transfer including conduction, convection, radiation and their applications in industry. Heater and heat exchanger design and selection, and industrial evaporation. Spring, 1979.
Prerequisites: PSE 370, 371 or equivalent.

461. Pulping Technology (3)
One hour of lecture and 6 hours of laboratory. Discussion of pulping and bleaching processes: Effect of chemical and physical variables on the wood components and pulp properties; chemistry involved. Experiments in pulping and bleaching, and pulp evaluation. Fall, 1978.
Prerequisites: PSE 301, CHE 346 and CHE 356.
Note: A student may not enroll in or receive credit for both PSE 461 and ERE 671.

465. Paper Properties (4)
Three hours of lecture, 3 hours of laboratory and discussion. Evaluation and study of the physical, optical and chemical properties of paper and the interrelationships existing between paper manufacturing methods, papermaking additives, test results and the ultimate properties desired in the finished paper. Fall, 1978.
Prerequisites: PSE 301, PSE 302.
Note: A student may not enroll in or receive credit for both PSE 465 and ERE 677.

466. Paper Coating and Converting (3)
Two hours of lecture and 3 hours of laboratory. Evaluation and study of various coating materials and processes used by the paper industry. Introduction to polymers and their use in converting operations. Study of materials and equipment used in converting operations, fundamentals and parameters which control their use, effects on final properties of papers. Spring, 1979.
Prerequisite: PSE 465
Note: A student may not enroll in or receive credit for both PSE 466 and ERE 678.

468. Papermaking Processes (3)
One hour of lecture and 6 hours of laboratory. Laboratory study of the papermaking process, with emphasis on operation of the semicommercial Fourdrinier paper machine. Emphasis is on the fundamentals of stock preparation, paper machine operation, evaluation of the finished

product and the collection and analysis of data to develop material and energy balance. Results of each paper machine run are evaluated in seminar-type discussions. Spring, 1979.
Prerequisites: PSE 461 and PSE 465.

473. Mass Transfer **(3)**
Three hours of lecture. The study of mass transfer. Humidification, air conditioning, drying, gas adsorption, distillation, leaching, washing, and extraction. Fall, 1978.
Prerequisites: PSE 370, 371, 372 or equivalent.

491. Paper Science and Engineering Project I **(1)**
Student makes a systematic survey of all available literature on the problem assigned him and incorporates it in a formal, typewritten report. An essential part of this report is a detailed outline of a research project (PSE 492) which the student proposes to undertake during the next semester. Fall, 1978.
Prerequisites: PSE 300 and 301.

492. Paper Science and Engineering Project II **(3)**
The analysis of a problem, the synthesis of a solution and the basic design of the facilities ;eeded to solve the problem. Laboratory research, field work and consulting as needed in addition to the literature survey completed in PSE 491. Progress reports and a final report and seminar-style presentation. Spring, 1979.
Prerequisite: PSE 491.

496. Special Topics **(1-3)**
Lectures, conferences and discussions. Specialized topics in chemistry, chemical engineering and physics as well as topics pertaining to management as related to the pulp, paper, paperboard and allied industries. Spring and Fall, 1978-79.

498. Research Problem **(1-4)**
The student is assigned a research problem in pulping, bleaching, refining, additives, quality control of paper or paper products or chemical engineering. The student must make a systematic survey of available literature on the assigned problem. Emphasis is on application of correct research technique rather than on the results of commercial importance. The information obtained from the literature survey, along with the data developed as a result of the investigation, is to be presented as a technical report. Spring and Fall, 1978-79.
Prerequisites: PSE 461 and PSE 465.

WPE—WOOD PRODUCTS ENGINEERING

300. Properties of Wood for Designers **(2)**
Two hours of lecture. An introduction to the basic structure and properties of wood for the designer. Discussion of the effects of wood structure and properties on practical woodworking techniques. Fall and Spring, 1978-79.

320. Polymeric Adhesives and Coatings **(2)**
Two hours of lecture a week. An introduction to organic adhesives and coatings for the purpose of being able to specify proper materials for particular applications. Knowledge acquired will allow the individual to understand product literature and specifications. Wood product systems are discussed in detail, but the principles involved are easily transferred to other substrate systems. A knowledge of chemistry is not required. Spring, 1979.
Prerequisites: Junior standing.

321. Adhesives and Coatings Laboratory **(1)**
Three hours of laboratory a week. Laboratory experiments to identify materials, methods of application and methods of evaluation of adhesives and coatings normally used in the wood industry. Spring, 1979.
Prerequisites: WPE 320 (may be concurrent) or permission of instructor.

322. Mechanical Processing (3)
Two hours of lecture and 3 hours of laboratory. Primary log reduction methods and industry practices. Lumber grading. Wood cutting principles. Machining practice in secondary wood-using industries. Experience in the operation of certain primary and secondary machining equipment. Fall, 1978.

326. Fluid Treatments (2)
Two hours of lecture. An introduction to wood-moisture relationships, wood permeability and pressure treatments, thermal conductivity, water-vapor movement and drying and fire retardancy. The flow of fluids, heat and water vapor are treated as analogous phenomena and are related to the cellular structure of wood. Unsteady-state flow of gases, heat and water vapor are introduced. Spring, 1979.
Prerequisites: Junior status.

327. Fluid Treatments Laboratory (1)
Three hours of laboratory a week. Laboratory studies in relative humidity measurement, wood-moisture relationships, the relationship between permeability and treatability, wood-preservative treatments, wood drying and flame testing. Spring, 1979.
Prerequisites: Junior status, concurrently with WPE 326.

386. Elementary Wood Technology (2)
One hour of lecture and 3 hours of laboratory. Structure of wood in relation to defects, properties and uses. The variability of wood. Identification of major commercial U.S. timber by gross feature. Spring, 1979.

387. Wood Structure and Properties (2)
Two hours of lecture. Structure of wood and its relation to physical properties and uses. The normal variability of wood, abnormal growth, defects, deterioration of wood and their influence on properties and uses. Fall, 1978.
Prerequisite: FBO 100 or equivalent is recommended.

388. Wood and Fiber Identification Laboratory (2)
Six hours of laboratory. Wood and papermaking fiber identification using both gross and microscopic features. Fall, 1978.
Prerequisite: WPE 387 (may be concurrent).

389. Wood Identification Laboratory (1)
Three hours of laboratory. Identification of principal commercial timbers of United States on gross characteristics. Spring, 1979.
Prerequisite: WPE 387.

390. Field Trip (2)
Two weeks supervised study and reporting of representative wood products industries. Required of all students in WPE. Estimated individual expenses are $100—$150 while on the trip. Summer, 1979.

400. Introduction to Forest Products (2)
Two hours of lecture. Characteristics of the products of the forest tree and manufacture of wood products. Fall or Spring, 1978-79.

404. Design of Wood Structural Elements (3)
Lectures plus laboratory exercises. A development of the principles involved in designing structural elements in wood and practice in their application. Fall or Spring, 1978-79.
Prerequisite: ERE 362.

422. Composite Materials (3)
Two hours of lecture and 3 hours of laboratory. Manufacturing methods and physical properties of wood laminates, fiberboard, particleboard, plywood, paper overlays, sandwich materials, wood-polymer composites and extruded and molded products. Fall, 1978.
Prerequisites: WPE 320 and WPE 326. Concurrent or prior registration in ERE 362.

442. Light Construction **(3)**
Two hours of lecture, 2 hours of discussion, problems and practice. Elements of light frame construction, blue print reading and estimating. Fall and Spring, 1978-79.

444. Materials Marketing **(3)**
Three hours of lecture and discussion. Marketing functions, agencies and management in the wood products and related industries. Principles of salesmanship and their application. Spring, 1979.

450. Construction Equipment **(3)**
Three hours of lecture. Principles of selection, operation and maintenance of construction equipment. Primary types of site preparation, handling and assembly devices and their efficient utilization will be examined. Spring, 1979.
Prerequisite: Senior standing.

497. Senior Seminar for Wood Products Engineering Majors **(2)**
Discussion and assigned reports in current problems and new developments in wood products engineering. Fall, 1978.

498. Research or Design Problem **(1-3)**
Conferences, library, laboratory and/or field research on a specific problem in wood products engineering. Typewritten report (original and one copy) required. Fall and/or Spring, 1978-79.
Prerequisite: Consent of instructor.

Summer Attendance

A wide array of Syracuse University courses at the undergraduate and graduate levels is available to College of Environmental Science and Forestry students. Syracuse University courses taken as an integral part of the student's planned program and *approved by his faculty advisor* may be taken without additional cost to the student during the regular academic year.

Syracuse University courses are also available, at the student's expense, during the Syracuse University summer sessions. Research problems, theses, and special courses regularly available at the College may also be taken during the summer sessions.

Summer session tuition charges at the College for New York State residents are $30.00 for undergraduate upper level students, and $58.50 for graduate level students, per credit. Tuition charges for nonresidents of New York State are correspondingly $50.00 and $75.00 per credit. A College fee will be charged at the rate of eighty five cents per credit hour.

SUMMER FIELD PROGRAMS

Program in Field Forestry

Charles Lathrop Pack Demonstration Forest
Warrensburg Campus
Warrensburg, New York

A 5-week (6-credit) program of courses emphasizing the field application of forestry principles and practices is conducted twice each summer at the Pack Demonstration Forest near Warrensburg, New York. These sessions are coordinated with the Syracuse University summer sessions, permitting students to attend an on-campus session and a field session in the same summer. The courses presented in the field forestry program are listed in both the forest biology and resources management curricula sections. Room, board, and fee charges approximating $250 are levied. No tuition charge is made for matriculated students since the courses in this session are coordinated with and considered an integral part of the fall semester of the junior year. *Transfer students* planning to enroll in either the resources management or forest biology curriculum should write to the Coordinator, Summer Session in Field Forestry at the College for additional information on session dates and special requirements.

Completion of the field forestry program is required of students in resource management prior to the fall term of their junior year. Students in forest biology are also required to attend either this program or the program at Cranberry Lake Biological Station, although attendance at other approved biological field stations may be arranged with the Curriculum Director.

Program in Environmental Biology

Cranberry Lake Biological Station
Cranberry Lake Campus
Cranberry Lake, New York

The Summer Program in Environmental Biology provides graduate students and undergraduate biology majors with the opportunity to continue their studies and research at a lake-and-forest field station in the summer. Qualified students from other institutions are welcome and are encouraged to attend.

Cranberry Lake and its environs are ideally suited for an advanced biology summer program. The surrounding topography is rolling hill and lake country dotted with numerous small ponds, closed bogs, and stream drainages. The lake itself is the third largest body of water in the Adirondacks. Because 80 percent of the shoreline is in State ownership, the lake remains relatively unspoiled by recreational developments and is free of pollution problems. Much of the original forest cover in the region was harvested years ago; today a rich variety of community types occupy those sites as the vegetation reverts again to the natural forest condition. The remaining virgin forests also provide the student with many examples of stable forests, each type reflecting the particular environmental conditions controlling forest development. A wealth of wildlife parallels the variety of cover types over the region. The area is centrally located providing easy access to a wide range of additional ecosystems ranging from bog to alpine types.

Facilities include four classroom-laboratories; dining facilities capable of serving 120; faculty quarters and cabins; an administration building; 12 cabins housing 6-8 students each; a recreation hall; and several smaller, supporting buildings.

The 10-week program extends from mid-June into mid-August and is divided into two 5-week sessions. Courses are taught in blocks of 2-day units, permitting concentrated study without hourly interruptions. These courses are designed to emphasize and effectively utilize the unique nature of this Adirondack setting and include the ecology of plants, invertebrate and vertebrate animals in such diverse offerings as aquatic ecology, bryophyte ecology, insect ecology, vertebrate ecology, micro-community ecology, ornithology, forest communities, ecological measurements, forest pathology and limnology. Room, board and fee charges are approximately $50.00 per week. The offerings vary from year to year, and interested students should contact the Director, Cranberry Lake Biological Station, State University of New York College of Environmental Science and Forestry, Syracuse, New York 13210,for additional information.

School of Forest Technology

FOREST TECHNICIAN PROGRAM

In 1912, some 1,800 acres of land in the Adirondack Mountains were donated as a site for the development of a Ranger School by the College. Since that time, the forest technician program has trained more than 2,800 graduates, most of whom are now working in a variety of forest activities, and it has earned the School a national reputation for excellence.

The two-year curriculum trains students as forest technicians. The degree of Associate in Applied Science in Forest Technology (A.A.S.) is awarded upon the successful completion of the curriculum. The objectives of the curriculum are to provide students with a knowledge of the field practices of forestry as related to forestry managerial needs; the ability to work and communicate effectively with professional and paraprofessional forestry personnel; and an understanding of the sciences and practices of forestry with some emphasis on ecological applications.

Graduates are generally classified as forest technicians or forestry aides in initial employment positions. Forestry agencies and wood-using industries employ forest technicians as an important part of their forest management teams, usually as the "people on the ground" who plan and execute the field practice of forestry normally under the supervision of a professional forester.

Since this curriculum is structured as a terminal, two-year program at the paraprofessional level, students interested in a professional degree in forestry are advised to investigate enrollment directly in one of the College's undergraduate programs. Transfer into some of these programs is possible upon completion of the A.A.S. degree. Further, it should be stressed that while there is a real value and need for forest technician training at the A.A.S. level, a concept fully backed by the total College, graduates must appreciate the fact that they are not considered professional foresters upon completion of the A.A.S.

The freshman year forest technology curriculum consists of general studies courses which may be taken at any accredited four-year college, community or junior college, or agricultural and technical institute.

The second year of the curriculum is offered at the College's School of Forest Technology on the Wanakena Campus. Presented in a varied forest environment, the curriculum's emphasis is on applied field training and on the relationships between forest technology and managerial needs. Fifty

percent of the studies are devoted to field exercises, most of which are held in the School's forest. This rolling belt of managed forest, containing both hardwood and coniferous species, covers an area some 3½ miles long with widths varying from 6/10ths of a mile to 2¼ miles. On two sides, the forest is bounded by State Forest Preserve lands. The forest is also adjacent to an area of several square miles of virgin timber within the Adirondack Forest Preserve. This excellent forest backdrop for the technology program provides a most diverse laboratory for instructional purposes.

Since the School is situated within a forest environment, some applicants to the forest technology program may mistakenly believe that the program is one of forest lore and wilderness survival. It is, therefore, strongly emphasized that the forest technology curriculum demands high quality academic achievement. Students cannot complete the program without concentrated and consistent study. Classes are scheduled from 8:00 a.m. to 5:00 p.m., Monday through Friday, with classroom and laboratory or field time equally divided. The intensity of the program normally requires a minimum of 70 hours a week of evening and weekend study, daily classes, and laboratory/field exercises. Several short trips, at no additional expense to the student, are made during the year in connection with courses in logging, forest recreation, forest mensuration and silviculture. A longer trip of seven days' duration emphasizing regional forestry practice is sponsored during the spring semester of the second year. Students must bear their proportionate share of the cost of this field trip which consists primarily of air fare, lodging and meal expenses.

LIFE AT WANAKENA

The Wanakena Campus of the College of Environmental Science and Forestry is located on the banks of the Oswegatchie River near the picturesque hamlet of Wanakena. Approximately 65 miles northeast of Watertown, New York, and 35 miles west of Tupper Lake, New York. The School's buildings and its surrounding forest border on the river which flows directly into Cranberry Lake.

The main School building consists of a central service unit with dormitory wings on either side. The central unit contains classrooms, laboratories, a student lounge, faculty offices, the library, a kitchen, dining room and 47 student rooms, each housing two students.

Faculty living quarters are nearby on the campus. Other buildings include a maintenance shop, garages, a sugar house and storage buildings.

The close proximity of faculty offices and student quarters and the intensive field-work pattern enables students to consult easily and frequently with the faculty. The School considers this traditional close student-faculty association to be of major benefit in its training program.

A small library of approximately 1,500 volumes consists of highly specialized materials required for the teaching and study programs of the School.

Students taking the second year of the forest technology curriculum at the Wanakena Campus are required to live in the School's dormitories. An exception may be made for married students who may bring their families and rent their own private accommodations in the vicinity of the Wanakena Campus. Such accommodations are not plentiful. It is recommended that each married student make rental arrangements well in advance of the registration date.

The Wanakena Campus does not maintain an infirmary, nor does it have on its staff a physician or nurse. There are two excellent physicians and a dentist available in the immediate area as well as an excellent Community Hospital in nearby Star Lake, New York. In emergency situations, the School transports sick or injured students to the local physician of their choice or to the hospital. Furthermore, there is no student accident or sickness insurance plan available through the Wanakena Campus, so that it is strongly suggested that the student consider such coverage before reporting to the Campus.

Because of the comparatively isolated location of the Wanakena Campus, a stock of books and supplies used in connection with the second year of the program is maintained on campus for sale to students.

During the first year of the program, College-enrolled students will be guided by the rules and regulations that govern attendance at their local campus. During the second year of the program, students will be guided by the general rules and regulations for College of Environmental Science and Forestry students and an additional set of Wanakena Campus "house rules."

ADMISSION

Admission Requirements

Requirements for entrance into the forest technology curriculum require a minimum of high school units consisting of: English; history (social science); science (including biology); mathematics (including trigonometry or Math 11); and electives. Mechanical drawing is a suggested elective.

In addition to the academic requirements, the following must also be met by all applicants:

1. The applicant must be strongly motivated toward a career as a forest technician.
2. The applicant must be willing and able to meet the physical requirements of the program which include pole and tree climbing, walking 2 to 6 miles through forest areas often carrying 15-20 pounds of equipment, and using a wide array of hand tools and power equipment.
3. The applicant's parents (if the applicant is under 18 years of age) must be fully aware of the field nature of the study program, its rigorous study-work regime and supporting academic facilities.

4. A full medical examination report must be submitted.

Questions concerning any of these requirements should be referred to the Director of Admissions who may, under special circumstances, waive some of them.

Admission Procedures

The decision to admit any student to the Forest Technician Program rests solely with the College of Environmental Science and Forestry. Most openings in the program are filled by students who received conditional acceptances while still seniors in high school, contingent on successful completion of the first year of college. Remaining openings are filled by transfer students who have already attended college. Therefore, it is suggested that the potential forest technician student apply while still a high school senior.

Here is the procedure:

1. Seniors in high school must submit a regular SUNY freshman application for the College of Environmental Science and Forestry, using Curriculum Code 620 (Forest Technology). These applicants should indicate entry date to be one year in advance of the current year.

2. Submit a regular application to that school selected for the first year of study, using Curriculum Code 620. It is important that students gain entry on their own for the first year of studies. The College will request information at a later date concerning what institution the student will be attending.

Transfer Students

Students with previous college experience, or students who are currently enrolled at another college, may apply for transfer. However, courses transferred for credit can be applied only to the freshman year course of studies, and they must be appropriate to those courses and comparable in subject matter, content, and level. All second year courses must be taken at the Wanakena Campus and, therefore, a student cannot transfer any previously earned credit toward the second year. Transfer applicants must submit a recent official copy of their college transcript and a list of courses they anticipate completing prior to enrollment.

EXPENSES

Cost of the first year will vary with the specific institution attended.

Estimated costs of the second-year program on the Wanakena Campus are as follow:

	Tuition	*Board & Room*	*Books & Supplies*
New York Resident	$ 750	Approx. $1,250	Approx. $350
Nonresident	$1,200	Approx. $1,250	Approx. $350

An additional estimated expense of $150.00 will likely be incurred to cover the cost of laundry and clothing. The cost of the 5-day regional forestry practice trip during the spring semester is estimated at approximately $200. There is also a $20 graduation fee and a $10 student activity fee.

FOREST TECHNOLOGY CURRICULUM
(Associate in Applied Science Degree)

Freshman Year *Credit Hours*

(Completed at a college of the student's choice

[1]General Biology	8
English	6
[2]Math	6
Economics	3
Electives	7
	30

[1]Courses selected may be in general biology, but at least one course in introductory botany is preferred.

[2]Competency in plane trigonometry and college algebra is required. If demonstrated, credits become electives.

Senior Year
(Wanakena Campus)

First Semester	FTC 200	Dendrology I	2
	FTC 202	Plane Surveying I	4
	FTC 204	Forest Mensuration and Statistics I	3½
	FTC 206	Forest Ecology	3
	FTC 208	Forest Installations	3
	FTC 207	Aerial Photogrammetry	2
	FTC 213	Forest Protection I	2
	FTC 223	Graphics	1
			20½

Second Semester	FTC 203	Plane Surveying II	3
	FTC 205	Forest Mensuration and Statistics II	2
	FTC 209	Forest Roads	2
	FTC 211	Silviculture	2½
	FTC 212	General Forestry	1
	FTC 214	Personnel Management	1½
	FTC 215	Timber Harvesting	2
	FTC 217	Forest Management	2½
	FTC 218	Forest Recreation	1½
	FTC 219	Elements of Wildlife Ecology	1½
	FTC 221	Water Resource Management	2
	FTC 225	Regional Forestry Practices	1
	FTC 227	Forest Protection II	2
	FTC 228	Structure and Growth of Trees	1
			25½

A total of 76 credit hours is required. Upon satisfactory completion, an Associate in Applied Science (A.A.S.) degree in Forest Technology will be awarded.

FINANCIAL ASSISTANCE

Financial aid is available upon acceptance to the College of Environmental Science and Forestry. There are three basic loans, scholarships or grants, and part-time employment.

More detailed information on these financial aid opportunities can be found on pages 31-34 of this bulletin and the publication *Financial Assistance at ESF.*

The student must file an application with the Office of Financial Aid at the Syracuse Campus and submit a *Financial Aid Form* to the College Scholarship Service, Princeton, New Jersey 08540.

PLACEMENT

The School assists in placement of graduates. The reputation of the College's Forest Technology School usually results in graduates being readily able to find employment. Employment is common with local, state and federal forestry and land resource agencies, private forestry enterprises and surveying firms. Positions most frequently filled by recent graduates include: state forest ranger, state forest technician, forest aide, industrial forest district supervisor, timber inventory specialist, timber sales supervisor, forest surveyor, forest engineering aides, forest protection technician, forest research technician and forest equipment salesman.

FOREST TECHNOLOGY

200. Dendrology I **(2)**

Twenty-five hours of lecture and 34 hours of field time. A study of the distinguishing characteristics, growth features, distribution, associates and importance of the major tree species of North America.

Seasonal field identification and on-the-spot discussion of habitats, associates, and the place in succession of the predominant forest trees and shrubs as found in the Adirondack area of the Northeast, plus a limited number of introduced species. Fall, 1978.

202. Plane Surveying I **(4)**

Fifty-four hours of lecture and 100 hours of field and laboratory time. An introduction to the theory and practice of plane surveying. Emphasis is on individual skill development through small crew projects, handling typical surveying equipment in typical field situations. Lecture topics include the theory of measurements and errors, mathematics for plane surveying, introduction to field problems and introduction to map use and preparation. Field projects include traversing, methods, and proficiency projects in handling typical surveying instruments. Fall, 1978.

203. Plane Surveying II **(3)**

Forty-two hours of lecture and 62 hours of field time. A continuation of FTC 202 with emphasis on small crew field projects including leveling, theololite proficiency development exercises, triangulation, route surveying and determination of meridian. Classroom work develops the principles behind the solution to these field problems. Deeds and record keeping systems are discussed and a trip to the Country Court House is scheduled to examine a typical record keeping system. Other topics include the Surveys of the Public Lands and surveying as a profession. Spring, 1979.

204. Forest Mensuration and Statistics I **(3½)**

Sixty-seven hours of lecture and 36 hours of field time. A classroom and field study of the basic principles and skills required for timber measurements. Volume tables, their use and construction are studied. Cruise reports are required in which the student presents cruise

results. Various methods of forest sampling are studied including methods of calculating necessary sampling intensities and sampling errors. Fall, 1978.

205. Forest Mensuration and Statistics II **(2)**
Four hours of lecture and 44 hours of field and laboratory time. A field problem of practical nature utilizing methods for collecting, analyzing and presenting data dealing with timber volumes. Spring, 1979.
Prerequisite: FTC 204.

206. Forest Ecology **(3)**
Forty-two hours of lecture and 50 hours of field time. Study of weather and weather data collection; students manning a forest weather station. Study of weather and soil factors as to how they affect trees and forests, plus the interactions within the forest community and with the environment. Introduction to cover type mapping. Final field problem and report on detailed measurement and analysis of a belt transect. Fall, 1978.

207. Aerial Photogrammetry **(2)**
Twenty hours of lecture and 36 hours of laboratory. Development of the ability to interpret important ground features by viewing aerial photos singly and in pairs, using stereoscopic techniques and equipment. Scale problems and the making of reliable horizontal and vertical measurements. Radial line plot control for the transfer of detail to base maps. Forest type mapping and forest mensuration using photos. Fall, 1978.

208. Forest Installations **(3)**
Thirty-six hours of lecture and 60 hours of field time. This course provides the student with the technical competence necessary to use, plan, construct and maintain such typical forest improvements as telephone lines, radio systems, trails and light frame structures. Fall, 1978.

209. Forest Roads **(2)**
Twenty-two hours of lecture and 32 hours of laboratory time. This course provides the student with the technical competence necessary to administer, locate and design the construction and maintenance of a typical forest gravel road. Spring, 1979.
Prerequisite: FTC 202.

211. Silviculture **(2½)**
Thirty hours of lecture and 40 hours of laboratory and field work blocked with forest management. Lectures based on text study cover orientation, terminology and present a framework of the various treatments used in many common stand conditions to bring the forest into a more productive state in accord with the objectives of management. Emphasis on thinning in computer simulation and field practice. Exercises in planting and pruning. Demonstrations in chemical silviculture. Prerequisite: forest ecology. Spring, 1979.

212. General Forestry **(1)**
Sixteen hours of lecture. This course provides a brief overview of the development of forestry in the United States, the multiple-use concept of forestry, current public and private programs in forestry (including current events), and the place of forest technicians in forestry. Career opportunities for forest technicians are explored. Spring, 1979.

213. Forest Protection I **(2)**
Thirty-eight hours of lecture and 36 hours of lab/field time. A study of the insect and disease agents that damage trees and their role in the total forest community. The course covers identification of local forest insects and disease-causing organisms, study of the major pest groups of other forest regions, and control measures including the effects of pesticides on the environment. Field trips cover local pests and the damage caused, while laboratory work covers major groups of pests likely to be encountered elsewhere. Fall, 1978.

214. Personnel Management **(1½)**
Fourteen hours of lecture and 12 hours of laboratory time. A study of company and agency organization functions, including selection of and placement of personnel, training of personnel and performance evaluations, planning for and administering crew responsibilities, human relations in the working situation and special personnel problems of the forest are covered. Techniques of foremanship are applied in various field exercises in other courses, along with the

duty of safety hazards, accident prevention, accident classification and accident reporting. Spring, 1979.

215. Timber Harvesting **(2)**

Sixteen hours of lecture and 36 hours of field time. This course acquaints the student with the basic harvesting methods and techniques, with emphasis on the Northeast, along with the knowledge of how and where harvesting fits in with other forest uses. Students gain technical competence in timber sale contract administration and basic timber appraising. Spring, 1979.

217. Forest Management **(2½)**

Thirty-six hours of lecture and 40 hours of lab and field work blocked with silviculture. Coverage of the common problems met in organizing a forest property to approach the goals of ownership. Study and practice in techniques of growth measurement and the gathering and use of forest records in general. Summary application of pertinent information from many other courses in a work plan involving management decisions for an assigned forestry property.

Prerequisite: Forest ecology, Spring, 1979.

218. Forest Recreation **(1½)**

Fifteen hours of lecture and 32 hours of laboratory or field time. This course acquaints the student with the forest recreational resources—its present and future needs. Principles of recreation development and management are discussed with special emphasis placed on the technical aspects. Spring, 1979.

219. Elements of Wildlife Ecology **(1½)**

Twenty-eight hours of lecture and 4 hours of field time. A study of the principles of wildlife ecology with fundamentals related to the actions of the preservationist, conservationist, and particularly those of the forest manager. Spring, 1979.

Prerequisite: A course in biology or its equivalent.

221. Water Resource Management **(2)**

Twenty-seven hours of lecture. An introduction to lettering and drafting with emphasis on the skills needed by the forest or surveying technician. Individual skill development is achieved through several projects. The concept behind each project is explained in handout material and lecture, and each student is then expected to complete the project on his/her own time. Freehand and mechanical lettering plates are produced in addition to precision and pictorial drawings. Fall, 1978.

223. Graphics **(1)**

Twenty-two hours of lecture. An introduction to lettering and drafting with emphasis on the skills needed by the forest or surveying technician. Individual skill development is achieved through several projects. The concept behind each project is explained in handout material and lecture, and each student is then expected to complete the project on his/her own time. Freehand and mechanical lettering plates are produced in addition to precision and pictorial drawings. Fall, 1978.

225. Regional Forestry Practices **(1)**

Forty hours of field time. An 8-day field trip to provide concentrated and varied field observation. it is conducted during the fourth semester to give the student first-hand observation of the current forestry practices in some region of the United States. Spring, 1979.

227. Forest Protection II **(2)**

Twenty-three hours of lecture and 24 hours of field and laboratory time. The basic principles of fire ecology, forest fire behavior, fire danger and fire danger rating, forest fire prevention and control, and prescribed burning are covered. Handtool fire suppression techniques are demonstrated and practiced. Spring, 1979.

Prerequisite: FTC 213.

228. Structure and Growth of Trees **(1)**

Thirteen hours of lecture and 8 hours of laboratory. A study of the various tissues of forest trees and how their growth and development are affected by internal and external factors. Differences in stem structures of some of the more important commercial tree species of the United States are studied in the laboratory and these differences are related to the commercial uses of these species. Spring, 1979.

Prerequisite: An introductory course in general botany of biology.

State University of New York

STATE UNIVERSITY OF NEW YORK

Chancellor of the University ... CLIFTON R. WHARTON, Jr., B.A., M.A., Ph.D., LL.D., L.H.D., D.P.S.

Secretary of the University ..... MARTHA J. DOWNEY, B.S., M.A.

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State University's 64 geographically dispersed campuses bring educational opportunity within commuting distance of virtually all New York citizens and comprise the nation's largest, centrally managed system of public higher education.

When founded in 1948, the University consolidated 29 State-operated, but unaffiliated, institutions. In response to need, the University has grown to a point where its impact is felt educationally, culturally and economically the length and breadth of the State.

More than 340,000 students are pursuing traditional study in classrooms or are working at home, at their own pace, through such innovative institutions as Empire State College, whose students follow individualized and often nontraditional paths to a degree. Of the total enrollment, more than 100,000 students are 24 years or older, reflecting State University's services to specific constituencies, such as refresher courses for the professional community, continuing educational opportunities for returning servicemen, and personal enrichment for the more mature persons.

State University's research contributions are helping to solve some of modern society's most urgent problems. It was a State University scientist who first warned the world of potentially harmful mercury deposits in canned fish, and another who made the connection between automobile and industrial smoke combining to cause

changes in weather patterns. Other University researchers continue important studies in such wide-ranging areas as immunology, marine biology, sickle-cell anemia, and organ transplantation.

More than 1,000 Public Service activities are currently being pursued on State University campuses. Examples of these efforts include: special training courses for local government personnel, State civil service personnel, and the unemployed; participation by campus personnel in joint community planning or project work, and campus-community arrangements for community use of campus facilities.

A distinguished faculty includes nationally or internationally recognized figures in all the major disciplines. Their efforts are recognized each year in the form of such prestigious awards as Fulbright-Hayes, Guggenheim and Danforth Fellowships.

The University offers a wide diversity of what are considered the more conventional career fields, such as engineering, medicine, literature, dairy farming, medical technology, accounting, social work, forestry and automotive technology. Additionally, its responsiveness to progress in all areas of learning and to tomorrow's developing societal needs has resulted in concentrations which include pollution, urban studies, computer science, immunology, preservation of national resources, and microbiology.

SUNY programs for the educationally and economically disadvantaged have become models for delivering better learning opportunities to a once-forgotten segment of society. Educational Opportunity Centers offer high school equivalency and college preparatory courses to provide young people and adults with the opportunity to begin college or to learn marketable skills. In addition, campus based Educational Opportunity Programs provide counseling, developmental education and financial aid to disadvantaged students in traditional degree programs on most SUNY campuses.

Overall, at its EOC's, two-year colleges, four-year campuses and university and medical centers, the University offers 3,600 academic programs. Degree opportunities range from two-year associate programs to doctoral studies offered at 12 senior campuses.

The 30 two-year community colleges operating under the program of State University play a unique role in the expansion of educational opportunity, by:

Providing local industry with trained technicians in a wide variety of occupational curricula;

Providing transfer options to students who wish to go on and earn advanced degrees, and;

Providing the community with yet another source for technical and professional upgrading as well as personal enrichment.

During its brief history, State University has graduated more than 600,000 alumni, the majority of whom are pursuing their careers in communities across the State.

State University is governed by a Board of Trustees, appointed by the Governor, which directly determines the policies to be followed by the 34 State-supported campuses. Community colleges have their own local boards of trustees whose relationship to the SUNY board is defined by law. The state contributes one-third to 40 percent of their operating cost and one-half of their capital costs.

The State University motto is: "To Learn—To Search—To Serve."

STATE UNIVERSITY OF NEW YORK

UNIVERSITY CENTERS

State University at Albany
State University at Binghamton
State University at Buffalo
State University at Stony Brook

COLLEGES OF ARTS AND SCIENCES

College at Brockport
College at Buffalo
College at Cortland
Empire State College
College at Fredonia
College at Geneseo
College at New Paltz
College at Old Westbury
College at Oneonta
College at Oswego
College at Plattsburgh
College at Potsdam
College at Purchase

COLLEGES AND CENTERS FOR THE HEALTH SCIENCES

Health Sciences Center at Buffalo University Center
Health Sciences Center at Stony Brook University Center
Downstate Medical Center at Brooklyn
Upstate Medical Center at Syracuse
College of Optometry at New York City
College of Veterinary Medicine at Cornell University*

AGRICULTURAL AND TECHNICAL COLLEGES

College at Alfred
College at Canton
College at Cobleskill
College at Delhi
College at Farmingdale
College at Morrisville

SPECIALIZED COLLEGES

College of Agriculture and Life Sciences at Cornell University*
College of Ceramics at Alfred University*
College of Environmental Science and Forestry at Syracuse
College of Human Ecology at Cornell University*
College of Technology at Utica/Rome
Fashion Institute of Technology at New York City**
Maritime College at Fort Schuyler
School of Industrial and Labor Relations at Cornell University*

COMMUNITY COLLEGES

(Locally-sponsored, two-year colleges under the program of State University)

Adirondack Community College at Glens Falls
Broome Community College at Binghamton
Cayuga County Community College at Auburn
Clinton Community College at Plattsburgh
Columbia-Greene Community College at Hudson
Community College of the Finger Lakes at Canandaigua
Corning Community College at Corning
Dutchess Community College at Poughkeepsie
Erie Community College at Buffalo
Fulton-Montgomery Community College at Johnstown
Genesee Community College at Batavia
Herkimer County Community College at Herkimer
Hudson Valley Community College at Troy
Jamestown Community College at Jamestown
Jefferson Community College at Watertown
Mohawk Valley Community College at Utica
Monroe Community College at Rochester
Nassau Community College at Garden City
Niagara County Community College at Sanborn
North Country Community College at Saranac Lake
Onondaga Community College at Syracuse
Orange County Community College at Middletown
Rockland Community College at Suffern
Schenectady County Community College at Schenectady
Suffolk County Community College at Selden
Sullivan County Community College at South Fallsburg
Tompkins Cortland Community College at Dryden
Ulster County Community College at Stone Ridge
Westchester Community College at Valhalla

*These operate as "contract colleges" on the campuses of private universities.
**While offering a limited number of baccalaureate degree programs, in addition to the associate degree, FIT is financed and administered in the manner provided for Community Colleges.

College of Environmental Science and Forestry

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Vice President for Student Affairs ..... HARRISON H. PAYNE
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Coordinator of Facilities ..... CHARLES N. LaFORTY
Director of Campus Safety and Security ..... BRIAN M. SPEER
Associate for Institutional Research ..... RHONDDA K. CASSETTA
Director of Analytical and Technical Services ..... JOHN A. MEYER
Affirmative Action Officer ..... ALTON W. ZANDERS

Dean, School of Biology, Chemistry and Ecology ..... STUART W. TANENBAUM
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Dean, School of Environmental and Resource Engineering ..... WILFRED A. CÔTÉ, JR.
Dean, School Environmental and Resource Management ..... CHARLES C. LARSON
Dean, School of Landscape Architecture ..... ROBERT G. REIMANN
Director, School of Forest Technology ..... JAMES E. COUFAL
Director, Graduate Program in Environmental Science ..... ROBERT D. HENNIGAN
Director, Adirondack Ecological Center ..... WILLIAM C. TIERSON
Director, Applied Forestry Research Institute ..... RAYMOND L. MARLER
Director, Empire State Paper Research Institute ..... BENGT LEOPOLD
Director, State University Polymer Research Center ..... MICHAEL M. SZWARC
Director, Ultrastructure Studies Center ..... WILFRED A. CÔTÉ, JR.
Director, Tropical Timber Information Center ..... ROBERT W. DAVIDSON
Director, Cellulose Research Institute ..... TORE E. TIMELL
Project Leader, U.S. Forest Service Cooperative Research Unit .. ROWAN A. ROWNTREE

COLLEGE FACULTY AND PROFESSIONAL STAFF

This listing represents an official record of the State University of New York College of Environmental Science and Forestry faculty and professional staff for 1978. It is designed for use in 1978-79.

The date in parentheses after each name denotes the first year of service, two or more dates, the term of service. An asterisk (*) indicates graduate faculty.

LAWRENCE P. ABRAHAMSON (1977), *Senior Research Associate*, Applied Forestry Research Institute; B.S., Michigan Technical University, 1964; M.S., University of Wisconsin, 1967; Ph.D., University of Wisconsin, 1969.

MAURICE M. ALEXANDER (1949)*, *Professor*, Department of Environmental and Forest Biology; B.S., State University of New York College of Forestry, 1940; M.S., University of Connecticut, 1942; Ph.D., State University of New York College of Forestry, 1950

DOUGLAS C. ALLEN (1968)*, *Associate Professor*, Department of Environmental and Forest Biology; B.S., University of Maine, 1962; M.S., 1965; Ph.D., University of Michigan, 1968

IRA H. AMES (1972), *Adjunct Associate Professor*, Department of Environmental and Forest Biology; B.A., Brooklyn College, 1959; M.S., New York University, 1962; Ph.D., 1966

DAVID G. ANDERSON (1959), *Vice President for Administration and Services; Associate Professor;* A.A.S., State University of New York College of Forestry (Ranger School), 1950; B.S., State University of New York College of Forestry, 1953; M.S., University of Utah, 1958; M.P.A., Syracuse University, 1972.

ROBERT E. ANTHONY (1953), *Technical Specialist*, Department of Environmental and Forest Biology; A.A.S., State University of New York Agricultural and Technical College at Morrisville, 1952

GEORGE R. ARMSTRONG (1950)*, *Professor*, Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1949; M.S., 1959; Ph.D., 1965

ROBERT W. ARSENEAU (1972), *Programmer/Analyst*, Computer Center; A.A.S., Mohawk Valley Community College, 1967

JAMES P. BAMBACHT (1967)*, *Associate Professor*, Department of Paper Science and Engineering; A.B., Kalamazoo College, 1954; M.S., The Institute of Paper Chemistry, 1956; Ph.D., State University of New York College of Environmental Science and Forestry, 1973

C. ELLISON BECK (1970), *Technical Specialist*, Analytical and Technical Services, Office of the Vice President for Administration and Services

DONALD F. BEHREND (1960-67) (1968)*, *Assistant Vice President for Research Programs; Executive Director of the Institute of Environmental Program Affairs; Senior Research Associate*; B.S., University of Connecticut, 1958; M.S., 1960; Ph.D., State University of New York College of Forestry, 1966

JOHN D. BENNETT (1960)*, *Associate Professor*, Department of Managerial Science and Policy; B.A., Ohio Wesleyan University, 1954; Ph.D., Syracuse University, 1968; *Chancellor's Award for Excellence in Teaching* (1973)

CAMILLO BENZO (1975), *Adjunct Associate Professor*, Department of Environmental and Forest Biology; B.A., Utica College of Syracuse University, 1964; Ph.D., University of Pennsylvania, 1969

JOHN V. BERGLUND (1965)*, *Professor and Chairman*, Department of Silviculture and Forest Influences; B.S., Pennsylvania State University, 1962; M.S., 1964; Ph.D., State University of New York College of Forestry, 1968

WILLIAM H. BETTINGER (1972), *Technical Specialist*, Analytical and Technical Services, Office of the Vice President for Administration and Services

DONALD H. BICKELHAUPT (1969), *Technical Assistant*, Department of Silviculture and Forest Influences; B.S., State University of New York College of Forestry, 1969

PETER E. BLACK (1965)*, *Professor*, Department of Silviculture and Forest Influences; B.S., University of Michigan, 1956; M.F., 1958; Ph.D., Colorado State University, 1961; *Executive Chairman of the Faculty* (1974-76) (1976-78)

WILLIAM R. BORGSTEDE (1971), *Technical Assistant*, Department of Environmental and Forest Biology; A.A.S., Minor Institute, 1966; A.A.S., State University of New York College at Delhi, 1970; B.S., State University of New York College of Environmental Science and Forestry, 1975

JEROME BREZNER (1961)*, *Professor*, Department of Environmental and Forest Biology; A.B., University of Rochester, 1952; A.M., University of Missouri, 1956; Ph.D., 1959

ROBERT H. BROCK, JR. (1967)*, *Professor*, Department of Forest Engineering; B.S., State University of New York College of Forestry, 1958; M.S., 1959; Ph.D., Cornell University, 1971

RANIER H. BROCKE (1969)*, *Senior Research Associate*, Adirondack Ecological Center; B.S., Michigan State University, 1955; M.S., 1957; Ph.D., 1970

ALTON F. BROWN (1963) *Technical Specialist*, Empire State Paper Research Institute

THOMAS E. BROWN (1977), *Adjunct Assistant Professor*, Department of Environmental and Forest Biology; B.S., Niagara University, 1957

KENNETH F. BURNS (1970), *Technical Assistant*, Applied Forestry Research Institute; A.A.S., Paul Smith's College, 1969

HARRY W. BURRY (1962), *Extension Specialist*, Applied Forestry Research Institute; *Associate Professor*; B.S., State University of New York College of Forestry, 1941; M.F., 1964

PAUL M. CALUWE (1969)*, *Senior Research Associate*, Department of Chemistry; M.S., University of Louvain, 1964; Ph.D., 1967

ROBERT CAMERON (1974), *Research Assistant*, Adirondack Ecological Center; State University of New York College of Environmental Science and Forestry (Ranger School), 1973

WILBUR H. CAMPBELL (1975), *Assistant Professor*, Department of Chemistry; A.A., Santa Ana College, 1965; B.A., Pomona College, 1967; Ph.D., University of Wisconsin, 1972

HUGH O. CANHAM (1966)*, *Associate Professor*, Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1960; M.S., 1962; Ph.D., 1971

DIANNE M. CAPRITTA (1967), *Associate Librarian*, F. Franklin Moon Library; B.S., University of Illinois, 1965; M.S.L.S., Syracuse University, 1967

RHONDDA K. CASSETTA (1967), *Associate for Institutional Research*, Office of the Vice President for Administration and Services; A.B., Elmira College, 1933

ROBERT E. CHAMBERS (1967)*, *Associate Professor*, Department of Environmental and Forest Biology; B.S., Pennsylvania State University, 1954; M.S., 1956; Ph.D., Ohio State University, 1972

WILLIAM M. CHRISTIAN (1974), *Technical Assistant*, Department of Security and Safety

NEILS B. CHRISTIANSEN (1960)*, *Associate Professor*, Department of Managerial Science and Policy; B.S., University of Idaho, 1957; M.S., State University of New York College of Forestry, 1959; Ph.D., 1966

ROLLA W. COCHRAN (1964), *Assistant to the President for Community Relations*; Office of the President; *Associate Professor*; Coordinator of Demonstration and Information, Institute of Environmental Affairs; B.A., Denison University, 1949; M.S., Ohio State University, 1951

JAMES M. COLMAN (1973), *Assistant Director of Admissions*, Office of the Vice President for Student Affairs; B.A., Villanova University, 1967; M.A., Lateran University, 1968

HARRY J. CORR (1967), *Director of Business and Fiscal Affairs*, Office of the Vice President for Administration and Services; B.S. Siena College, 1957

WILFRED A. CÔTE, JR. (1950)*, *Professor and Dean*, School of Environmental and Resource Engineering; *Director*, Nelson Cortlandt Brown Center for Ultrastructure Studies; B.S., University of Maine, 1949; M.F., Duke University, 1950; Ph.D., State University of New York College of Forestry, 1958

JAMES E. COUFAL (1965), *Director and Associate Professor*, School of Forest Technology; State University of New York College of Forestry (Ranger School), 1957; B.S., State University of New York College of Forestry, 1960; M.S., 1962; Ed.S., State University of New York at Albany, 1976

PHILLIP J. CRAUL (1968)*, *Associate Professor*, Department of Silviculture and Forest Influences; B.S.F., Pennsylvania State University, 1954; M.S., 1960; Ph.D., 1964

JAMES O. CREVELLING (1970), *Technical Assistant*, Department of Environmental and Forest Biology; A.A.S., Paul Smith's College, 1965; M.S., University of Massachusetts, 1967

CLAY M. CROSBY (1964), *Research Assistant*, Empire State Paper Research Institute; B.S., State University of New York College of Forestry, 1964; M.S., 1970

SHEILA M. CROWLEY (1977), *Assistant for Institutional Research*, Office of the Vice President for Administration and Services; A.B., Albertus Magnus College, 1967

TIBERIUS CUNIA (1968) *Professor*, Department of Managerial Science and Policy; Forest Engineer, Ecole Nat. des Eaux et Forets, 1951; M.S., McGill University, 1957

GEORGE W. CURRY (1966)*, *Professor*, School of Landscape Architecture; B.A., Michigan State University, 1962; B.S., 1965; M.L.A., University of Illinois, 1969

BENJAMIN V. DALL (1975)*, *Professor and Chairman*, Department of Managerial Science and Policy; B.S., Yale University, 1955; M.F., 1956; J.D., University of Virginia, 1959; Ph.D., Pennsylvania State University, 1972

ROBERT W. DAVIDSON (1957)*, *Professor and Chairman*, Department of Wood Products Engineering; *Director*, Tropical Timber Information Center; B.S., Montana State University, 1948; M.S., State University of New York College of Forestry, 1956; Ph.D., 1960

ARNOLD C. DAY (1969), *Technical Specialist*, Nelson Cortlandt Brown Center for Ultrastructure Studies

SALVACION De La PAZ (1973), *Associate Librarian*, F. Franklin Moon Library; B.S.L.S., University of the Philippines, 1956; M.S.L.S., Simmons College, 1962

CARLTON W. DENCE (1951)*, *Senior Research Associate*, Empire State Paper Research Institute; *Professor*, B.S., Syracuse University, 1947; M.S., State University of New York College of Forestry, 1949; Ph.D., 1959

CARL H. DeZEEUW (1946)*, *Professor*, Department of Wood Products Engineering; A.B., Michigan State College, 1934; B.S., 1937; M.S., State University of New York College of Forestry, 1939; Ph.D., 1949

ARTHUR G. DILLON (1976), *Technical Assistant*, Department of Paper Science and Engineering; B.S., State University of New York College of Environmental Science and Forestry, 1974

DANIEL L. DINDAL (1966)*, *Professor*, Department of Environmental and Forest Biology; B.S., Ohio State University, 1958; M.A., 1961; Ph.D., 1966; *Chancellor's Award for Excellence in Teaching* (1974)

GEORGE F. EARLE (1952)*, *Professor*, School of Landscape Architecture; B.F.A., Syracuse University, 1937; M.F.A., Yale University, 1946

ANDREW L. EGGERS (1967), *Media Engineer*, Educational Communications Section, Office of the Vice President for Administration and Services

THOMAS ELIAS (1977), *Adjunct Associate Professor*, Department of Environmental and Forest Biology; B.A., Southern Illinois University, 1964; M.A., 1966; Ph.D., St. Louis University and the Missouri Botanical Garden, 1969.

ELIZABETH A. ELKINS (1973), *Associate Librarian*, F. Franklin Moon Library; B.A., Hartwick College, 1968; M.L.S., State University of New York at Geneseo, 1970

JOHN H. ENGELKEN (1959), *Assistant Professor; Forest Property Manager*, Tully Campus; B.S.F., Utah State University, 1950

ARTHUR R. ESCHNER (1961)*, *Professor*, Department of Silviculture and Forest Influences; B.S., State University of New York College of Forestry, 1950; M.S., Iowa State College, 1952; Ph.D., State University of New York College of Forestry, 1965

AMINUR EUSUFZAI (1977), *Technical Assistant*, Empire State Paper Research Institute; B.Sc. (Hons.), Decca University, 1957; M.Sc., Decca University, 1960; B.Sc. (Hons.), Beshawar University, 1962, M.S., West Virginia University, 1969.

EDMUND FALLON (1975), *Adjunct Professor*, Graduate Program in Environmental Science; B.S., Clarkson College of Technology, 1931

MILDRED FAUST (1976), *Adjunct Professor*, School of Biology, Chemistry and Ecology; A.B., Penn College, 1921; M.S., University of Chicago, 1923; Ph.D., University of Chicago, 1933

JOHN P. FELLEMAN (1973)*, *Associate Professor*, School of Landscape Architecture; B.C.E., Cornell University, 1966; M.E.C., 1966; D.P.A., New York University, 1975

JEAN E. FISHER (1963), *Senior Research Associate*, Applied Forestry Research Institute; *Professor*; B.S., University of Idaho, 1941

JOHN S. FISHLOCK (1965), *Technical Assistant*, Department of Environmental and Forest Biology; State University of New York College of Forestry, 1965

MICHAEL FLASHNER (1973), *Assistant Professor*, Department of Chemistry; B.S., Brooklyn College, 1965; A.M., University of Michigan, 1970; Ph.D., 1971

CLAUDE C. FREEMAN (1959), *Associate Professor*, School of Landscape Architecture; B.S., State University of New York College of Forestry, 1959

ROBERT L. FRIEDMAN (1967), *Director of Admissions*, Office of the Vice President for Student Affairs; A.B., Syracuse University, 1952; M.A., 1954

ROBERT H. FREY (1977), *Assistant Vice President for Academic Programs, Associate Professor*, B.A., Valparaiso University, 1965; M.Ed., Springfield College, 1966; Ed.D., Indiana University, 1973

EVA GALSON (1965), *Research Assistant*, Department of Chemistry; B.S., Queens College, 1949; M.S., Syracuse University, 1965

THOMAS L. GEE (1975), *Technical Assistant*, Department of Chemistry; A.A., Corning Community College, 1965; B.S., State University of New York at Geneseo, 1968

JAMES W. GEIS (1968)*, *Associate Professor*, Department of Environmental and Forest Biology; B.S.F., University of Illinois, 1965; M.S., 1967; Ph.D., State University of New York College of Environmental Science and Forestry, 1972

RONALD J. GIEGERICH (1977), *Technical Assistant*, Department of Environmental and Forest Biology; A.A.S., State University of New York Agricultural and Technical College at Cobleskill, 1976.

CATHERINE GLENNON (1977); *Assistant to the Vice President*, Office of Student Affairs; B.A., State University of New York at Binghamton, 1975; M.S., State University at Albany, 1977

SERGE N. GORBATSEVICH (1956)*, *Associate Professor*, Department of Paper Science and Engineering; B.S., State University of New York College of Forestry, 1954; M.S., 1955

MORT GRANT (1976), *Adjunct Professor*, Institute of Environmental Program Affairs; B.A., Whitman College, 1946; M.B.A., University of Chicago, 1949; M.P.A., Harvard University, 1959

STEPHEN GRANZOW (1969), *Technical Specialist*, Empire State Paper Research Institute

MIKLOS A. J. GRATZER (1973)*, *Professor*, Department of Managerial Science and Policy; Diploma for Forest Engineering, Sopron University, 1956; B.Sc., University of British Columbia, 1959; M.S.R.C., University of Montana, 1965; Ph.D., 1971

PAUL F. GRAVES (1947)*, *Professor*, Department of Managerial Science and Policy; B.S., State University of New York College of Forestry, 1939; M.F., 1941; Ph.D., Syracuse University, 1950

RICHARD L GRAY (1975), *Research Associate*, Applied Forestry Research Institute; B.A., State University of New York College of Environmental Science and Forestry, 1967; M.A., 1970; Ph.D., 1974

DAVID H. GRIFFIN (1968)*, *Associate Professor*, Department of Environmental and Forest Biology; B.S., State University of New York College of Forestry, 1959; M.A., University of California, 1960; Ph.D., 1963

DAVID L. HANSELMAN (1963)*, *Associate Professor*, Department of Managerial Science and Policy; B.S., Cornell University, 1957; M.S., 1958; Ph.D., Ohio State University, 1963

DAVID B. HARPER (1972), *Senior Research Associate*, School of Landscape Architecture; B.S., Bates College, 1959; M.R.P., University of Pennsylvania, 1969

ROY C. HARTENSTEIN (1959-65) (1967)*, *Professor*, Department of Environmental and Forest Biology; B.S., State Teachers College at Buffalo, 1953; M.S., Syracuse University, 1957; Ph.D., State University of New York College of Forestry, 1959

ALAN HARVEY (1977); *Technical Specialist*, Analytical and Technical Services

GORDON M. HEISLER (1973), *Adjunct Assistant Professor*, Department of Silviculture and Forest Influences; B.S., Pennsylvania State University, 1961; M.F., Yale University, 1962; Ph.D., State University of New York College of Forestry, 1970

ROBERT D. HENNIGAN (1967)*, *Professor*, Department of Managerial Science and Policy; *Director*, Graduate Program in Environmental Science; B.C.E., Manhattan College, 1949; M.A., Syracuse University, 1964

LEE P. HERRINGTON (1965)*, *Professor*, Department of Silviculture and Forest Influences; B.S., University of Maine, 1959; M.F., Yale University, 1960; Ph.D., 1964

JOSEPH A. HIBBARD (1975), *Assistant Professor*, School of Landscape Architecture; B.L.A., College of Environmental Science and Forestry, 1969

BERNARD T. HOLTMAN (1968), *TV/Motion Picture Producer-Director, Acting Director*, Educational Communications Section, Office of the Vice President for Administration and Services; B.A., Siena College, 1950; M.S., Syracuse University, 1972

ALLEN F. HORN, JR. (1957)*, *Professor*, Department of Managerial Science and Policy; B.S., Michigan State University, 1950; M.S., 1951; Ph.D., State University of New York College of Forestry, 1957; L.L.B., Syracuse University, 1967

STEPHEN B. HORSLEY (1977), *Adjunct Assistant Professor*, Department of Silviculture and Forest Influences; B.S., Penn State University, 1965; M.A., University of Massachusetts, 1968; Ph.D., University of Massachusetts, 1970

JOEL R. HOWARD (1977), *Coordinator*, Summer Sessions in Field Forestry; *Instructor*, Department of Silviculture and Forest Influences; State University of New York College of Forestry (Ranger School), 1966; B.S., State University of New York College of Environmental Science and Forestry, 1973; M.S., 1977

JOHN J. HOWARD *Adjunct Assistant Professor*, Department of Environmental and Forest Biology; B.A., Yale University, 1966; M.P.H., 1970; Ph.D., 1973.

THEODORE HULLAR (1976), *Adjunct Professor*, Institute of Environmental Program Affairs; B.S., University of Minnesota, 1957; Ph.D., University of Minnesota, 1963

HUGO A. JAMNBACK (1973), *Adjunct Senior Research Associate*, Department of Environmental and Forest Biology; B.A., Boston University, 1949; M.A., University of Massachusetts, 1951; Ph.D., 1953

ROBERT V. JELINEK (1972)*, *Professor*, Department of Paper Science and Engineering; B.S., Columbia University, 1945; M.S., 1947; Ph.D., 1953

HAZEL S. JENNISON (1965), *Research Assistant*, Analytical and Technical Services, Office of the Vice President for Administration and Services; B.S., Western Kentucky State College, 1941; M.S., Syracuse University, 1966

DAVID L. JOHNSON (1975), *Assistant Professor*, Department of Chemistry; B.S., Antioch College, 1965; Ph.D., University of Rhode Island, 1973

WILLIAM L. JOHNSON (1974), *Technical Specialist*, Department of Forest Engineering; B.S., University of Wisconsin, 1972; M.S., 1974

JAMES C. JOSEPH (1976), *Assistant to the President*, Office of the President; B.A., Oregon State University, 1975; M.P.A., Syracuse University, 1976

RONALD R. KARNS (1965), *Editorial Associate*, Office of Publications; B.S., Ohio State University, 1954

DAVID F. KARNOSKY (1977); *Adjunct Assistant Professor*, Department of Environmental and Forest Biology; B.S., University of Wisconsin, 1971; M.S., 1972; Ph.D., 1975

ROWENA V. KATHER (1974), *Assistant to the Director*, Analytical and Technical Services, Office of the Vice President for Administration and Services

EDWIN H. KETCHLEDGE (1955)*, *Distinguished Teaching Professor*, Department of Environmental and Forest Biology; *Director*, Cranberry Lake Biological Station; *Forest Manager*, Pack Demonstration Forest, Cranberry Lake Campus; B.S., State University of New York College of Forestry, 1949; M.S., 1950; Ph.D., Stanford University, 1957

LEE E. KOPPELMAN (1975)*, *Adjunct Professor*, Graduate Program in Environmental Science; B.E., City College of New York, 1950; M.S., Pratt Institute Graduate School of Architecture, 1962; D.P.A., New York University, 1970

DONALD E. KOTEN (1961)*, *Associate Professor*, Department of Managerial Science and Policy; B.A., North Central College, 1951; B.S., Oregon State College, 1957; Ph.D., State University of New York College of Forestry, 1966

STELLA D. KROFT (1973), *Technical Assistant*, F. Franklin Moon Library

FRANK E. KURCZEWSKI (1966)*, *Professor*, Department of Environmental and Forest Biology; B.S., Allegheny College, 1958; M.S., Cornell University, 1962; Ph.D., 1964

GEORGE H. KYANKA (1967)*, *Associate Professor*, Department of Wood Products Engineering; B.S., Syracuse University, 1962; M.S., 1966; *Chancellor's Award for Excellence in Teaching* (1973); Ph.D., 1976

CHARLES N. LaFORTY (1965), *Assistant Facilities Program Coordinator*, Office of the Vice President for Administration and Services

ROBERT T. LaLONDE (1959)*, *Professor*, Department of Chemistry; B.A., St. John's University, 1953; Ph.D., University of Colorado, 1957

JUDITH A. LaMANNA (1973), *Assistant Director of Personnel*; Office of the Vice President for Administration and Services; A.A.S., Onondaga Community College, 1969; B.A., LeMoyne College, 1971; M.P.A., Syracuse University, 1976

GERALD N. LANIER (1970)*, *Professor*, Department of Environmental and Forest Biology; B.S., University of California, 1960; M.S., 1965; Ph.D., 1967

RONALD F. LaPLAINE (1963), *Technical Specialist*, Department of Paper Science and Engineering

CHARLES C. LARSON (1950)*, *Professor and Dean*, School of Environmental and Resource Management; A.S., North Dakota State School of Forestry, 1938; B.S., University of Minnesota, 1940; M.S., University of Vermont, 1943; Ph.D., State University of New York College of Forestry, 1952

RICHARD V. LEA (1946-56) (1967)*, *Associate Professor*, Department of Silviculture and Forest Influences; B.S., State University of New York College of Forestry, 1946; M.S., 1948; Ph.D., 1953

ALBERT L. LEAF (1957)*, *Professor*, Department of Silviculture and Forest Influences; B.S.F., University of Washington, 1950; M.S., 1952; Ph.D., University of Wisconsin, 1957

CHARLES N. LEE (1959)*, *Director*, Computer Services; *Professor*, Department of Forest Engineering; B.S., State University of New York College of Forestry, 1949; B.C.E., Syracuse University, 1957; M.C.E., 1959

RAYMOND E. LEONARD (1964)*, *Adjunct Professor*, Institute of Environmental Program Affairs; B.S., University of Vermont, 1955; M.M.M., University of Helsinki, 1957; M.F., Yale University, 1964; Ph.D., State University of New York College of Forestry, 1967

BENGT LEOPOLD (1961)*, *Professor and Chairman*, Department of Paper Science and Engineering; *Director*, Empire State Paper Research Institute; B.Sc., Royal Institute of Technology, Stockholm, 1947; Licentiat, 1949; Ph.D., 1952

GIDEON LEVIN (1972), *Senior Research Associate*, State University Polymer Research Center; B.S., Technion, Israel Institute of Technology, 1960; M.S., Purdue University, 1965; Ph.D., State University of New York College of Forestry, 1971

ALLEN R. LEWIS (1970)*, *Associate Professor*, School of Landscape Architecture; B.A., University of Oklahoma, 1959; M.C.P., University of California (Berkeley), 1961

ROBERT C. LOOMIS (1974), *Manager*, Computer Center; B.S., Wheaton College, 1949; M.A., Columbia University, 1952

PHILIP LUNER (1957)*, *Senior Research Associate*, Empire State Paper Research Institute; *Professor*, B.Sc., University of Montreal (Loyola College), 1947; Ph.D., McGill University, 1951

J. DONALD MABIE (1967), *Coordinator for Sponsored Programs*, Office of the Vice President for Program Affairs; B.S., State University of New York at Albany, 1961

CHARLES C. MADDISON (1977), *Technical Assistant*, Adirondack Ecological Center

WALTER A. MAIER (1966), *Technical Specialist*, Department of Wood Products Engineering; B.S., State University of New York College of Forestry, 1960

PAUL D. MANION (1967)*, *Associate Professor*, Department of Environmental and Forest Biology; B.S., University of Minnesota, 1962; M.S., 1965; Ph.D., 1967

MARY ANNE T. MARANO (1972), *Bursar*, Office of the Vice President for Administration and Services; A.A., Onondaga Community College, 1967

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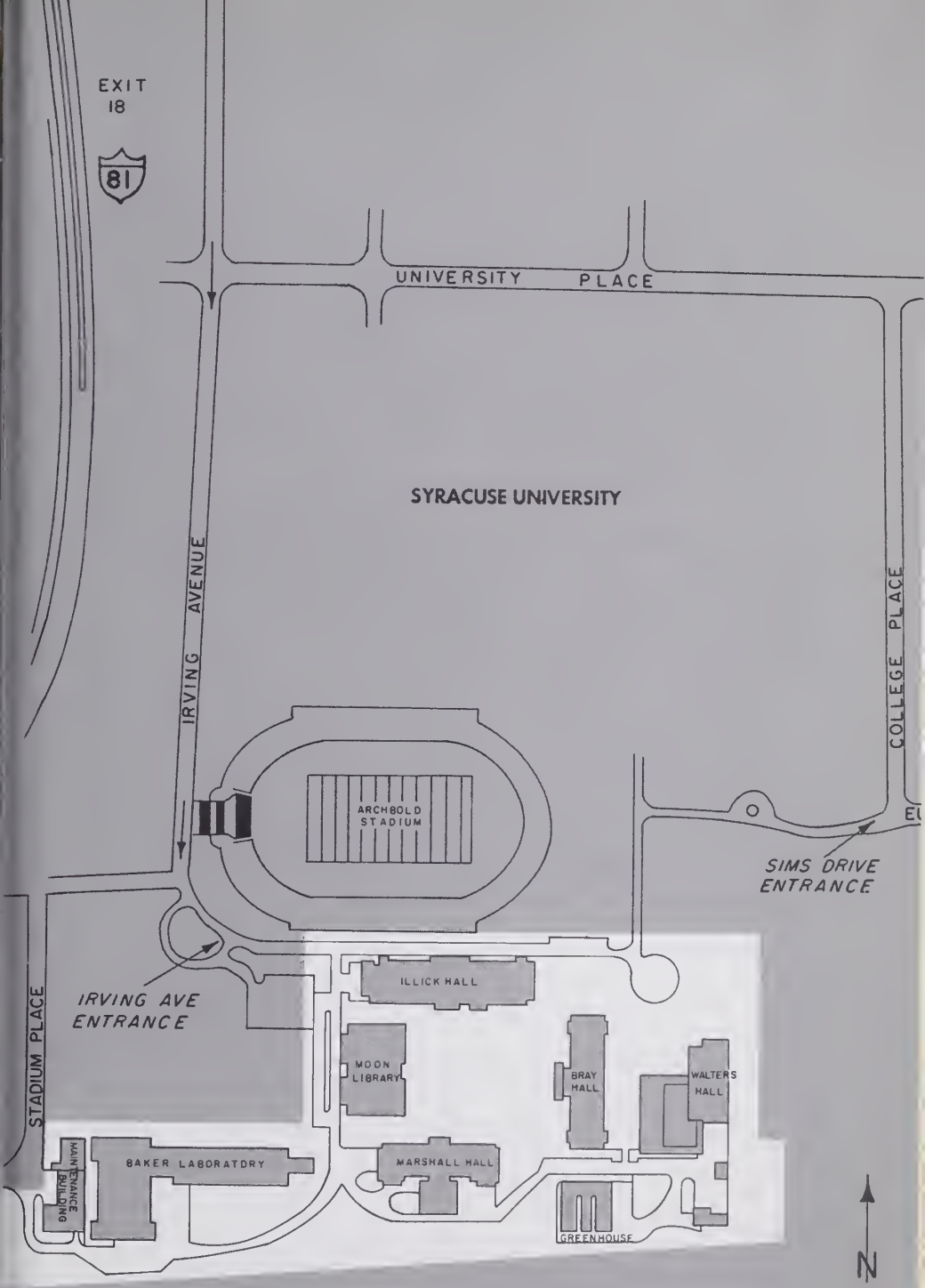

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