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1977

1977-1978 Wright State University Graduate Course Catalog

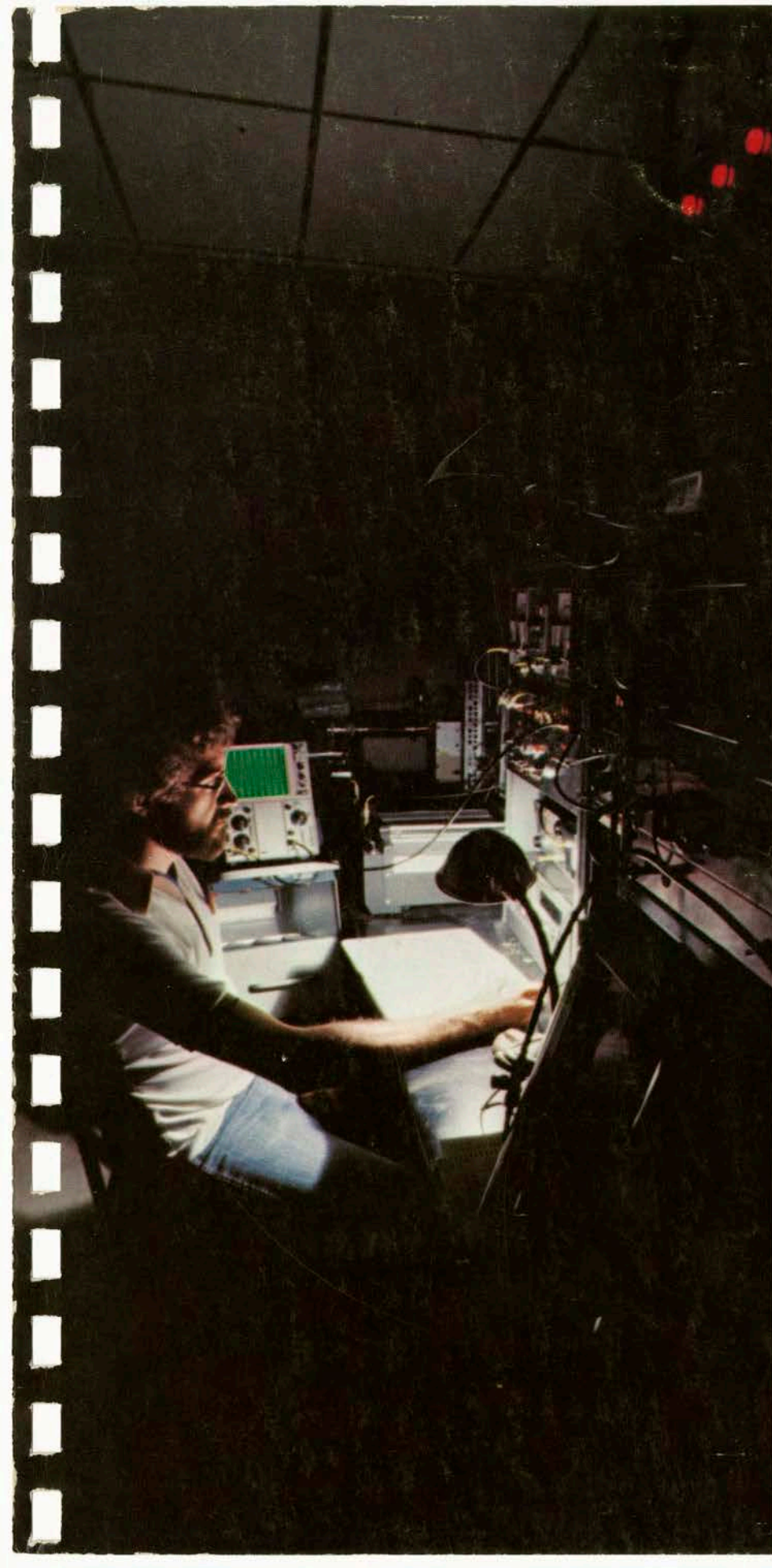
Wright State University

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Graduate Catalog 77-78 Wright State University

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University Officers

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(Term expires June 30 of year following member's name)

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Pictured on the cover is a data acquisition system for use with a two million volt Van de Graff.

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Graduate Catalog 77-78

Wright State University

Calendar

Fall Quarter

September 15
November 11
November 23
November 24-27
November 28-December 3

Winter Quarter

January 3
January 20
March 11
March 13-18

Spring Quarter

March 27
May 29
June 2
June 3-9
June 10

Summer Quarter

June 13
July 4
July 18
July 19
August 22

September 15-December 3, 1977

Thursday/classes begin
Friday/Veteran's Day holiday
Wednesday/classes end
Thursday-Sunday/Thanksgiving holiday
Monday-Saturday/final examinations

January 3-March 18, 1978

Tuesday/classes begin
Friday/Martin Luther King holiday
Saturday/classes end
Monday-Saturday/final examinations

March 27-June 10, 1978

Monday/classes begin
Monday/Memorial Day holiday
Friday/classes end
Saturday-Friday/final examinations
Saturday/Commencement

June 13-August 22, 1978

Tuesday/classes begin, Terms A and C
Tuesday/Independence Day holiday
Tuesday/Term A classes end
Wednesday/Term B classes begin
Tuesday/Terms B and C classes end

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Graduate Officers

School of Graduate Studies

Robert Dolphin, Jr. *Dean*
Robert W. Gardier *Acting Associate Dean*
Ronald M. Sirkin *Acting Assistant Dean*
Charles (Jack) Wood *Assistant to the Dean*

College Graduate Officers

College of Business and Administration

Edward A. Nicholson *Dean*

College of Education

Roger G. Iddings *Dean*
Thomas J. Matczynski *Director of Graduate Studies*

College of Liberal Arts

Eugene B. Cantelupe *Dean*

College of Science and Engineering

Brian L. Hutchings *Dean*

Graduate Program Officers

College of Business and Administration

Accountancy/Joseph Castellano *Chairman*
Administrative Sciences and Finance/Rust F. Gray
Chairman
Management/Thomas Von der Embse *Chairman*
Marketing/Peter S. Carusone *Chairman*
Social and Applied Economics/John L. Iacobelli
Chairman

College of Education

Division of Teacher Education/Beatrice F. Chait
Associate Dean and Director
Art Education/Gary C. Barlow
Special Education/Marlene Bireley
Health, Physical Education, and Recreation/
Clifford T. McPeak
Elementary Education/Robert D. Earl
Secondary Education/Dennis Badaczewski
Division of Educational Leadership and Human
Services/James A. Dillehay *Associate Dean and*
Director
Educational Leadership/Lilburn Hoehn
Counselor Education/S. Joseph Emanuel, Jr.
School Psychology/Marlene Bireley
Rehabilitation Education/Perry Hall

College of Liberal Arts

English/Peter Bracher
History/Victor D. Sutch
Music/Martha Harris Wurtz

College of Science and Engineering

Biology/Noel S. Nussbaum
Chemistry/Charles E. Carraher *Chairman*
Computer Science/James Brandeberry *Chairman*
Engineering/William R. Wells *Chairman*
Geology/Ronald G. Schmidt *Chairman*
Mathematics/David Sachs
Physics/John S. Martin *Chairman*

School of Graduate Studies

Applied Behavioral Science/Helen A. Klein

Graduate Council Members 1977-78

School of Graduate Studies

Dean Robert Dolphin, Jr. *Chairman*

**Dr. Robert Gardier

College of Business and Administration

Dean Edward Nicholson

Dr. Gordon K. Constable 1976-78

Dr. Waldemar M. Goulet 1977-79

Dr. J. Taylor Sims 1977-78

**To be appointed

College of Education

Dean Roger Iddings

Dr. Tyrone Payne 1976-78

Dr. Carl Benner 1977-79

*To be elected

**Dr. Tom Matczynski

College of Liberal Arts

Dean Eugene Cantelupe

Dr. Paul Shaw 1976-78

To be elected

*To be elected

**Dr. Paul Merriam

College of Science and Engineering

Dean Brian Hutchings

Dr. James Brandeberry 1976-78

To be elected

*To be elected

**Dr. Marc Low

School of Medicine

Dr. John Beljan

Dr. Samuel Kolmen 1977-78

To be elected

*Dr. Jane Scott 1977-78

**Dr. Robert Jewett

School of Nursing

Dean Gertrude Torres

Dr. Suzanne Falco 1977-79

Ms. Charlotte Paul 1977-78

*Ms. Marjorie Kinney 1977-78

**Dr. Margery Stanton

College of Continuing and Community Education

Dean Willard Hutzell

**Dr. Hal Gaddis

Provost (Ex Officio)

Dr. John Murray

**Dr. Jerry Hubschman

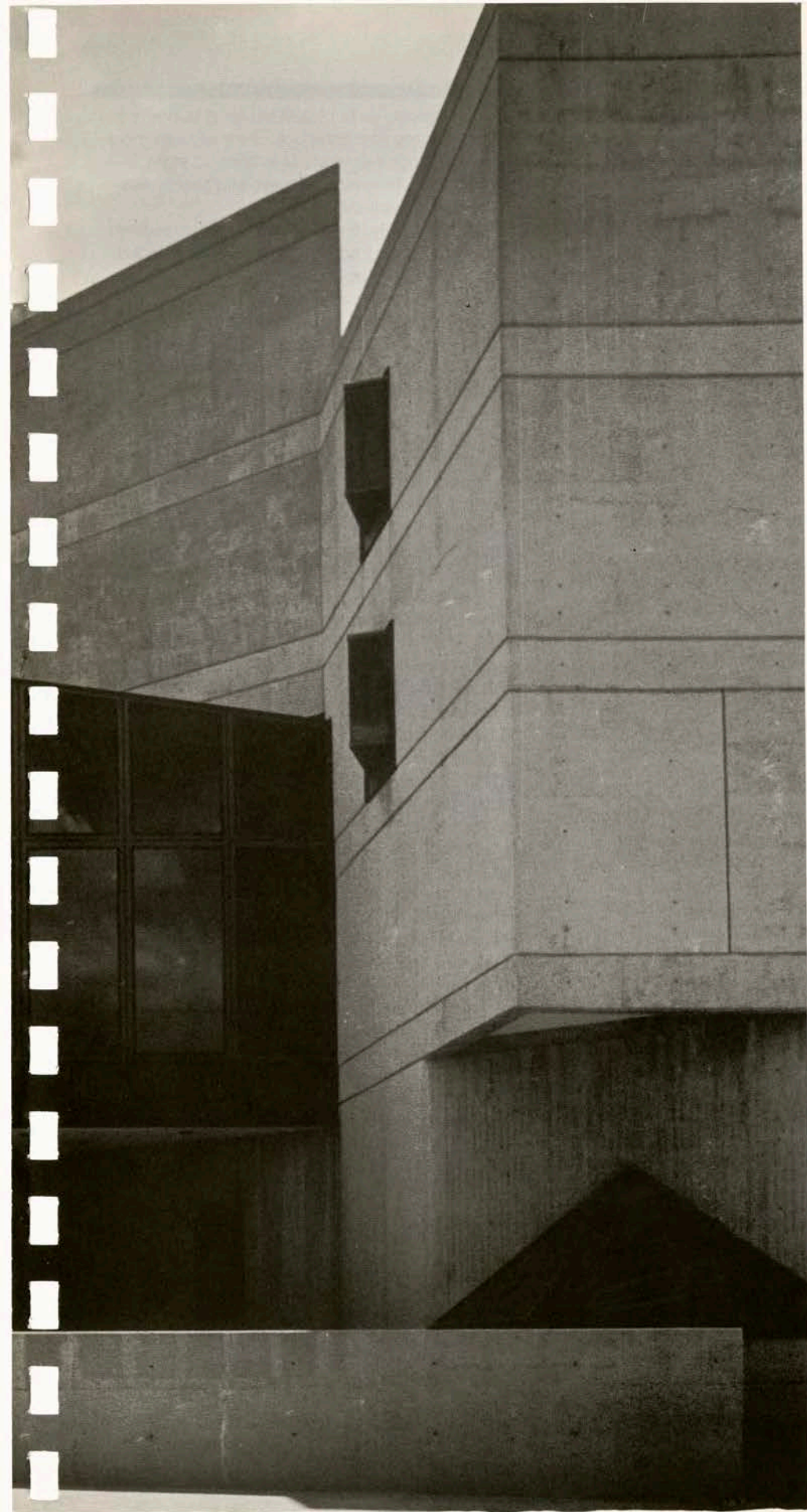
Student Representative

To be elected

*College Alternate

**Dean's Alternate





The University

Wright State University is the newest of the twelve state-assisted universities in Ohio. Located next to Wright-Patterson Air Force Base, northeast of Dayton, it is just minutes from downtown.

The university has developed to its present state mostly from generous support from the Dayton community and its business and professional leaders.

Past

In the early 1960s, Miami University and Ohio State University were offering classes in Dayton in borrowed facilities. As increasing numbers of students enrolled, it became clear the branch needed its own facilities.

In mid-1961, a community fund-raising effort produced \$3 million to purchase the present campus and construct the first building, Allyn Hall. The present 618-acre site of the campus was chosen partly because of its closeness to Wright-Patterson Air Force Base which could contribute technical knowledge to the university, particularly in science and engineering.

In September 1964, Allyn Hall opened its doors to 3,200 students and 55 faculty as the new Dayton Campus of Miami University and Ohio State University.

The university's name was changed to the Wright State Campus in 1965, and the second, third, and fourth buildings were constructed by 1967, to complete Founders Quadrangle.

The university became independent in October 1967. At that time, Wright State University was recognized as a fully accredited autonomous state institution, organized, then, into the Divisions of Business Administration, Education, Liberal Arts, and Science and Engineering.

Since then the university has seen the completion of the University Center, the Residence Hall, the Physical Education Building, the Creative Arts Center, the Brehm Laboratory of Natural Sciences, the Biological Sciences Building, the Medical Sciences Building, and the University Library, bringing to fruition the university's commitment to develop a fully balanced university program.

The approval of the Wright State University School of Medicine in 1974 marked the university's first professional doctorate, and the first freshman class of medical students entered in the fall of 1976.

The university is seeking planning approval for a Ph.D. degree in biomedical sciences. It will be an interdisciplinary degree staffed by faculty from the School of Medicine and the College of Science and Engineering. The program will probably begin in 1979.

Profile

Now a university with 13,000 students (more than 2,900 graduate students), the university has more than sixty programs of study leading to eight different baccalaureate degrees and twenty-two programs of graduate study.

Academically, the university is organized into nine units. Undergraduate degrees are awarded through the Colleges of Business and Administration, Education, Liberal Arts, Science and Engineering, and the School of Nursing. Graduate degrees are awarded through the School of Graduate Studies and the departments offering graduate programs. The University Division serves underclassmen, especially freshmen, in the areas of advising, academic placement, and tutoring. The College of Continuing and Community Education offers workshops, special courses, and seminars to meet the needs of nondegree and adult special students. And the new School of Medicine trains primary care physicians, awarding the Doctor of Medicine (M.D.) degree.

Established in 1973, the School of Medicine strives for excellence in educating primary care physicians, in conducting research and generating new knowledge, and in developing continuing and graduate education programs—all within the context of preparing physicians to meet the needs of patients and society.

Affiliated with twelve hospitals and health care facilities in the Dayton-Miami Valley region, the school enjoys the support of a cross-section of the community it was created to serve.

The school features a four-year curriculum with instruction in over twenty departments and programs. A full-time faculty of ninety medical educators currently serves the school. At the same time, over 650 practicing physicians throughout the region are closely involved as members of the voluntary clinical faculty.

Wright State is a commuter campus. Ninety-eight percent of its students commute. Almost ninety-nine percent of the students are from Ohio with eighty percent from the nearest three counties—Montgomery, Greene, and Clark. Only a few students are from other states and foreign countries.

Purpose

The university's chief purposes are to provide excellence in teaching, to contribute as much as possible to human knowledge, to serve the larger community, and to maintain the type of environment in which these goals may be attained.

Wright State is committed to providing career and professional education for students as well as a general liberal education. Education is seen as a lifelong learning process, so in addition to traditional degree programs, the university provides adult education. To enhance the learning process, it's important for both the teacher and the student to exchange ideas freely and for faculty to experiment with innovative teaching techniques.

The university wants faculty and students to remain open-minded and to explore new directions which may contribute to human knowledge. Importance is placed on basic research in the arts and humanities as well as in the science and technical fields, especially if it will benefit the larger community.

As a public institution of higher education, the university makes every effort to serve the community, attempting to be particularly responsive to the needs of the Miami Valley, the state of Ohio, and the region.

The university tries to create an environment in which each person has academic freedom, with the opportunity to learn the truth about any subject as long as it doesn't interfere with the rights of others. Wright State actively seeks people of diverse backgrounds for its faculty, staff, and student populations to maintain an identity as a general university.

The people at Wright State are constantly working to eliminate discrimination. There is an established program of affirmative action on campus with special program counselors to ensure equal opportunity for all qualified people and to prevent any person from experiencing discrimination at Wright State.

Wright State is accredited by the North Central Association of Colleges and Schools. Also, programs in the College of Education are accredited by the State of Ohio Department of Education, music programs are accredited by the National Association of Schools of Music, business programs by the American Assembly of Collegiate Schools of Business, social work by the Council on Social Work Education, medical technology by the American Society of Clinical Pathologists, medicine by the Liaison Committee on Medical Education, and nursing by the National League of Nursing.

The university holds membership in numerous organizations, including the American Assembly of Collegiate Schools of Business, the Midwest Association of Graduate Schools, the Council of Graduate Schools, the National University Extension Association, the Ohio College Association, the Association of Urban Universities, the American Association of State Colleges and Universities, the American Council on Education, and the American Association of Colleges.

Wright State students have hundreds of additional classes available to them through the university's membership in the Dayton-Miami Valley Consortium, an association which includes many area colleges and universities. Full-time students at Wright State may cross register for credit at member institutions, paying Wright State's tuition rates, as long as class space is available, the student has the adviser's consent, the course isn't offered at Wright State, and the student meets course prerequisites.

The consortium also offers cooperative library privileges to students at all member institutions. These library holdings total more than a million volumes.

The Office of Community Service (OCS), a project of the consortium, handles educational and community research and cable television. Periodically, OCS offers college courses through a few of the consortium member schools, using the resources of cable television.

The Office of Professional and Graduate School Advising and Information at Wright State provides a central source of information about law study, law schools, graduate and professional schools.



The Bolinga Black Cultural Resources Center was established on campus to promote within the university community and the surrounding area an understanding and appreciation of the culture and heritage of black Americans. The center sponsors lectures and seminars by noted speakers and performances and exhibitions by black artists. It also has audiovisual facilities and a library of special publications and black history books.

The services of the Public Education Religion Studies Center (PERSC) are available to Wright State students. This interdisciplinary program is administered by the Colleges of Education and Liberal Arts to encourage and facilitate teaching about religion in public education. The center maintains a special research collection in the University Library and sponsors workshops and special programs. PERSC also works closely with the College of Education and the Department of Religion on the religion studies option available in the M.Ed. classroom teacher program.

An innovative agreement with the Engineering and Science Foundation of Dayton has placed Wright State in charge of the Engineering and Science Institute in downtown Dayton. The institute, a part of the College of Continuing and Community Education, offers continuing education programs emphasizing areas beyond those covered by existing degree programs. There is also professional training in engineering, science, and management for members of the industrial-scientific community.





Fees

Students who register early will find payment deadlines in the university calendar published in the quarterly schedule of classes. If registration fees are not paid on time, a student's registration may be cancelled to make class space available for students who register later. Students who do not register early must pay all fees and charges when they register. No registration or payment is accepted after the first week of classes without the proper approval.

Any payment made with a bad check may result in a student's registration being cancelled. The bursar assesses a charge to reprocess any payment previously made with a bad check. These charges must be paid on the day of reprocessing. Fee assessments can be audited at any time during a student's enrollment or academic career. If a student doesn't make acceptable arrangements to pay the amount due within thirty days after notification, he or she will have the current registration cancelled.

The university does not defer fee payments or accept partial payments. For an additional receipt, it is to a student's advantage to pay fees by check or money order, made payable to Wright State University and sent to the attention of the Office of the Bursar. The check or money order should be written for the exact amount due. Incorrect checks will promptly be returned to the student and registration will proceed on schedule if a new check or money order for the correct amount is received by the published deadline date for payment of fees.

A current schedule of refunds can be found in the quarterly schedule of classes. Refunds are made only through the registrar's office. The amount is computed from the day a student reports withdrawal to the Office of the Registrar.

Students who are nonresidents of Ohio must pay a nonresident fee in addition to other fees and charges.

The following general rules, established by the University Board of Trustees, determines who can be considered an Ohio resident and cites specific exceptions to the general rules.

Persons in the following categories are classified as residents of the State of Ohio for subsidy and tuition surcharge purposes:

- 1 Dependent students, at least one of whose parents or legal guardian has been a resident of the State of Ohio for all other legal purposes for twelve consecutive months or more immediately preceding the enrollment of the student in an institution of higher education.
- 2 Persons who have resided in Ohio for all other legal purposes for at least twelve consecutive months preceding their enrollment in an institution of higher education and who are not receiving, and have not directly or indirectly received in the preceding twelve consecutive months, financial support from persons or entities who are not residents of Ohio for all other legal purposes.
- 3 Persons who reside and are gainfully employed on a full-time or part-time and self-sustaining basis in Ohio and who are pursuing a part-time program of instruction at an institution of higher education.

Specific exceptions and circumstances include:

- 1 A person on active duty status in the United States military service who is stationed and resides in Ohio and his or her dependents shall be considered residents of Ohio for these purposes.
- 2 A person who enters active duty status in the United States military service while a resident of Ohio for all legal purposes as long as Ohio remains the state of that person's domicile.
- 3 Any alien who holds an immigration visa or is classified as a political refugee, shall be considered a resident of the State of Ohio for state subsidy and tuition surcharge purposes in the same manner as any other student.
- 4 No person who holds a student or other temporary visa shall be eligible for Ohio residency for these purposes.
- 5 A dependent person classified as a resident of Ohio who is enrolled in an institution of higher education when his or her parents or legal guardian remove their residency from the State of Ohio shall be considered a resident of Ohio for these purposes during continuous full-time enrollment and until his or her completion of any one academic degree program.
- 6 Any person once classified as a nonresident, upon the completion of twelve consecutive months of residency in Ohio for all other legal purposes, may apply to the institution he or she attends for reclassification as a resident of Ohio for these purposes. Should this person present clear and convincing proof that no part of his or her financial support is or in the preceding twelve consecutive months has been provided directly or indirectly by persons or entities who are not residents of Ohio for all other legal purposes, this person shall be reclassified as a resident. The institution may require, among other things, the submission of information regarding the sources of a student's actual support to that end.
- 7 Any reclassification of a person who was once classified as a nonresident for these purposes shall have prospective application only from the date of the reclassification.

Fee schedules are subject to change depending on action by the state legislature and approval by the Ohio Board of Regents and the University Board of Trustees. The quarterly fees we have listed here for the main campus, Western Ohio Branch Campus, and Piqua Resident Credit Center are those in effect when this catalog went to press. For an up-to-date list, you should consult the Office of the Registrar.

Graduate Students	Main Campus	WOBC	Piqua Center
<i>1 through 10 hours/per hour</i>			
Instruction and General fee	\$34	\$32	\$31
Nonresident tuition/add to above	29	29	29
Total: Ohio resident	34	32	31
Total: Nonresident	63	61	60
<i>10.5 through 14 hours</i>			
Instruction fee	\$320	\$320	\$320
General fee	25	15	5
Nonresident tuition/add to above	330	330	330
Total: Ohio resident	345	325	325
Total: Nonresident	675	665	655
<i>14.5 through 18 hours*</i>			
Instruction fee	\$325	\$325	\$325
General fee	25	15	5
Nonresident tuition/add to above	330	330	330
Total: Ohio resident	350	340	330
Total: Nonresident	680	670	660

*The part-time quarter hour rate will apply to all hours in excess of 18.

Additional Fees and Charges

Mass Registration fee/ <i>continuing students</i>	\$15
Late Registration fee/ <i>all students</i>	25
Nondegree application fee	10
Audit fee/ <i>per credit hour (laboratory and special courses not open to audit)</i>	same as for credit courses
WOBC only/ <i>per credit hour</i>	10
Drop fee	10
Charge for persons taking courses under Educational Benefits Policy or with Registration Fee Certificate/ <i>per credit hour</i>	7
Transcript fee/ <i>first request each additional at same time 50 cents</i>	2
Undergraduate and graduate degree application and certification application fee	25
Returned check penalty/ <i>per check</i>	15
Applied music fee	
<i>one half hour lesson per week</i>	35
<i>one hour lesson per week</i>	70
Proficiency Test/ <i>per credit hour</i>	5
Graduation fee	10
Parking fees are listed in the quarterly schedules.	
Library fines are set by the librarian with the approval of the executive vice-president and provost and treasurer.	
Wright State University will not defer payment of fees or accept partial payments.	

Financial Aid

Types of financial aid available to graduate students include graduate assistantships, graduate fellowships, National Direct Student Loans, College Work-Study employment, and short-term loans. Information concerning applications for graduate assistantships or fellowships may be obtained directly from the department concerned; all other types of financial aid are handled through the Office of Financial Aid in Allyn Hall.

Financial aid awards cannot be final until the student has completed the admission process. Entering students should be sure that a transcript of credits has been sent to the Office of Admissions.

In addition to filing a Wright State University application for financial aid, students and/or their parents must fill out a Financial Aid Form (FAF) and send it to the College Scholarship Service. These forms may be obtained from the Office of Financial Aid. Allow approximately four weeks for the College Scholarship Service to process the FAF.

Graduate Assistantships/Fellowships

Assistantships or fellowships are awarded through individual departments of instruction and require the student to spend a specified amount of time assisting either in instruction or in research. The balance of the student's time is devoted to graduate studies. Half-time graduate assistants and associates are required by the graduate school to register for a minimum of six hours per quarter although some departments may require as many as fifteen hours per quarter. (A maximum of six hours for each five-week summer term is considered the normal load.) Graduate assistants and associates on less than half-time duty should register for at least nine hours per quarter and may carry up to sixteen hours.

Continuation of graduate assistantship contracts depends upon satisfactory academic and assistantship performance. For information regarding assistantships or fellowships, contact directly the chairman of the department involved.

Wright State University Graduate Fellowships

The Wright State University Foundation awards graduate fellowships based on academic performance, standardized test results, extracurricular activities, and personal recommendations. Financial need is not a consideration in these awards. The required application and detailed information can be obtained from the Office of Financial Aid.

National Direct Student Loans

Since 1958, the federal government has been allocating federal funds to institutions of higher education to be lent to students who need financial assistance to attend college. An undergraduate student may borrow up to \$2,500 aggregate for the first two years in college, \$5,000 for the total undergraduate program, and \$10,000 aggregate for all undergraduate and graduate years.

The repayment period and interest on these loans do not begin until nine months after the student terminates his or her education. The loan bears interest at the rate of three percent per year and repayment of the principal may be extended over a ten-year period. For students who become teachers of handicapped students (mentally, physically, emotionally, or economically handicapped), a certain percentage of these loans is cancelled each year.

College Work-Study Program

Employment through the College Work-Study Program is available to students who demonstrate a financial need, according to federal guidelines.

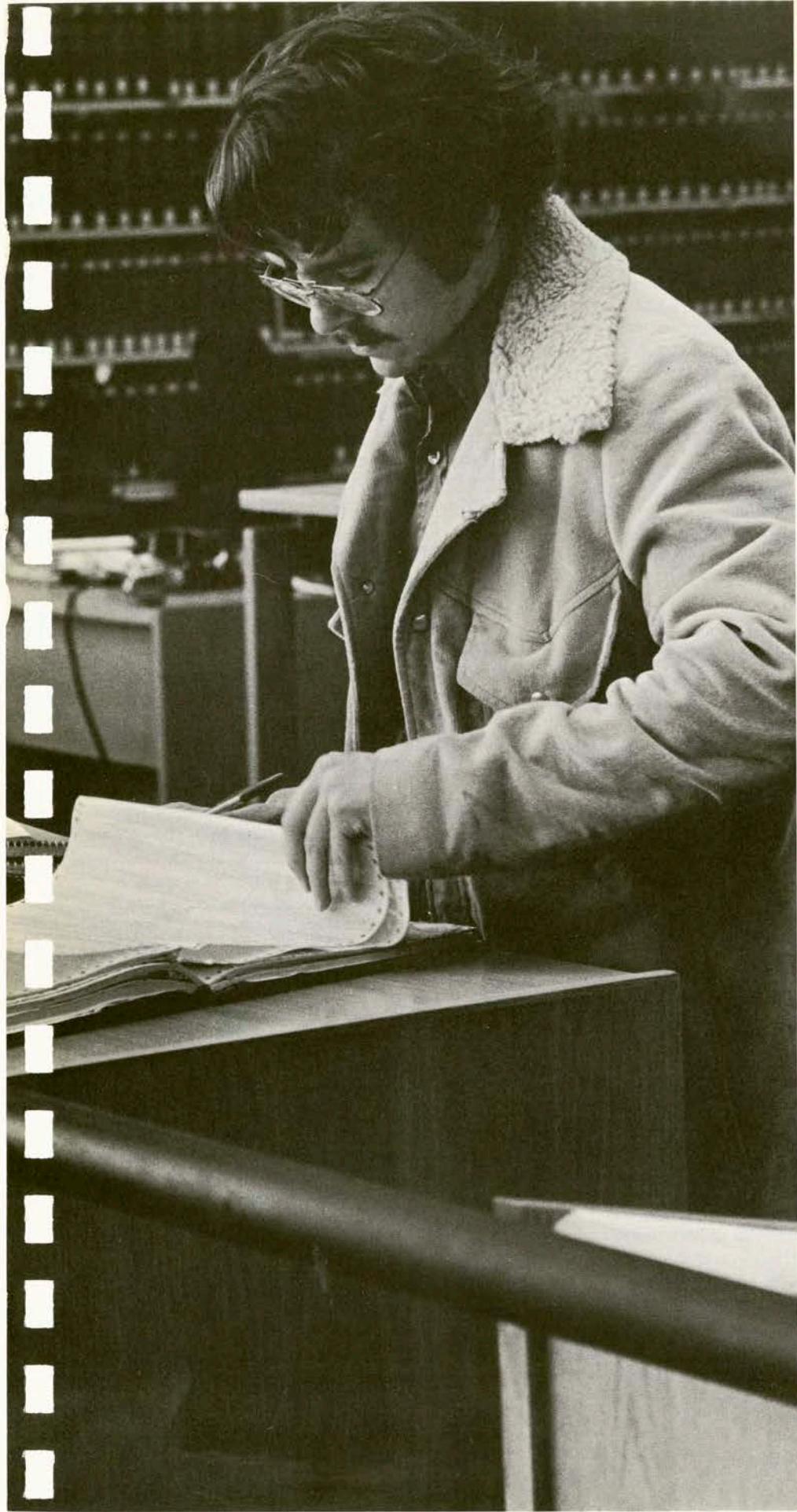
Graduate students who are registered for at least 4.5 credit hours are eligible to work a maximum of twenty hours per week while classes are in session. Full-time summer employment is available to students who qualify for financial aid for the following fall term.

Short-Term Loans

Students who have earned at least three credit hours at Wright State University are eligible for small, short-term loans for fees or for personal needs. The entire amount of the loan must be paid in full by the sixth week of the quarter in which the money is borrowed.

G.I. Bill

To be eligible for benefits under the G.I. Bill, any veteran of the Army, Navy, Marine Corps, Air Force, or Coast Guard must have served continuously on active duty for at least 181 days ending after January 31, 1955, and have received an honorable discharge. Applications are available from the Veterans Affairs Office at Wright State University or from any Veterans Administration office. Educational opportunities are available for children, wives, and widows of veterans whose deaths or permanent total disabilities were service-connected and for wives and children of servicemen missing in action or prisoners of war.



The School of Graduate Studies

The School of Graduate Studies had a total enrollment of 2,914 fall quarter 1976, 85 percent of whom were part-time students. Graduate degrees are awarded through the School of Graduate Studies and the departments offering graduate programs. The graduate school offers twenty-two master's degree programs in the Colleges of Business and Administration, Education, Liberal Arts, and Science and Engineering.

In addition to granting graduate degrees, the School of Graduate Studies is responsible for the administration of all graduate programs in the university, a task it shares with the four discipline-focused colleges and their academic departments. (The interdisciplinary Applied Behavioral Science program is administered directly by the School of Graduate Studies.) The graduate school also helps to develop new programs and maintains appropriate standards for graduate-level programs. The administrative services of the school are provided by the graduate office, consisting of the dean, the associate dean, and their staff.

The Graduate Council

The Graduate Council is composed of deans, elected representatives and alternates from each of the five colleges and the School of Medicine, and two graduate students. The council is the graduate school's policy-making body, which acts for the graduate faculty and is chaired by the dean of the School of Graduate Studies.

The council's functions include developing university policies and procedures for graduate studies, recommending to the president and Board of Trustees the approval of new graduate degrees and programs, and establishing standards for the graduate faculty. The council regulates student admission, registration, academic requirements, and other procedures regarding graduate study. It provides the central planning required to promote programs of highest quality and evaluates proposals for new graduate programs and major revisions of existing programs.

Graduate Faculty

The graduate faculty, the body primarily responsible for graduate study, is comprised of faculty members whose experience and record of scholarship qualify them to offer graduate-level instruction. The graduate faculty's purpose is to encourage and contribute to the advancement of knowledge through instruction and research of the highest quality. It is responsible for student advising and supervising student research and graduate assistants. Emphasis is placed on the totality of a graduate faculty member's instructional, advising, and professional responsibilities as well as explicit scholarship criteria.

The Graduate Student Community

An association of graduate students at Wright State University was established in January 1974 to promote communication within the graduate student body and between graduate students, the faculty, and the university administration. Membership is open to all Wright State graduate students.

Student Caucus

Student Caucus, the elected representative student assembly, represents the interests of the student body on the Academic Council, communicates with the student body on matters of policy, appoints students to committees throughout the university, and researches matters of interest to the student body. Student Caucus consists of six main campus students, including a graduate student, who are members of the Academic Council and hold membership on major committees of the council.

Research and Graduate Study

One objective of the School of Graduate Studies is to advance scholarship in all forms. There is a close association between graduate study and research, since many graduate programs aim specifically toward education for research. Even those programs which aim more toward professional practice rather than research require an education adequate for persons who must apply the results of research in their professional work.

The term "research" is used here to include scholarly efforts of many kinds. It includes work in the laboratory, the library, or the field. The various kinds of research and scholarship include laboratory and field experiments, correlation studies, naturalistic observations, economic research, historical and other documentary studies, and the creative endeavors of the arts. The graduate school is obligated to aid and encourage all forms of scholarly efforts by the graduate faculty and graduate students.

The school publishes a *Directory of Research Interests*, which summarizes the current research interests and activities of the graduate faculty. This directory serves as a fast reference for students, faculty, and administrators seeking to identify the work currently being done in a particular area of scholarship. It is also used for directing information about funding sources for a particular faculty member. It is an excellent source for graduate students to determine which faculty member's interests most closely match their own. Copies are available in college and department offices, as well as in the graduate office.

The university's Research Council is responsible for institutional research policy. The council is made up of elected representatives of the faculty and the administration and the dean of graduate studies. The chairman is elected from the council membership. The Wright State University Research Institute was founded in 1969 as a separately incorporated body to act for the university in matters related to research funding. The institute's board of directors includes the dean of graduate studies and representatives from the faculty, administration, and other educational institutions, as well as from the community. The Research Committee of the graduate school is a faculty committee charged with advising the Graduate Council on all matters related to research as it affects graduate study. The committee is appointed annually by the graduate dean with the advice and consent of the Graduate Council.

The university's Office of Research Services aids faculty and students in finding sources of funding for research and in preparing proposals. This office serves as a liaison with federal, state, and local sources for the support of research and scholarly activity. The office's staff provides assistance upon request. Information may be obtained from the Office of Research Services.

Research News, a monthly publication of the Office of Research Services, is an excellent source of information on research currently being carried out in the university and for potential sources of funding. It is available upon request.

The university's Committee on the Use of Human Subjects in Behavioral Research, which reports to the dean of the graduate school, monitors all behavioral research projects involving human subjects. The committee is responsible for insuring the ethical and proper treatment of human subjects. All projects utilizing human subjects must be reviewed in advance by this committee.

It is important that graduate students working in a program which includes education for research carefully assess their research interests and needs for research experience. They should then contact interested faculty members who will advise and work with them in these efforts, and begin their research work at the earliest possible time. Graduate students should discuss this with the department chairman or dean shortly after beginning graduate study.

University Library

The University Library is a focal point for many graduate programs at Wright State since its collections and services support the course-related and independent research projects of graduate students and faculty.

The collection contains over 315,000 bound volumes, 338,000 microforms, 74,000 U.S. and Ohio government documents, and 27,000 pieces of

nonprint media. Since the collection is barely over ten years old, the emphasis is on current materials, yet important older resources have also been acquired. Many of the 5,500 periodical subscriptions include significant back files.

Archives and Special Collections is an area of special interest to graduate students since its collections contain primary research materials such as manuscripts, archival records, and special book collections. The papers of James M. Cox, the records of the Miami Conservancy District, a growing collection of first editions of American women writers' books, and the records of the Dayton and Springfield Urban Leagues are among the holdings. And the private aeronautical library of Wilbur and Orville Wright is on loan to the university. The collection of federal government documents, which have been received on deposit since 1966, is another rich and varied collection of research materials.

Media Services serves both faculty and students. Instructional Materials Services houses educational kits and games, children's literature and textbooks, resource units, curriculum guides, and standardized tests. Media Equipment Distribution loans media equipment and software for instructional purposes. The Auto-Tutorial Lab, Listening Lab, and Equipment Lab make possible individualized self-paced instruction. The Media Production Lab provides facilities and materials for producing materials for class requirements. The Tape Center for the Handicapped contains textbooks on tape for handicapped students and houses special equipment for student use.

The music library, located in the Creative Arts Center, houses recordings and music scores. Sophisticated audio reproduction equipment is available there for students to use.

The Health Sciences Library principally serves the School of Medicine faculty and students, and faculty in the life sciences at Wright State University. It is housed in separate facilities from the University Library.

The reference staff of the University Library is eager to assist graduate students in their use of the collections. They offer bibliographic instruction and assistance in developing workable research strategies.

Since no single academic library can possibly collect all the materials that its many graduate students and faculty members require for their research, Wright State actively supports and participates in a number of local and nationwide

cooperative programs. Interlibrary loan service insures that virtually anything required by a student can be obtained in a week's time. Wright State's membership in the Dayton-Miami Valley Consortium, its support of a full-time reference and interlibrary loan librarian at Ohio State, and its arrangements with the other state-assisted Ohio universities facilitate the interlibrary loan process. *The Union List of Serials in the Miami Valley*, available at the reference desk, locates holdings of more than 10,000 serial titles in forty-four area libraries.

Wright State is an associate member of the Center for Research Libraries. The center, supported by the major U.S. academic and research libraries, has a vast collection of research materials not available through interlibrary loan.

Computer Services

Academic computing services are provided and coordinated through the Research and Instruction Computation Center (RICC). The major objectives of the RICC are to provide and maintain the general purpose computing programs and equipment needed to support the instructional and research activities of the university.

The computer equipment installed at this time is an IBM 360/65, used for both academic and administrative processing. Many computer languages and programs are installed and are available to students and faculty. Information and guidance in using the facilities are available at the center. Offices and computing equipment are located in the basement of the library building.

Application Procedures for Admission and Readmission

Students must be officially accepted for admission to the School of Graduate Studies before they may register for credit.

All correspondence pertaining to the admission of a student to the School of Graduate Studies should be addressed to the Office of Admissions, Wright State University. The admissions office will coordinate the processing of the application materials with the appropriate graduate department and the School of Graduate Studies.

Applications for admission and supporting credentials should be received at least three weeks before registration for the quarter or summer term in which the student wishes to begin graduate study.

All documents received by the university in connection with applications for admission become the property of Wright State University. Under no circumstances will they be returned to the applicant or forwarded to any agency or other college or university.

Admission to the School of Graduate Studies does not necessarily indicate candidacy for an advanced degree. Such candidacy is subject to specific requirements as defined by the individual programs.

Students are identified by the School of Graduate Studies as being in one of the following categories:

Regular Status

A student admitted as fully qualified to pursue a program toward a graduate degree.

Conditional Status

A student admitted on a conditional basis. Upon completion of twelve quarter hours of graduate credit and all other admission requirements specified by the department/college the student is either admitted to regular status or refused further registration.

Nondegree Status

A student qualified for admission who does not plan to work toward a degree may be admitted on a nondegree basis for selected graduate courses. A student cannot become a degree candidate while in this status. Subject to subsequent acceptance into a degree program and provided the credits are acceptable to the department/college, a maximum of twelve quarter hours of credit may be applied toward a graduate degree. A student must maintain a 2.5 average. A grade of D will be cause for dismissal.

Certification Status

Students who wish to complete a portion of the teacher certification requirements at the graduate level but do not wish to pursue a graduate degree may be admitted as certification candidates.

Senior Status

Seniors at Wright State who have completed 162 credit hours toward the baccalaureate degree and have earned a cumulative grade point average of 3.0 may apply for permission to elect specified graduate courses for graduate credit. Approval must be granted by the student's undergraduate adviser and by the chairman of the department in which graduate credit is sought. No credits or grades earned from graduate courses may be applied to fulfill requirements for the baccalaureate degree.

Transient Status

Students actively pursuing a graduate program at another college or university who wish to earn credits for transfer to that institution may be admitted for one quarter. Transient students will not be required to submit official transcripts. Students must complete the admission application and request the dean of their graduate school to complete the Wright State transient form indicating the student is in good standing.

Special Status

Open to students who have a bachelor's degree. A student may enroll in workshop courses only for graduate credit without being admitted to graduate school.

Undergraduate students may enroll in a graduate course and apply that credit to their undergraduate programs only if they meet the following conditions: (1) have accrued 126 credit hours or more; (2) have a minimum cumulative grade point average of 2.7 or higher; (3) have a minimum cumulative grade point average of 3.0 or higher in the major; and (4) have permission granted by the instructor and the chairman of the department offering the course.

Requirements for Admission

- 1 An application form completed by the applicant.
- 2 Payment of the nonrefundable application fee.
- 3 A bachelor's degree from an accredited college or university.
- 4 One official transcript of all previous college work (undergraduate and graduate). An applicant should request the registrars of all colleges previously attended to send one official transcript directly to the Office of Admissions.
- 5 The following are minimum requirements for admission to:
Regular Status An overall undergraduate grade point average of 2.7 (based on a 4.0 grading system) or an overall undergraduate average of 2.5, but with a 3.0 or better in the major field or in the latter half of undergraduate work.
Conditional Status An undergraduate grade point average of less than 2.7 but above 2.5 (based on a 4.0 grading system) or an undergraduate grade point average of less than 2.5 but above a 2.3 if the grades in the last half of undergraduate work constitute a 2.7 or better.
Nondegree and Certification Status An undergraduate grade point average of 2.3 or better.

- 6 Candidates must demonstrate sufficient preparation in the field of their intended major to be acceptable to the department concerned. However, on condition that any required prerequisites will be completed on a satisfactory basis, admission to do graduate study may be made before prerequisite study has been completed
- 7 Admission test requirements are listed under *Test Information*.
- 8 For international student requirements see the section entitled *International Applicants*.
- 9 Acceptance by both the department/college and the graduate school.

Individual departments/colleges may have requirements over and above those of the School of Graduate Studies. Candidates should consult the specific requirements set forth by the department; see program descriptions in the catalog.

Test Information

Graduate Management Admission Test (GMAT)

Each applicant for admission to the Master of Business Administration program, regardless of previous academic record, must submit satisfactory scores on the Graduate Management Admission Test (formerly Admission Test for Graduate Study in Business) before admission will be considered. The GMAT is administered throughout the area in January, March, July, and November. Preregistration directly with the Educational Testing Service is required. Registration forms may be obtained from the Office of Admissions and the graduate office.

Miller Analogies Test

Applicants for admission to the applied behavioral science program and to education must submit scores on the Miller Analogies Test. The test is administered on campus at two-week intervals. Information concerning preregistration and test dates may be obtained from the Office of Admissions.

Graduate Record Examination (GRE)

Applicants for admission to certain programs or under particular circumstances may be required to submit scores on the aptitude and advanced portions of the Graduate Record Examination. The GRE consists of two parts: the aptitude test which contains both a verbal and quantitative portion, and the advanced test which assesses achievement in the student's major field.

Graduate Record Examinations, for which a fee is charged, are scheduled throughout the United States in January, February, April, June, October, and December. Preregistration directly with the Educational Testing Service is required several weeks in advance of test dates. Information and registration forms may be obtained from the Office of Admissions or the testing service.

Applicants will be advised concerning GRE test requirements following a review of their admission files.

International Applicants

International applicants are requested to complete the following forms in order that a preliminary evaluation of their academic and financial status may be made:

- 1 Request for Application Materials
- 2 Educational Summary form
- 3 Financial Statement form

If this information is favorable, the application for admission is mailed to the applicant. In addition, the applicant is advised by letter that before final consideration may be given to a request for admission the following items must be submitted:

- a A Wright State University application and application fee
- b A complete academic record (official or certified transcripts) of all previous university attendance
- c If English is not the native language, the results of the Test of English as a Foreign Language (TOEFL)
- d Assurance to the university of sufficient financial funds to guarantee student's educational goals
- e If seeking admission into the M.B.A. program, scores from the Graduate Management Admission Test (formerly ATGSB)
- f A complete health record, submitted on an official Wright State University Medical History and Physical Examination Report

Readmission

A student or applicant who falls into one of these categories must reapply:

- 1 An applicant who has previously been admitted to the university but did not enroll for the quarter admitted (have file updated).
- 2 A graduate student at Wright State who was accepted for one degree program and wishes to apply for another program or degree.
- 3 A graduate student who has not registered for one academic year.

- 4 A graduate student who has completed the degree requirements for which he or she was originally admitted.

Registration

A student must be admitted to the School of Graduate Studies in order to register for and earn graduate credit.

Procedure for Initial Registration

Upon completion of the admission requirements and acceptance by the School of Graduate Studies, the student is mailed registration materials by the Office of Admissions.

The following are exceptions to this mailing:

- 1 Students admitted to the core program in the College of Education are advised in their admission letter that they must contact the director of graduate studies in education for an appointment to complete their registration.
- 2 Students admitted to the M.B.A. program in the College of Business and Administration are advised in their admission letter that they must contact the M.B.A. adviser for an appointment to complete a program of study. The registration forms may be completed subsequent to this advising session.

Registration must be completed by the date indicated in the quarterly schedule of classes. Fee statements and confirmation of registration will be mailed to the student and fees must be paid before the date scheduled.

Registration will not be accepted after the first week of the quarter unless the instructor, department chairman, and dean of the college approve the late registration during the second week. No registration will be accepted after the second week of the quarter. No student may be admitted to a class for which he or she is not properly registered.

Procedure for Subsequent Registration

Students who have registered for classes at Wright State University for any of the four preceding quarters will receive registration forms for the current quarter. Students who have not registered during the preceding year must reapply to the Office of Admissions to have their files updated.



Change in Courses

No change in registration is made until the drop and add form has been accepted by the Office of the Registrar and the fee for dropping or changing classes has been paid.

Course additions must be completed by the end of the first week of the quarter. There is no fee for adding courses, although instructional and general fees are charged when applicable.

Audit

A properly admitted student may audit a course with the approval of the course instructor. All audits must be clearly indicated on the registration form. Registration for audit cannot be changed to registration for credit after the first class meeting.

Change of Program

Students who wish to change from one degree program to another must have the approval of the departments concerned as well as the graduate office.

Program changes within the College of Education may be reviewed by submitting a change of program form available in the graduate studies office in the College of Education or the graduate school office. Approval may be granted by the director of graduate studies in education and the School of Graduate Studies.

Students admitted to the M.B.A. program in the College of Business and Administration who wish to change their programs may submit a change of program form to the director of the M.B.A. program. Approval is granted by both the College of Business and Administration and the School of Graduate Studies.

All other requests for change of program must be processed by completing an application for admission to the Office of Admissions. The application and supporting documentation will be forwarded to and reviewed by the department concerned. The Office of Admissions will notify the student of the admission decision.

Withdrawal from Courses

A student may drop a course or withdraw from the university without a grade up to the date specified in the university calendar. No record of these courses will appear on the student's transcript.

A student who stops attending a course and does not officially withdraw receives a grade of F or X for the course.

Continuing Registration

Students must be registered at the graduate level in the quarter in which they receive their degree. If a student has completed all of the course work for the degree, he or she may register for continuing registration.

A master's degree student must register for a minimum of one credit hour and a doctoral student for a minimum of two credit hours. It is the faculty adviser's responsibility to determine the number of credits appropriate to the student's use of the university facilities and services.

Any exception must be approved by the student's adviser, department chairman, and the dean of the School of Graduate Studies.

Courses in each department are reserved for continuing registration as 789 for master's degree candidates and 889 for doctoral candidates.

Grade Explanation

Academic achievement is indicated by the following letter grades and points used in calculating grade point averages.

- A Highest quality/4 points per credit hour
- B Second quality/3 points per credit hour
- C Third quality/2 points per credit hour
- D Lowest quality/1 point per credit hour
- F Failed/0 points
- X Failure to complete a course for which registered, without officially withdrawing/0 points

The following symbols appear on the record, but are not included in calculating grade point averages.

- L Audit; given only if arranged for at time of registration
- N No report; instructor did not report grade
- P Passing; given only for specifically approved courses
- S Satisfactory performance; final grade assigned upon completion of the project
- U Unsatisfactory performance
- I Incomplete; given only when part of required work is missing and arrangements have been made with instructor to complete it; grade should be removed within one quarter or it will remain on the record indefinitely. Only by exception may a grade be changed after one quarter
- T Attended; this grade is used only for honors courses; hours are not counted toward graduation

Grade reports are mailed as soon after the end of the quarter as possible.

Course Repeat

A graduate student may repeat once any course previously taken for credit in which the grade received was below a B.

Students must have the consent of the program adviser and have department and/or college approval that they should be continued in the program of study (prior to enrolling for the "repeat" course):

Only hours and grade points earned the last time the course is taken will be included in the computing of the grade point average and meeting degree requirements.

Whenever a course is repeated under these terms, the student must so specify at the time of registration.

This procedure is acceptable only twice in any given master's degree program.

Petition Procedure

A student who wishes to deviate from the normal graduate school regulations and procedures may submit a petition to the Graduate Petitions Committee.

Petition forms are available in the graduate office. The student should include all supporting documents and must have the recommendation of the adviser, the instructor (if applicable), and the appropriate department or college.

The Graduate Petitions Committee will consider the petition and the student will be advised of the committee's decision. Action taken on petitions will not be considered as a precedent for any future action.

Graduate Credit

Credit Hour Limits

The maximum number of hours that normally can be earned by a graduate student in a quarter is sixteen. In a summer term of five weeks, nine hours is a maximum.

Students holding appointments as graduate assistants must register for a minimum of six quarter hours during each quarter they hold the appointment.

A student who wishes to deviate from the normal registrations listed above must have the approval of the program adviser and the graduate school.

A graduate student who is employed full time should normally register for no more than two courses per quarter. This should be determined by the student and the faculty adviser based on such factors as: the student's employment and its effect on the student's energy and mental alertness; the student's previous academic record; and the nature of the course taken.

Retroactive Graduate Credit

Under the rules of the Graduate Council a student must be admitted to the School of Graduate Studies in order to receive graduate credit.

Students registered in the College of Continuing and Community Education may not receive graduate credit for work completed while in that status.



Graduate Credit for Undergraduates

A Wright State senior who does not need to register full time in order to complete the baccalaureate degree may be granted permission to take certain courses for graduate credit provided that:

- a the credit is not needed to complete the baccalaureate degree.
- b the student has completed 162 credit hours and has earned a cumulative grade point average of 3.0 or above.
- c approval is granted by the student's undergraduate adviser, the chairman of the department in which graduate credit is sought, and the graduate school.

Workshops and In-Service Courses

All students who have completed the graduate admission requirements may take workshop and in-service courses.

In addition, students granted special status are permitted to take workshop courses for graduate credit *without being admitted* to the School of Graduate Studies.

Workshop and in-service courses are assigned a 700-level class number by the Office of the Registrar and are so indicated in the schedule.

Transfer Credit

Upon the recommendation of the student's adviser and the approval of the concerned department/college and the graduate school, graduate credit completed at another graduate school may be transferred to the student's program at Wright State.

Credit may be transferred if the following conditions are met:

- a the student is in good standing at the other institution.
- b the grades in the courses to be transferred are B or better.
- c the credit is within the five-year time limit for completing a master's degree.

The student must have been registered for a minimum of one quarter in the School of Graduate Studies before transfer credit may be reviewed.

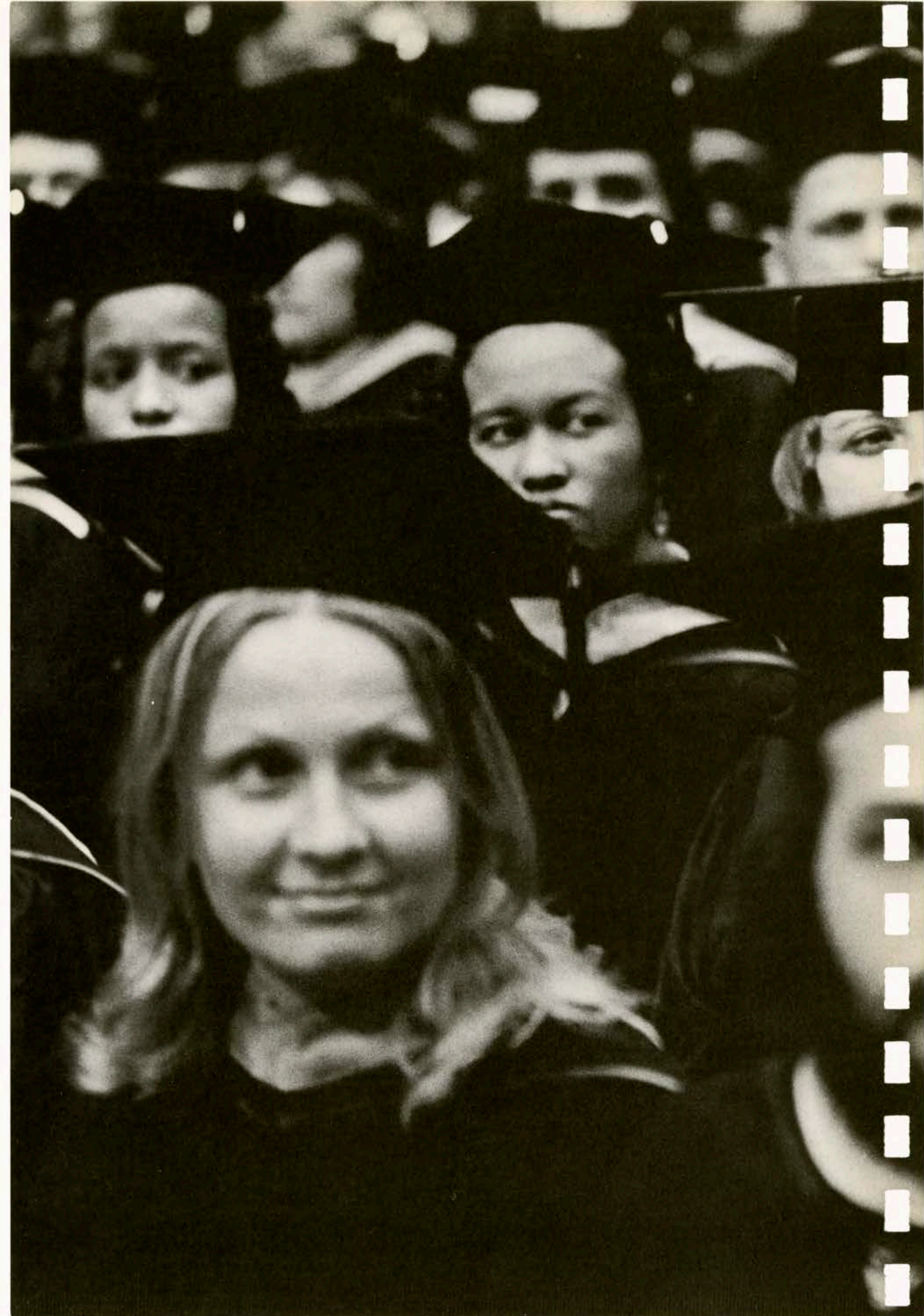
Credit by Examination

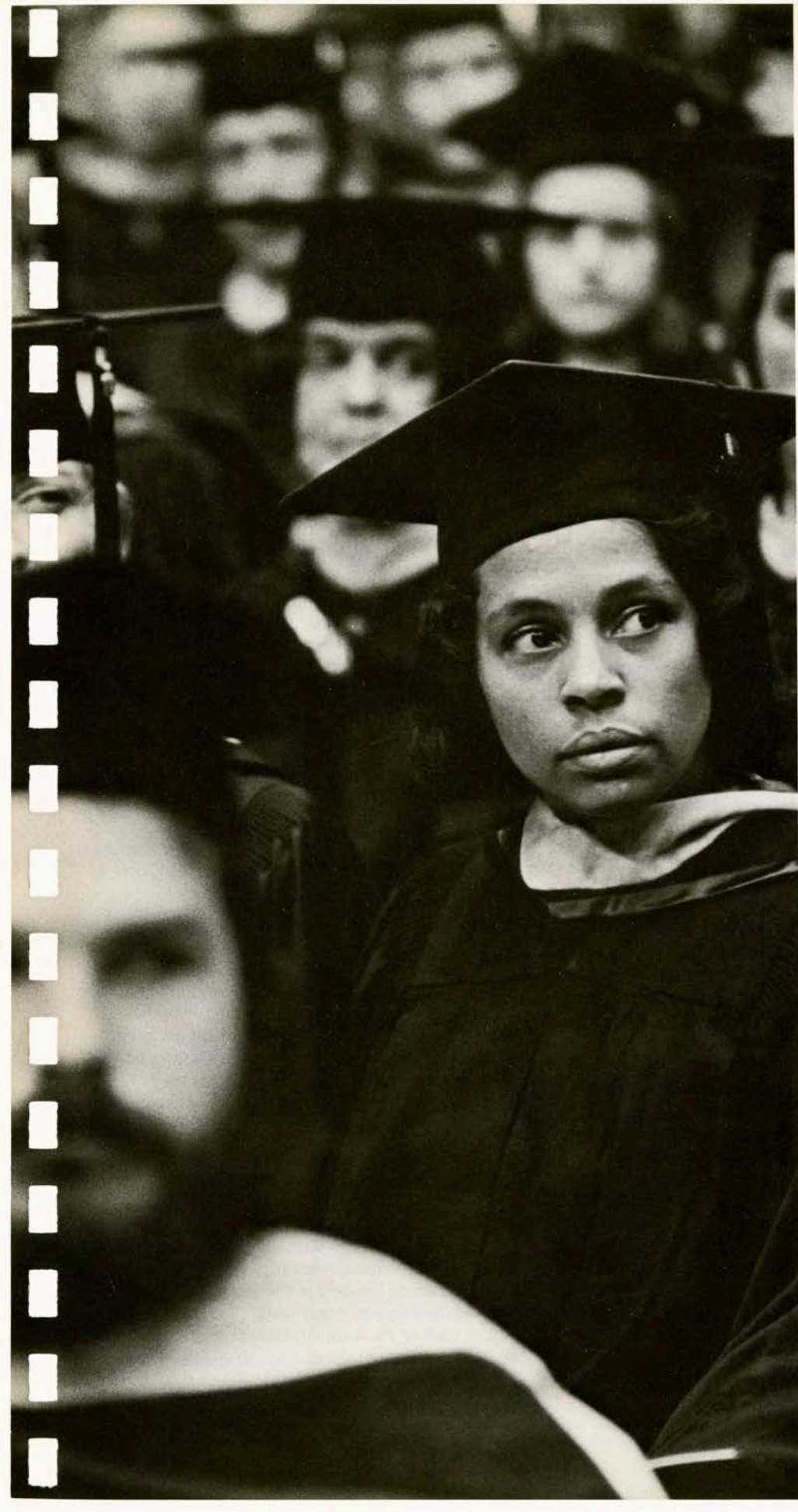
Graduate students may earn graduate credit in specific courses by demonstrating their ability on proficiency examinations administered by the respective departments.

Each student must obtain the approval of the program adviser and the department administering the examination.

Proficiency Examination Certification forms may be obtained from the registrar's office before taking the examination. Signatures of the examiner and the department chairman are required to indicate successful completion of the examination.

The completed form is presented to the bursar's office with a payment of \$5 per credit hour. The bursar will forward the form to the registrar for posting to the student's permanent record.





The Master's Degree

Program of Study

The program of study is a defined program which is contracted for between the student and the institution. The institution specifically indicates that it will award the degree sought by the student if the work contracted is completed. Similarly, students specifically agree to their responsibility for completing the program.

Completion of the Program of Study form for a graduate degree requires careful planning between the student and the major adviser. The first thing a student should do is spell out as completely as possible precisely what his or her professional goals are.

The next step is to complete the program portion of the form. The main point here is the joint planning of a program by the student and the adviser, followed by the approval of that program by appropriate university groups.

In planning a program, students should provide adequate time in seminar and individual study to permit them to pursue their own problems and to develop independence of thought and method.

The program of study is subject to modification as the student progresses, but all changes must have the adviser's approval.

The student should secure the program of study worksheet in the graduate office or from the adviser. The deadline for submitting the form is midterm of the second quarter of registration.

It is hoped that the student will regard the program of study as an assistance in meeting the standards and aims of graduate work. Clear charting of a degree program is especially important to students who spread their graduate work over a period of more than two years.

Advising

When students with a degree objective are admitted to graduate studies, they are assigned departmental advisers who counsel them regarding their objectives. The full degree program should be formulated with the major adviser and approved by the advisory committee and the dean of the School of Graduate Studies. Students obtain constant guidance from their advisers, examining or thesis committees, and major departments.

Credit Hour Requirement

All master's degree programs at the university require forty-five or more quarter hours of graduate course work. A department may require more than forty-five hours. Please consult requirements for a specific degree and major area.

A student must be registered for at least one hour of graduate credit during the quarter in which the degree is to be awarded.

Listed here are the fields of graduate study in which degrees are offered at Wright State University.

Master of Arts

Applied Behavioral Science, Classroom Teacher, Counseling and Guidance, Curriculum and Supervision, English, History, Personnel Counseling, School Administration

Master of Business Administration

Accountancy, Finance, Financial Administration, Management, Marketing

Master of Education

Classroom Teacher, Counseling and Guidance, Curriculum and Supervision, School Administration

Master of Music

Music Education

Master of Rehabilitation Counseling

Master of Science

Biological Sciences, Chemistry, Computer Science, Geology, Mathematics, Personnel Counseling, Physics, Social and Applied Economics, Systems Engineering

Master of Science in Teaching

Earth Science, Physics

General Requirements

A student's program of study is administered by the department or college and is subject to approval by the School of Graduate Studies. Since program requirements vary by department/college, it is important for the student to become acquainted with the specific requirements of the department/college as he or she must satisfy them as well as university requirements. The following description covers the graduate school requirements and will serve as a general guide.

Residence Requirements

A student is considered to be in residence whenever he or she is registered on campus as a graduate student. A minimum residence of three quarters at Wright State University, devoted wholly or partly to graduate work, is required. In addition, a minimum of thirty-three quarter hours toward the master's degree must be completed at Wright State.

Retroactive Graduate Credit

Under the rules of the Graduate Council a student must be admitted to the School of Graduate Studies in order to receive graduate credit.

Therefore, students temporarily registered in the College of Continuing and Community Education should not expect that credit earned before admission to the School of Graduate Studies will be counted at a later date toward a graduate degree. Graduate credit cannot be given for courses completed in order to qualify a student for admission to graduate standing.

Language Requirement

A candidate for the master's degree may be required to demonstrate a reading knowledge of a modern foreign language.

This requirement may be met either by examination or by college credit. The student should consult the individual department for its requirement.

Grade Standards

All students in graduate study programs are expected to maintain a minimum grade point average of 3.0. The grade of C is the minimum passing grade for graduate credit. However no more than nine quarter hours of C may be applied toward a master's degree. The attaining of a large proportion of C grades, even when balanced by A's, can be considered by the faculty as unsatisfactory course work. A course taken for graduate credit in which a D is received may not be used to meet the minimum hour requirements for a graduate degree.

An average of 3.0 is required for graduation in any graduate degree program. It should be emphasized that the successful completion of a required number of courses is not sufficient, of itself, to earn a master's degree. A student must also receive the recommendation of the departmental faculty after an evaluation based upon total performance.

Student Evaluation

At the completion of one year of graduate work or twenty-four quarter hours, whichever comes first, each student will be evaluated by the departmental faculty. This evaluation will be based upon performance in courses, research, and seminars and will be forwarded to the graduate dean. On the basis of this evaluation, a student will be: (1) recommended for continuance in the graduate program; (2) placed on probationary status; or (3) required to discontinue graduate study at this university.

Probationary Status

A student placed on probation after the department evaluation will be required to change this status by achieving a cumulative grade point average of 3.0 within the completion of the next twelve quarter hours of credit work. If a portion of these credits are in research for the thesis requirement, the student's major department must certify the student's eligibility to continue studies at the university.

Thesis

Certain programs specify the presentation of a thesis as a requirement for the master's degree. Students completing this requirement should secure a copy of *A Handbook for Graduate Theses and Dissertations*, published by the School of Graduate Studies and available in the graduate office. The requirements outlined in this manual are basic minimal criteria which have been approved by the Graduate Council for preparing the thesis. Students should seek the advice of their thesis directors and departments for further details.

The topic of the thesis should come from the student's personal exploration in his or her major or minor field. The formal petition for approval of the thesis topic must clearly set forth the problem, the intended organization, and the methods of development of the thesis. The thesis topic must be approved by the student's adviser and committee.

A student working on the approved topic for the master's thesis is required to register for a course 799 or 899 as designated by the department.

Two unbound copies of the thesis in prescribed form are to be taken to the graduate office at least two weeks before the degree is to be granted. The first copy of the thesis is considered an archival copy and is eventually deposited in the university's closed stacks in the library. The second copy is made available for circulation in the library. Since some departments require additional copies, students should consult their advisers to determine the total number of copies needed.

Final Examinations

Some departments require a final comprehensive examination to test the candidate's mastery of the course of study pursued. It may be written or oral, or both, at the option of the examining committee.

Candidates for a degree requiring a thesis have written and/or oral examinations conducted by the major committee subsequent to the submission and approval of the thesis.

Arrangements for taking the examinations should be made with the candidate's adviser and the department at least three weeks in advance.

Time Limit

A student must complete all requirements for a master's degree within five years. The time limit is from the beginning date of the earliest course of the last forty-five hours applied toward the degree. This time does not include a leave of absence granted for adequate cause.

Graduate students who fail to take courses or otherwise to pursue their graduate education for a period of two years will be automatically retired from the active files of the School of Graduate Studies. Reapplication for admission will be required for reactivation of the student's records.

Second Master's Degree

A minimum of thirty-three quarter hours must be completed at Wright State. Additional credit earned for the first degree may be applied toward a second master's degree provided the work is not more than five years old.

Application for Degree

The university has established the following filing periods for submitting applications for degrees: If the anticipated completion date is December, the filing period is from September 1 to October 1; for an anticipated completion date of March, the filing period is from December 1 to January 15; for an anticipated completion date of June, the filing period is from February 1 to March 1; for an anticipated completion date of August, the filing period is from March 1 to April 1 if the student intends to participate in the June commencement; otherwise the filing deadline is June 1. If the degree requirements are not completed at the time specified, another application, which will replace any previously submitted, must be filed.

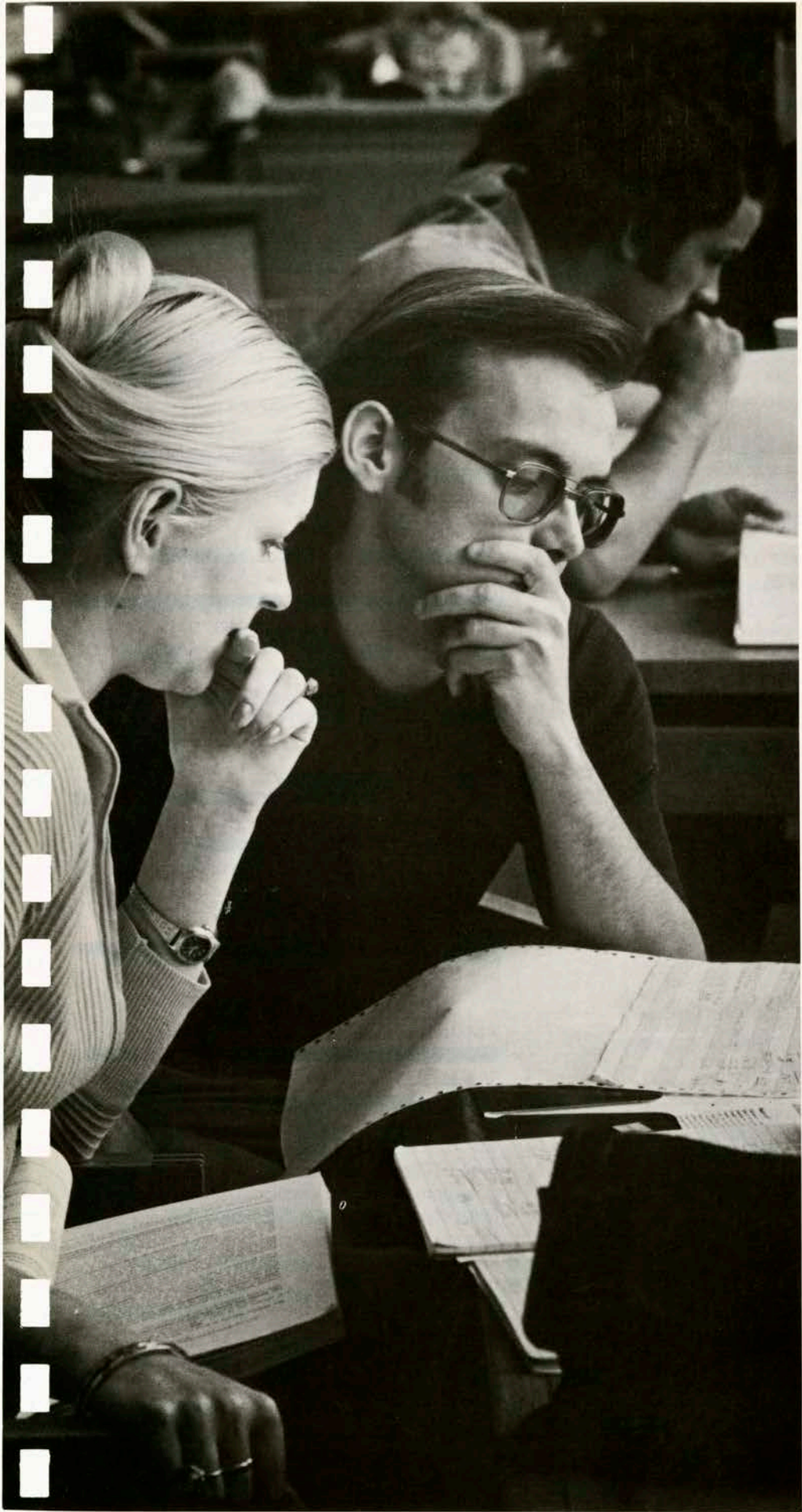
Individuals completing their degree requirements in June will receive their diplomas at the June commencement. Those completing their degree requirements at other periods will have their diplomas mailed to them.

Summary of Requirements for the Master's Degree

Listed below is a summary of the requirements graduate students must complete to earn a master's degree at Wright State University.

- 1 Completed Program of Study form on file in the Office of Graduate Studies.
- 2 Completion of the requirements for the graduate degree within five calendar years.
- 3 Achievement of a cumulative grade point-hour ratio of at least a 3.0 in all courses taken for graduate credit. (No more than nine hours of C are acceptable.)
- 4 Registration during the quarter in which the degree is conferred.
- 5 Successful completion of final comprehensive examination (if required in program).
- 6 Presentation of two copies of an approved thesis (if required in program).

Individual departments/colleges have requirements which must be met in addition to the general requirements set forth above. Please consult the appropriate section for specific requirements.



Graduate Programs

The graduate programs at Wright State University provide advanced professional training in the area of a student's field of specialization and afford opportunities to conduct research and special investigations. The program of graduate study should become an initiation into methods of intensive study and research in some selected area of knowledge. It is the objective of the School of Graduate Studies to provide its students with a high degree of professional competence.

Graduate programs offered by Wright State University and the degrees which may be earned are listed below. Concentrations offered are listed under each program.

Applied Behavioral Science/M.A.

Biology/M.S.

Business Administration/M.B.A.

Accountancy, Finance, Financial Administration, Management, Marketing, Quantitative Business Analysis

Chemistry/M.S.

Classroom Teacher/M.A., M.Ed.

Art Education, Business Education, Elementary Education, Reading Specialist, Secondary Education, Special Education

Computer Science/M.S.

Counseling and Guidance/M.A., M.Ed.

School Counseling, Visiting Teacher, School Psychology

Curriculum and Supervision/M.A., M.Ed.

Elementary School Supervisor, Middle School Supervisor, Secondary School Supervisor, Special Education Supervisor, Teacher Leader, Central Office

Earth Science/M.S.T.

Economics/M.S.

English/M.A.

Geology/M.S.

History/M.A.

Mathematics/M.S.

Music Education/M.Mus.

Personnel Counseling/M.A., M.S.

Mental Health, Rehabilitation Counseling, Business and Industrial

Physics/M.S., M.S.T.

Rehabilitation Counseling/M.R.C.

School Administration/M.A., M.Ed.

Elementary Principalship, Middle School Principalship, Secondary Principalship, Educational Specialist (Pupil Personnel, Special Education, Instructional Services, Research)

Systems Engineering/M.S.

Course Numbering System

500-599 Courses that carry graduate credit only in a major field different from that of the department offering the course. Most such courses will be alternate designations of courses normally numbered 300-499.

600-699 Courses that carry graduate credit in any major field, and that have alternate designations in which the first digit is a 3 or 4 when taken for undergraduate credit.

700-799 Courses intended for graduate credit only. (Unclassified students may, with the approval of the department offering the course, register for undergraduate credit in courses numbered 700-799.)

The number following the hyphen in each course number indicates the number of credit hours per quarter for that course.

Abbreviations Used in Course Listings and Program Descriptions

Departmental and divisional designations for courses are abbreviated throughout this catalog. The proper abbreviations appear at the head of each list of courses in this and the following chapters, as well as in the index.

Fields of Graduate Study

Detailed descriptions of the fields of study in which Wright State University offers course work leading to the master's degree follow in alphabetical order.

Accountancy

See Business Administration.

Applied Behavioral Science

The Applied Behavioral Science program is a training program in social and evaluation research leading to a Master of Arts degree. Program faculty are multidisciplinary in training and research. The program prepares graduates to participate in the development, implementation, and evaluation of institutional programs in five program area specializations. The program area specializations are community mental health; public policy and organizational analysis; role transitions; deviance and corrections; and training and motivating skilled performance.

Participating Faculty

Professors Barry Blackwell, community health; George H. Crampton, skilled performance; Lawrence J. Cross, the family, society, technology; A.K.M. Aminul Islam, social anthropology; Matthew Melko, social change, social conflict, comparative sociology; Warner Wilson, interpersonal relations skills training, delinquency

Associate Professors Robert W. Adams, American political parties, interest groups, public opinion; Jeanne H. Ballantine, relations in complex organizations, role transitions; Patrick E. Campbell, skilled performance, behavior modification; Leonard Cargan, intergroup relations; Herbert A. Colle, evaluation research, human factors; Helen A. Klein, developmental processes; Myrtle Korenbaum, occupational role transitions; Martin Moss, community mental health, behavior therapy; Richard Page, environmental psychology, prejudice, discrimination; Jerald Savells, social deviance, the family

Assistant Professors Joseph Balloun, program, community, and industrial systems evaluation; Bela J. Bogner, social gerontology, community mental health; Harry N. Davis, drug use, human sexuality; Charles Funderburk, research design and methodology; Thomas Koebernick, organizational networks; Perry Moore, public administration, organizational change; Ellen Murray, penology, correctional reform; Justin Schulz, community program planning, evaluation research; Paul Shaw, policy analysis, social planning; Harvey Siegal, community human service delivery, social problems; Ronald M. Sirkin, statistics and methodology; Anne Stericker, community mental health services, sex roles; Richard Vestewig, large data bank analysis, evaluation research; Frank Ward, human visual perception, scaling of geographic space

Admission to the Program

The minimum entrance requirement is a bachelor's degree, preferably in political science, psychology, sociology, or a related field. A background in statistics and research design is highly desirable. A deficiency will require remedial work prior to final acceptance. Work experience in an applied behavior or social research setting is desirable but not necessary.

A prospective student must submit official transcripts from undergraduate institutions and Graduate Record Examination scores (verbal and mathematics portions). Three letters of recommendation are necessary, with at least one from a previous university instructor.

Finally, each prospective student is asked to submit an essay (300 words maximum) describing his or her professional goals and/or current academic interests as they relate to the applied behavioral science (ABS) program.

Deadline for applications is May 15. Students applying for financial aid should submit applications by March 15.

Basic Degree Requirements

Entering students receive basic interdisciplinary training by completing the core courses. These include a foundation in social and applied change research as well as rigorous background in the statistical and methodological bases for planning and evaluating applied behavioral programs. Following the core courses, each student engages in an individualized course of study in one of the five problem area specializations. Each of these areas consists of selected courses and seminars planned jointly by the student and his or her adviser. The third part of the training, the practicum, consists of supervised observation and participation in an organization dealing with applied behavioral problems. The fourth part of the training is the thesis. The thesis research is to be a program design, program implementation and program evaluation project in an area appropriate to the program area specialization.

The Program

<i>Required core courses</i>	23
ABS 701, 702, 703, 721, 722, 731	
<i>Specialization courses and seminars</i>	22
Planned by student and advisory committee	
<i>Practicum</i> ABS 779	15
<i>Thesis</i> ABS 799	15
<i>Total</i>	75

Graduate Courses

Applied Behavioral Science/ABS

For additional specialization courses, see the additional course listings for political science, psychology, and sociology/social work.

- 701-4 *Intrapersonal Bases of Behavior and Strategies for Change* Emphasis on the psychological determinants of behavior and those techniques of behavior change in which the key independent variables are psychological in nature.
- 702-4 *Interpersonal Bases of Behavior and Strategies for Change* Emphasis on the social structural determinants of behavior and those techniques of behavior change in which the key independent variables are social in nature.
- 703-4 *Institutional Bases of Behavior and Strategies for Change* Emphasis on the institutional (educational, political, economic) determinants of behavior and those techniques of behavior change in which the key independent variables are properties of the institutional setting in which the target behavior is located.

- 721-4 *Evaluative Research Methods: Experimental Design* Emphasis on experimental designs and those inferential and descriptive statistics appropriate for the analysis and interpretation of data generated by such designs. Use of computer technology for data storage, retrieval, and analysis.
- 722-4 *Evaluative Research Methods: Nonexperimental Design* Emphasis on nonexperimental and quasi-experimental designs and those inferential statistics appropriate for the analysis and interpretation of data generated by such designs.
- 731-3 *Seminar for Problem Assessment and Planned Change* Emphasis on the case study method of instruction. An interdisciplinary faculty will demonstrate the relevance of concepts drawn from their various disciplines to specific problem cases and will attempt a synthetic solution to the problem. Students will get experience in working through assigned cases in a similar fashion. The object is to encourage integration of the content of prior core courses.
- 779-2 to 6 *Practicum in Applied Behavioral Science* On-site participation of students in selected behavioral science projects. Jointly supervised by faculty and on-site personnel. Completion of core and permission of instructor required for enrollment. May be repeated to a total of fifteen credit hours.
- 789-1 to 4 *Graduate Seminar in Applied Behavioral Science* In-depth coverage of special topics in applied behavioral science. Consult quarterly class schedule for topics and sections. Permission of instructor required. May be repeated to a total of fifteen credit hours.
- 799-2 to 6 *Graduate Thesis Research* Research for the master's degree thesis. Consent of instructor required. May be repeated to a total of fifteen credit hours.

Art Education

See Education.

Biology

The program leading to the Master of Science degree is designed to give the student a solid foundation in modern interdisciplinary biology in preparation for further professional training or careers in research or teaching.

Areas of concentration available through the Department of Biological Sciences include cell, molecular, organismic, and environmental biology.

Concentration areas in gross anatomy, developmental anatomy, neuroanatomy, microanatomy, and ultrastructure are available through the Department of Anatomy; nucleic acid, protein, lipid and carbohydrate biochemistry, regulatory mechanisms, membranes, drug metabolism, and nutrition through the Department of Biological Chemistry; microbial physiology, immunology, and virology through the Department of Microbiology and Immunology; and cardiological, circulatory, digestive, endocrinological, respiratory, renal, and exercise physiology through the Department of Physiology. Students interested in a particular concentration area should make their preference known to the appropriate department as early as possible to insure proper advising.

Seminars concentrate on biological specialties. In order to provide flexibility and an interdisciplinary approach, specific prerequisites for many graduate courses are not listed. However, areas of prior training are recommended for the student in order to obtain maximum benefits. In addition, the Departments of Chemistry, Engineering, Geology, Mathematics, Physics, and Psychology currently offer courses that support the biology program. A graduate student in biology, therefore, will receive exposure to subjects in the field of specialization, to related biological fields, and to supporting disciplines outside the department.

A student pursuing an M.S. degree in biology must submit and orally defend a thesis based upon original research performed while enrolled as a graduate student at the university. Under unusual circumstances, the student may be permitted to substitute, for the research thesis, one of these two options: Option A, a thesis based on a critical review of topic; or Option B, a research proposal concerning the life sciences. Options A or B can be chosen only with prior approval, as defined under the requirements for the Master of Science degree. The student is required to obtain a major adviser and an advisory committee.

The advisory committee will help formulate a study program, provide counseling, and evaluate student progress. If a student is uncertain of a major field of interest, a departmental graduate committee, through an assigned adviser, will function in place of an advisory committee until the student selects and is accepted by a professor.

The Graduate Faculty

Anatomy

Professors Joseph Zambarnard, ultrastructure, histochemistry, cell biology and virology, dynamics of cellular transformation by oncogenic viruses; Antonio Zappala (chairman), surgical anatomy, electromyography, clinical anatomy
Associate Professors Frank Nagy, ultrastructure, cell division, kinetics, male reproductive system, embryology; Creighton H. Phelps, neurocytology, ultrastructure, comparative neuroanatomy
Assistant Professors Andrew J. Kuntzman, micromorphology of adrenal gland and kidney; Jane Scott, embryology and reproductive system

Biological Chemistry

Professors Prem P. Batra, regulation and biosynthesis of isoprenes, biosynthesis of nucleic acids, photobiology; Emil Kmetec, mammalian biochemistry, nucleic acids, membranes; Robert A. Weisman (chairman), cellular differentiation
Associate Professor H. Ira Fritz, embryo nutrition, experimental teratology
Assistant Professors John Nduaguba, steroid hormones, clinical chemistry, circadian rhythms; Daniel T. Organisciak, visual biochemistry, membrane metabolism, neuronal lipid metabolism; George R. Peterson, drugs of abuse—tolerance, physical dependence, and metabolism; J. Donald Smith, lipid and membrane biochemistry

Biological Sciences

Professors George T. Dimopoulos (chairman), infectious anemias, vaccine development, immunology; Shigeru I. Honda, plant organelles, structure, and function; Jerry H. Hubschman, invertebrate physiology, invertebrate development; Brian L. Hutchings, microbial transport, microbial biochemistry, biochemistry of membranes
Associate Professors Larry G. Arlian, physiological ecology of terrestrial arthropods, parasitology; Clyde D. Barbour, ecology and systematics of fishes; George J. Kantor, biophysics, molecular genetics; Adrian V. Rake, molecular memory, molecular genetics; John Rossmiller, metabolic control processes, amino acid metabolism; Marvin B. Seiger, behavioral genetics, ecological genetics; Timothy S. Wood, aquatic ecology, invertebrate zoology
Assistant Professors James P. Amon, environmental health; William S. Brewer, environmental biology, microbiology; Peter H. Calcott, biochemistry, genetics, microbiology; Wayne W. Carmichael, aquatic biology, toxicology; Richard J. Jensen, plant systematics, numerical taxonomy of American oaks; Harold W. Keller, mycology, systematics of myxomycetes, medical parasitology; Mark J. Scriber, ecology, entomology

Microbiology and Immunology

Professors Nancy Bigley (chairman), immunology; J. Robert Suriano, virology
Associate Professors Charles McFarland, microbial physiology; L. Howard Moss III, virology
Assistant Professor Randall A. Smith, immunology

Physiology

Professors Samuel N. Kolmen (chairman), microcirculatory dynamics, host-defense interactions; Ronald L. Wiley, zoology
Associate Professors Roger M. Glaser, exercise physiology; Noel Nussbaum, endocrinology, electron microscopy; Thomas J. Sernka, gastrointestinal physiology
Adjunct Associate Professor P. K. Bajpai, reproductive physiology
Assistant Professors Harry Davis, neurophysiology; Mary Anne Frey, cardiovascular physiology; Robert Gotshall, renal physiology; Chandler Phillips, biomedical engineering, cardiovascular physiology; Alan Tucker, pulmonary physiology

Facilities

The life science departments are housed in modern air-conditioned buildings, well equipped with the newest research instruments. The departments maintain classrooms and research laboratories for over 150 upper division and graduate students. Excellent ancillary facilities include specialized instrument rooms, cold rooms, constant temperature rooms, animal rooms, a media preparation room, a greenhouse, a radioisotope laboratory, and an electron microscopy center, including complete darkroom capability. The Brehm Laboratory houses laboratories and classrooms for the study of environmental biology. Construction of two biological sciences buildings was completed in 1975. The buildings contain approximately 100,000 square feet and house facilities of the biological and health sciences departments.

Major items of available research equipment include: liquid scintillation, gas flow, and well-type scintillation counters, infra-red, ultra-violet, and visible light spectrophotometers; preparative ultracentrifuge; nuclear magnetic resonance spectrometer; mass spectrometer; X-ray diffraction apparatus; polarizing, phase-contrast, and fluorescence photomicroscopes; and an electron microscope.

The departments also have excellent working relationships with other departments on campus,

with the scientific complex of the Wright-Patterson Air Force Base, with the Charles F. Kettering Research Laboratory in nearby Yellow Springs, and with the Cox Heart Institute at the Kettering Medical Center which is affiliated with the Wright State School of Medicine.

Graduate Program

Students who expect to graduate with a bachelor's degree in biology, botany, zoology, physiology, microbiology, ecology, or biological chemistry, and expect an overall undergraduate grade point average of 3.0 or better on a 4.0 grading scale, are encouraged to apply. Applicants who rank below this level may be considered on the basis of performance in the Graduate Record Examination advanced test in biology, letters of recommendation and, if possible, a personal interview. Training in calculus, physics, and organic chemistry is strongly advised.

Requirements for the Master of Science Degree

Students who are candidates for the Master of Science degree in biology must meet all of the following requirements:

- 1 The candidate must complete a minimum of forty-five quarter credits. At least thirty quarter credits will be at the 700-800 level in biology and related areas. A maximum of ten quarter credits of graduate courses may be transferred from other institutions. The candidate will participate in the graduate seminars for at least four hours of credit.
- 2 The candidate must register for three consecutive quarters in the final academic year.
- 3 The candidate must maintain a 3.0 cumulative average with no more than nine hours of C grades applicable to the degree.
- 4 The candidate must submit and orally defend a thesis based upon original research performed while enrolled as a graduate student at the university. Under unusual circumstances the student may be permitted to substitute for the research thesis one of these two options: Option A, a thesis based on a critical review of a topic; or Option B, a research proposal concerning the life sciences. To elect one of these options, the student must have a petition signed and approved by a member of the graduate faculty who will serve as the thesis adviser, the department chairman, and the Graduate Studies Committee for the Life Sciences.
- 5 The candidate must satisfy the recommendations for language proficiency made by his or her advisory committee.

Financial Support

Several forms of financial assistance are available to qualified students. A number of teaching assistantships are awarded each year. These involve a commitment to a combination of laboratory and classroom instruction. Each appointment is for three quarters. The fourth quarter is then available for full-time study and research. A limited number of research assistantships involving duty on sponsored research projects are also available. Applicants must arrange to send at least two letters of recommendation to the department as part of their application. Students holding an appointment must maintain full-time status during each quarter and register for BIO 700.

Graduate Courses

Anatomy/ANT

- 699-1 to 4 *Special Problems in Anatomy* Consent of department required. A maximum of 4 credits is applicable toward degree requirements.
- 701-1 to 5 *Selected Topics in Anatomy* A course on a selected topic in anatomy. Consent of the department required.
- 711-4 *Anatomy of the Limbs* Lectures and human cadaver dissection of the upper and lower limb. Consent of the department required.
- 712-6 *Anatomy of the Thorax, Abdomen, and Pelvis* Lectures and human cadaver dissection of the thorax, abdomen, and pelvis. Prerequisite: ANT 711 or consent of department.
- 713-4 *Anatomy of the Head and Neck* Lectures and human cadaver dissection of the head and neck. Prerequisite: ANT 711 and 712 or consent of department.
- 721-3 *Human Microanatomy* Detailed microanatomy of human cells and tissues. Consent of department required.
- 722-4 *Human Microanatomy* Detailed microanatomy of human organ systems. Prerequisite: ANT 721 or consent of department.
- 731-6 *Human Neurobiology* A detailed survey of the anatomy and physiology of the major fiber tracts and cell groups of the human central nervous system. Consent of instructor required.
- 732-3 *Cellular Neurobiology* The correlated ultrastructure, chemistry, and physiology of vertebrate neurons, neuroglia, and synapses under normal conditions and during development, degeneration, and regeneration. Consent of instructor required.
- 800-1 *Graduate Seminar* Consult quarterly class schedule for sections and topics.
- 899-2 to 18 *Graduate Research* Supervised thesis research.
- 900-1 *Graduate Seminar* Consult quarterly class schedule for sections and topics.

Biological Chemistry/BCH

- 621-4.5 *Biochemistry I* Chemistry of biological compounds and introduction to enzymes. Prerequisite: organic chemistry or consent of instructor.
- 622-3 *Laboratory for Biochemistry I* Quantitative techniques in biochemistry; chemical and instrumental methodology. 1 lab., 1 rec. Corequisite: BCH 621 (may be taken separately with consent of instructor).
- 623-4.5 *Biochemistry II* Intermediary metabolism of carbohydrates, proteins, nucleic acids, and lipids. 2 lects. Prerequisite: BCH 621.
- 624-3 *Laboratory for Biochemistry II* Properties of enzymes, enzyme catalyzed reactions, and application of isotopes to the study of metabolism. 1 lab., 1 rec. Corequisite: BCH 623 (may be taken separately with consent of instructor).
- 632-3 *Plant Biochemistry* Detailed study of the biochemistry of photosynthesis, respiration, and other metabolic and biosynthetic processes in plants. (Also listed as BIO 632.) Prerequisite: BCH 621, 623, or consent of instructor.
- 633-2 *Laboratory in Plant Biochemistry* Also listed as BIO 633. Experiments designed to follow subject matter of BCH 632. 1 lab. Corequisite: BCH 632 or consent of instructor.
- 699-1 to 4 *Special Problems in Biological Chemistry* Consent of the department required. Maximum of four credits is applicable toward the degree.
- 701-1 to 5 *Selected Topics in Biological Chemistry* Consent of the department required.
- 727-3 *Enzymes* Current concepts of the mechanism of enzyme catalysis, to include such topics as structure, kinetics, energetics, allosterism, coenzymes, and control of enzymes and multienzyme systems. 2 lects. Recommended preparation: BCH 621, 623, and physical chemistry, or consent of instructor.
- 728-3 *Photobiology* Also listed as BIO 728. Selected topics in photobiology, 2 lects. Recommended preparation: BCH 621, 623, or consent of instructor.
- 737-4 *Biochemical Instrumentation* Theory and use of techniques and instruments in biology. Topics include spectroscopy, ultracentrifugation, chromatography, and electrophoresis. 1 lect., 2 lab. Recommended preparation: BCH 621, 623, and physical chemistry, or consent of instructor.
- 743-4.5 *Radioisotope Principles* Also listed as BIO 743. Principles of α , β , and γ radiation and methodology of counting, with application of tracers to physical and biological problems. 2 lects., 1 lab. Recommended preparation; physical chemistry or consent of instructor.
- 771-3 *Protein and Vitamin Nutrition* Examination of the utilization and function of proteins, amino acids, and vitamins in the nutrition of the organism. Although some reference will be made to microbial systems, emphasis will be given to these processes as they occur in birds and mammals. 2 lects. Recommended preparation: BCH 621, 623, or consent of instructor.
- 800-1 *Graduate Seminar* Consult quarterly class schedule for topics.
- 826-4 to 5 *Heritable Metabolic Diseases in Man* Biochemical mechanisms of inherited diseases and organ metabolism to genetic change and to physiological responses in man. Students who wish to complete a special research project should register for five credits. Recommended preparation: biochemistry and physiology or equivalent.
- 845-3 *Biochemistry of Natural Products* Also listed as BIO 845. Development of natural products as antibacterial and antifungal agents with emphasis on mode of action and biosynthesis. Their role in chemotherapy of infectious diseases and in the elucidation of basic biochemical reactions will be stressed. Recommended preparation: BCH 621-624, or equivalent.
- 900-1 *Graduate Seminar* Consult quarterly class schedule for sections and topics.

Biological Sciences/BIO

- 611-6 *The Aquatic Environment* A field and laboratory course concerned with the physical, chemical, and biological factors that determine biological productivity in natural waters. Recommended preparation: BIO 316 or equivalent or consent of instructor.
- 612-6 *Aquatic Communities* An analysis of the functional relationships of organisms with the aquatic environment with special emphasis on species interactions. 2 lect., 2 lab., with field trips. Recommended preparation: BIO 316 or equivalent.
- 613-5 *Biological Problems of Water Pollution* An introduction to the biological aspects of water pollution. Lectures, discussions, laboratories, and field trips will cover the various types of pollutants and their impact on aquatic life. 2 lect., 2 lab., with required field trips. Recommended preparation: BIO 411 or consent of instructor.

- 614-5 *Terrestrial Communities* The organization, diversity, distribution, and abundance of animals in plant communities, with particular regard to terrestrial insect-plant relationships. Laboratories and field trip will acquaint students with various techniques used for ecological studies of population and community dynamics in natural environments. A special travel fee may be applicable.
- 617-3 *Evolution* (Taught jointly with the Department of Religion: see REL 617.) An introduction to the biological, philosophical, theological, and ethical aspects of the concept of evolution. Prerequisite: consent of instructor.
- 625-5 *Microbial Ecology* Microbes in soil, water, and air. Experiments on mineral cycles, physical and biological limiting factors and symbiosis. Natural communities of microbes and microbes of man's special environments. Includes field studies. Recommended preparation: BIO 202, CHM 141, 211.
- 628-3 *Biology of Slime Molds* The biology of the slime molds will include primarily the Protosteliales, Acrasiales, and Myxomycetes. For each group the life cycle, the ultrastructure and gross morphology of developmental stages, and the natural relationships and taxonomy will be discussed and demonstrated. The course is designed primarily for biology majors and graduate students who may wish to use these organisms in future classroom teaching or as research subjects.
- 630-3 *Radiation Biology* An introductory study of the nature of ionizing radiation, its biological effects, and its applications to biological problems. Prerequisite: BIO 214, CHM 213, MTH 131, PHY 113, or consent of instructor.
- 632-3 *Plant Biochemistry* A detailed study of the biochemistry of photosynthesis, respiration, and other metabolic and biosynthetic processes in plants. Recommended preparation: BIO 621 and 623 or consent of instructor.
- 633-2 *Laboratory for Plant Biochemistry* Experiments will be designed to follow the subject matter sequence of BIO 632. 1 lab. Corequisite: BIO 632 or consent of instructor.
- 652-3 *Advanced Genetics* A study of basic concepts of genetic control of form, function, and change in biological systems with emphasis on microbial, developmental, and biochemical genetics. 2 lect. Prerequisite: BIO 212, 310, or consent of instructor.
- 653-3 *Advanced Genetics Laboratory* A laboratory course designed to illustrate some aspects of microbial, biochemical, and radiation genetics and systematics. 2 lab. Prerequisite: BIO 652 or concurrent registration.
- 655-3 *Plant Systematics* A survey of topics and techniques encountered in studies of the relationship and evolution of the higher plants, emphasizing the flowering plants. Prerequisite: BIO 204 and senior standing or consent of instructor.
- 660-3 *Population Genetics* A consideration of the principles controlling the genetic constitution of population and species. Prerequisite: introductory genetics.
- 665-3 *Ecological Genetics* The experimental study of evolution and adaptation which has been carried out by means of combined field work and laboratory genetics. The student is assumed to have a basic knowledge of genetics and ecology. Prerequisite: BIO 302, 306.
- 670-3 *General Entomology* A basic study of the morphology, physiology, habits, and classification of insects. Course content is designed to be useful in preparation of high school biology teachers as well as professional students. 3 lect. Prerequisite: consent of instructor.
- 671-2 *General Entomology Laboratory* An introduction to the morphology, physiology, and identification of insects. Student collection and field trips required. 2 lab (2 hrs. each).
- 673-1 *Marine Field Trip* A week-long field trip to selected coastal locations. A variety of habitats will be visited and organisms collected in their natural environment. Recommended preparation: BIO 672 or equivalent and permission of instructor. A special fee is applicable. This course may be repeated.



- 674-6 *Ecological Physiology of Aquatic Animals* A study of the physical and chemical adjustment, tolerance, and acclimation of organisms to the aquatic habitat. 1 lect., 3 lab. Recommended preparation: BIO 312 and 411 or equivalent.
- 676-2 *Human Parasitology* A study of the medical aspects of parasitology, such as pathology, symptomatology, diagnosis, and identification of parasites. Course content is divided into three major categories: human protozoology, human helminthology, and human anthropodology. Course is designed primarily for medical technologists, biology teachers, and environmental health students. 2 lect. Prerequisite: consent of instructor.
- 677-3 *Human Parasitology Laboratory* A laboratory course designed to examine and identify protozoan, helminthic and anthropod parasites of man. 2 lab (3 hrs. each.) Corequisite: BIO 676.
- 678-4 *Animal Behavior* The physiology, phylogeny, and ontogeny of behavior. Also listed as 678, Animal Behavior, in the Department of Psychology course offerings. 2 lect., 2 disc. Prerequisites are either PSY 111-112 and 212, or BIO 111-112-114 and 312, 313, and consent of instructors.
- 680-3 *Biology of Fishes* An introduction to the evolution, ecology, and distribution of fresh water and marine fish. Prerequisite: BIO 206, 306.
- 699-1 to 4 *Special Problems in Biology* Consent of department required. A maximum of 4 credits is applicable toward degree requirements.
- 700-3 *Principles of Instruction in Biology* A survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. Limited to graduate biology majors.
- 701-1 to 5 *Selected Topics in Biology* A course on a selected topic in biology. Prerequisites: BIO 316 and consent of the department.
- 702-2 *Introduction to Research* Different research problems under investigation by the faculty will be described with respect to objectives, methodology, and progress as examples of scientific methods applied to biology. Limited to first-year graduate students.
- 717-3 *Molecular Biology of Learning and Memory* Modern molecular biological investigations of the process of learning and memory. Implications for the development of a molecular theory of memory processes will be considered. Two lectures a week. Recommended background: molecular biology; biochemistry; or cell biology.
- 724-3 *Cell Physiology* The behavior of the cell and its constituents in the expression of the characteristic properties of life. Metabolism, reproduction, and motion will be treated. 2 lect. Recommended preparation: BIO 210, CHM 212.
- 728-3 *Photobiology* Selected topics in photobiology. 2 lect. Recommended preparation: BIO 421, 423 (621, 623) or consent of instructor.
- 734-3 *Molecular Genetics* A study of the replication, organization, and function of nucleic acids with emphasis on the role of nucleic acids in protein synthesis.
- 738-3 *Behavior Genetics* Behavior will be considered as a population phenomenon and as an adaptive process. Evolutionary theory will be used to integrate the disparate aspects of behavioral phenomena. Prerequisite: BIO 302.
- 743-4 *Radioisotope Principles* Principles of α , β , and γ radiation and methodology of counting, with application of tracers to physical and biological problems. 2 lect., 1 lab. Recommended preparation: physical chemistry or consent of instructor.
- 745-4 *Microinstrumentation* Equipment and technique used for the microscopic examination of biological structure and ultrastructure. 1 lect., 2 lab.
- 785-6 *Advanced Invertebrates* Advanced study of the growth, development and life history of invertebrates. 2 lect., 2 lab. Recommended preparation: BIO 672.
- 786-3 *Experimental Morphology* Examination of development and the periods therein when the organism is most susceptible to physiological insult. Emphasis will be given to birds and mammals. 2 lect. Recommended preparation: BIO 214, 215, 683.
- 787-3 *Experimental Morphology Laboratory* The effects of experimental procedures and abnormal environments on the development of the avian and mammalian embryo. 2 lab. Concurrent registration with BIO 786.
- 789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.
- 800-1 *Graduate Seminar* Consult quarterly class schedule for sections and topics.
- 825-3 *Metabolic Control Processes* Selected topics on the molecular basis of control processes in living systems. 2 lect. Recommended preparation: BIO 621, 622, 623, 624.

845-3 *Biochemistry of Natural Products* A study of the development of natural products as antibacterial and antifungal agents with emphasis on mode of action and biosynthesis. Their role in chemotherapy of infectious disease and in the elucidation of basic biochemical reactions will be stressed. Recommended preparation: BIO 621-624 or equivalent.

899-2 to 18 *Graduate Research* Supervised thesis research.

900-1 *Graduate Seminar* Consult quarterly class schedule for sections and topics.

Microbiology and Immunology/M/I

622-4 *Principles of Host Parasite Interaction* A study of initiation and results of infection of vertebrates. The symptomology and resulting pathology will be described in terms of unique properties of the invading organism and the interplay of nonspecific and acquired resistance mechanisms of the host. 3 lect., 1 rec. Prerequisite: BIO 402, M/I 426, or consent of instructor.

626-5 *Pathogenic Microbiology* Study of microorganisms pathogenic for man and animals with emphasis on mechanisms of infection, resistance, and laboratory diagnosis. 2 lect., 2 lab. Prerequisite: BIO 213 or consent of instructor.

627-3 *General Microbiology* Study of microbial mechanisms with emphasis on microbial products and the microbiology of special environments. 3 lect. Prerequisite: BIO 310, 311, or consent of instructor.

631-3 *Basic Virology* Basic introduction to the field of virology; plant, animal, and bacterial viruses. Major emphasis on the intrinsic properties of viruses and their interaction with cells; multiplication, genetics, and tumor induction. 3 lect. Prerequisite: BIO 402, BCH 421/621, M/I 427/627, or consent of instructor.

641-5 *Basic Immunology* Lectures, laboratory exercises, and demonstrations of physiochemical properties of antigens and antibodies, the mechanism of their reactions, and the effects of these reactions on parasites and host tissues. The development of humoral and cellular resistance to parasites, tissue grafts, and tumors is discussed on cellular and molecular levels. Prerequisite: BIO 402, M/I 426/626, or consent of instructor.

645-5 *Immunobiology* A study of biology of the immune system in terms of current concepts of antibody formation and function. Acquired, delayed, and immediate hypersensitivity are studied in respect to immunological deficiencies, malignancy, tolerance, graft rejection, infection, and acquired resistance. 3 lect., 2 rec. Prerequisite: M/I 426, BIO 402, or consent of instructor.

699-1 to 4 *Special Problems in Microbiology* Consent of the department required. Maximum of four credits is applicable toward the degree.

701-1 to 5 *Selected Topics in Microbiology* Course on selected topics in microbiology. Consent of the department required.

731-3 *Medical Virology* Basic aspects of animal viruses, their interaction with cells, and resultant human disease. Disease models serve to stress transmission, pathogenesis, diagnosis, and control of human viral diseases. Viral infections of lower animals will be utilized to introduce basic concepts of oncogenic and slow viruses. Prerequisite: BIO 402, BCH 421, M/I 626 and 631 or consent of instructor.

732-3 *Microbial Physiology* Study of the physiological and biochemical processes unique to microorganisms. 3 lects. Recommended preparation: BIO 421, 422, 423, and consent of instructor.

733-2 *Laboratory for Microbial Physiology* Corequisite: M/I 732 or consent of instructor.

800-1 *Graduate Seminar* Consult quarterly class schedule for topics.

900-1 *Graduate Seminar* Consult quarterly class schedule for topics.

Physiology/PHS

681-3 *Physiological Control Mechanisms* Integrative course in physiology emphasizing applications of control theory. 2 lect., student presentations. Prerequisite: PHS 219 or 402.

682-2 *Physiological Control Mechanisms Laboratory* Exercises reinforce principles described in PHS 681. Prerequisite or corequisite: PHS 681.

683-5 *Physiological Aspects of Exercise* Integration of physiological mechanisms involved in exercise. Cellular, neuromuscular, cardiovascular, and respiratory changes are discussed with relationship to exercise performance. 2 lect., 1 lab., student recitation. Prerequisite: PHS 219, 402 or equivalent, or consent of instructor.

- 699-1 to 4 *Special Problems in Physiology* Enables beginning graduate student to explore a potential career in physiology. Varies from working on an ongoing physiological research project to historical survey related to a completed research project. Consent of department required.
- 701-1 to 5 *Selected Topics in Physiology* A selected area is discussed in greater detail than in basic course. May be offered by visiting or adjunct professor as well as by department faculty. 2 lects., occasional recitation. Some topics may have laboratory associated with lectures. Prerequisite: PHS 219 or 402, or consent of instructor.
- 702-5 *Basic Human Physiology I* Subjects include homeostasis, cell function, muscle action, nervous system integration, circulation. 2 lect., 1 lab, conference, paper. Prerequisite: one year each of biology, chemistry, physics and cell physiology or consent of instructor.
- 703-5 *Basic Human Physiology II* Subjects include negative feedback regulation; metabolism; gastrointestinal, pulmonary, renal, and endocrine functions; integrative functions. 2 lect., 1 lab, conference, paper. Prerequisite: PHS 702 or consent of department.
- 771-3 *General Endocrinology* Survey of endocrinological mechanisms and their role in integration of body function. Prerequisite: PHS 703 or consent of instructor.
- 772-2 *General Endocrinology Laboratory* Exercises reinforce principles described in PHS 771. Prerequisite or corequisite: PHS 771.
- 800-1 *Physiology Seminar* Student organizes and presents material from a selected series of topics to colleagues and faculty; once each week, rotated among registrants. May be repeated once.
- 899-2 to 18 *Graduate Research* Supervised thesis research. Graduate standing and approval of supervisory committee or department required.

Business Administration

The Master of Business Administration degree program is designed for students with diverse undergraduate backgrounds. A student who has graduated with a degree in business administration may continue studies in this field, but the program is sufficiently flexible to allow students to enter from many other academic disciplines. For students who don't have an undergraduate degree in business, the program provides thirty hours of course work designed for initial exposure in accountancy, business law, economics, finance, management, marketing, mathematics, and statistics.

The Graduate Faculty

Accountancy

Professors Dean S. Eiteman, financial and managerial accounting; Donald F. Pabst, financial and managerial accounting
Associate Professors Joseph F. Castellano (chairman), financial and managerial accounting; Harper Roehm, financial and managerial accounting; John C. Talbott, financial and managerial accounting; Jerry J. Throckmorton, accounting systems

Administrative Sciences and Finance

Professor Robert Dolphin, Jr., financial institutions, financial management
Associate Professors Khurshid Ahmad, insurance, real estate, risk management; Peter Bacon, financial management; Michael J. Cleary, quantitative methods and computer applications; Myron K. Cox, research methodology; Waldemar M. Goulet, finance, real estate; Rust F. Gray, Jr. (chairman), financial management; Charles J. Hartmann, business law, college and university law, constitutional law; Edgar H. Hemmer, financial management, real estate valuation and investments; Andrew W. Lai, quantitative methods for business; William J. McGrath, business law, intellectual property law, government procurement law
Assistant Professor Robert T. Amsden, statistical theory and applications.

Economics

For list of Department of Economics graduate faculty, see entry under "Economics."

Management

Professors Sam Barone, management; Horace W. Lanford, Jr., technological forecasting, research management; John V. Murray, management policy, organizational behavior, long-range forecasting; Edward A. Nicholson, organizational behavior; Frank A. Stickney, systems management, business policy, organizational behavior; Thomas Von der Embse (chairman), business policy, organizational behavior and design, management theory
Associate Professors Gordon K. Constable, logistics management, quantitative methods; James M. Daily, organizational behavior, personnel management, organization development; Louis V. Imundo, public employees collective bargaining, personnel management, organizational behavior; Clyde C. Schrickel, personnel management, labor relations; Herman A. Waggner, computer-based management information systems, production management.

Marketing

Professors Herbert E. Brown, marketing research, marketing theory; Peter S. Carusone (chairman), contemporary marketing issues, entrepreneurship, marketing strategy; Robert J. Kegerreis, consumer behavior, marketing management and strategy; J. Taylor Sims, computerized information systems
Associate Professors Thomas Dovel, marketing policy, marketing research; Gordon Wise, retailing, consumer behavior
Assistant Professor Beverlee B. Anderson, marketing research, consumer behavior, advertising

Admission

Admission to the M.B.A. degree program requires application for admission to the School of Graduate Studies. All applicants must hold a baccalaureate degree from a regionally accredited institution and must submit satisfactory scores on the Graduate Management Admission Test (GMAT—formerly ATGSB), in addition to meeting a minimum undergraduate grade point average.

Regular Admission

Regular admission may be obtained by method 1 or 2.

Method 1 Undergraduate grade point average of 2.7 ($A = 4.0$) or better and GMAT score of 450 or better are required.

Method 2 The attainment of 990 or better on the Admission Index as indicated: Admission Index (AI) = 200 (UGPA) + (GMAT).

Conditional Admission

Conditional admission may be obtained by method 1, 2, or 3.

Method 1 The attainment of at least 950 but less than 990 on the Admission Index, using the UGPA.

Method 2 The attainment of 1,000 or better on the Admission Index, using the UGPA for the last two years of undergraduate study.

Method 3 For those who do not meet the standards of conditional admission but who feel they are qualified for graduate work, it is possible to petition the Graduate Programs Committee. Such a petition can be initiated through the director of the M.B.A. program.

Special Nondegree Admission

Students may seek nondegree admission if they fall into one of the two following categories: transient students who, by taking a few courses at Wright State University, will complete their graduate study

at another university, or students with advanced degrees who desire one or two courses at the graduate level in business administration but will never become degree-seeking students at Wright State University.

All individuals who apply for nondegree status must receive approval from the College of Business and Administration before being admitted to this category. A nondegree student must meet the minimum standards for those degree-seeking candidates admitted to conditional standing. A nondegree student who later wants to become a candidate for the M.B.A. should follow the procedures outlined in the chapter on general regulations. Students who would like to pursue further course work are urged to apply for admission to a degree program. No more than twelve credit hours taken while a student is in nondegree status may be applied as credit toward the M.B.A. degree.

The M.B.A. Program

After satisfying the prerequisites outlined below, the candidate begins a forty-eight quarter hour program. Eighteen hours are required of all candidates, including micro- and macroeconomic theory, two courses in quantitative business analysis, a course in behavioral theory, and one in administrative policy and decisions, which should be taken as the last course in the program.

To insure a broad exposure to business administration, the M.B.A. candidate is required to take at least one course in each of the following disciplines: accounting, finance, management, and marketing. A course is offered by each department for the student not concentrating in that area.

Further degree requirements include the selection of one of six areas of concentration: accountancy, finance, financial administration, management, quantitative business analysis, and marketing. A candidate has the flexibility to structure the program to meet career objectives by selecting courses that together provide emphasis within each area of concentration. Examples of this flexibility are managerial accounting and systems or financial accounting and tax within the area of accountancy, and personnel management or operations management within the area of management. The candidate must take a minimum of nine quarter hours in the area of concentration and a minimum of six quarter hours in business electives. The final six quarter hours of the program may be taken either in the candidate's area of concentration or as elective course work. Electives may be taken in any department of the university in which the candidate is qualified to take graduate course work.

Candidates for the M.B.A. will complete a program of study prior to starting their second quarter.

The Master of Business Administration Program

Stage I

May be waived for those areas in which candidate has had undergraduate preparation

ACC 621-622 Accounting	6
ADM 611 Business Law	3
EC 621-622 Economics	6
FIN 621 Finance	3
MGT 621 Management	3
MKT 621 Marketing	3
QBA 621 Statistics	3
QBA 620 Business Mathematics	3
Total	30

Stage II

Required Courses **18**

EC 715-717 Advanced Economics— micro and macro theory	6
MGT 700 Behavioral Theory	3
QBA 723-724 Quantitative Methodology	6
MGT 731 Administrative Policy and Decisions (last course taken in the program)	3

Area of Concentration **9-15**

Course work in nonconcentration areas
(three of four) 9

Electives **6-12**

business/economics graduate courses 6

business/economics or nonbusiness

graduate courses 0-6

Total 48

Graduate Courses

Accountancy/ACC

621-3, 622-3 *Graduate Survey of Accounting I and II*

A survey course of basic accounting designed for persons having had no previous course work in accountancy. Must be taken in sequence.

703-3 *Seminar in Accounting* Research and discussion of controversial accounting topics related to the determination of net income and financial position and the uses and limitations of accounting statements and reports.

711-3 *Financial Accounting Concepts I* A study of financial accounting concepts relating to the nature, measurement, and reporting of business income and financial condition. Special attention to controversial areas relating to asset definition, recognition, and measurement. Prerequisite: ACC 622 or equivalent. Not open to accountancy majors with previous courses in intermediate accounting without consent of adviser.

712-3 *Financial Accounting Concepts II A* continuation of ACC 711 including the definition, measurement, and reporting of liabilities and stockholder's equity. Special attention is placed on the controversial areas in the preparation of financial statements. Prerequisite: ACC 711 or equivalent.

721-3 *Federal Income Tax Accounting A* A study of the federal income tax and its effect upon business decisions. Prerequisite: ACC 622.

722-3 *Auditing Theory A* A study of the development of professional auditing with particular emphasis on the theory underlying the development of auditing standards, objectives, and procedures. Prerequisite: ACC 741. Not open to students with credit for an auditing course without departmental approval.

741-3 *Managerial Accounting A* A course especially designed to develop an understanding of accounting concepts and the use of accounting in relation to management planning and control. Emphasis is on cost analysis for guidance in decision making. Prerequisite: ACC 622. Not open to accountancy majors without adviser's consent.

752-3 *Business Information Systems* The study of accounting as a comprehensive information system that provides significant financial data needed by management for decision making and control as well as reporting to outside interest groups. Prerequisite: ACC 741.

753-3 *International Accounting* An identification, description, and analysis of the major dimensions of international accounting, concentrating on the fundamental patterns of accounting development discernible from an international perspective. Applied accounting problems of an international nature are also discussed. Prerequisite: ACC 622.

761-3 *Seminar in Financial Accounting Theory* Research and discussion of controversial accounting topics related to financial accounting theory. Prerequisite: ACC 712.

762-3 *Seminar in Income Tax Planning and Research* Research and discussion of accounting topics in tax planning and research. Prerequisite: ACC 721.

763-3 *Seminar in Behavioral Aspects of Managerial Accounting* Research and discussion of the behavioral science implications within the area of managerial accounting. Prerequisite: ACC 741.

Administration/ADM

611-3 *Graduate Survey of Law and the Legal Environment A* A survey course in law and legal systems designed for persons having had no previous course work in law.

680-3 *Special Topics in Business and Government* Deals with current problems of interest and value in the area of business. Topics will include government regulation of business, social responsibility of business, and legal problems in business. Not offered on a regular basis.

695-3 *Ethics of an Industrial Society* Taught jointly with the Department of Religion: see REL 695. An investigation of the ethical responsibilities of business in light of political, moral, social, and religious considerations. Emphasis will be placed on the analysis and evaluation of the changing framework of responsibilities facing both business organizations and their leaders. Permission of instructors required.

715-3 *Public Regulation of Business* Methods and rationale of such topics as interface between government and public institutions. Monopoly controls, consumer and employee protection. Prerequisite: ADM 611 or equivalent.

Finance/FIN

523-3 *Family Financial Security* Financial problems of the family: credit and borrowing, life and other forms of insurance, real estate ownership, savings and investment problems. Means of incorporating family financial security education in the secondary school curriculum. Graduate standing required. Credit not applicable to the M.B.A. May be offered as an inservice course.

621-3 *Graduate Survey in Financial Management* A survey course in financial management designed for persons having had no previous course work in finance. Emphasis on basic financial concepts, principles, and analytical techniques as they relate to the planning and management of assets and financial structure decisions. Offered fall, spring, and summer. Prerequisite: ACC 621, 622.

702-3 *Financial Institutions Seminar* Study of financial administration of financial institutions; policy formation is stressed. Prerequisite: EC 717.

710-3 *Investment Management* A course dealing with the concepts and techniques relevant to the formulation of investment policies and programs for individuals and institutions. Topics include investment media, investment risks and returns, analysis of investment opportunities, and portfolio management. Prerequisite: FIN 621.

711-3 *Investment Seminar* Advanced treatment of recent developments in investment theory and practice. Individual investigation of specific problem areas is emphasized. Prerequisite: FIN 710.

720-3 *Bank Management* Study of policy formulation in the commercial bank with emphasis on allocation of funds.

722-3 *Insurance and Risk Management* The course acquaints students with the nature and objectives of personal and corporate risk management. Primary consideration is devoted to the recognition, evaluation, and treatment of the insurable risks to which the corporation in particular and the individual in general are exposed. Various alternatives are examined and special emphasis is given to the use of insurance as a method of solving the problem of insurable risks. Specific topics covered include risk retention, self-insurance, loss prevention, employee benefit plans, corporate insurance policy, and various personal coverages. Designed for students having had no previous work in risk and insurance. No prerequisite.

731-3 *Land Economics and Real Estate Administration* Problems in utilization of real estate resources by business firms. Interrelationship between business and public decision and policies related to the acquisition, development, use, and renewal of real property.

741-3 *Financial Management I* Designed both for non-finance majors and for finance majors with limited undergraduate work in finance. Topics include financial analysis, estimating funds requirements, working capital management, intermediate and long-term financing, and capital budgeting techniques. Extensive use of cases. Prerequisite: FIN 621 or equivalent.

742-3 *Financial Management II* An in-depth treatment of advanced finance problems. Emphasis on capital expenditure evaluation, cost of capital, and capital structure planning. Extensive use of cases. Offered winter and summer quarters. Prerequisite: FIN 741 or permission of the instructor.

743-3 *Seminar in Financial Management* An in-depth analysis of recent developments in financial management. Individual investigation of specific problem areas is emphasized. Offered spring quarter. Prerequisite: FIN 741 or permission of instructor.

781-1 to 3 *Special Studies in Finance* Intensive reading or research in a selected field of advanced finance. Consent of instructor required.

790-3 *Seminar in International Financial Management* Development of perspective and analytical skills necessary to overcome the special environmental complications and problems of transcending international financial restrictions. Prerequisite: FIN 621.
799-6 to 9 *Thesis* To be arranged.

Management/MGT

621-3 *Graduate Survey in Management* A survey course of basic management designed for persons having had no previous course work in management.

700-3 *Organizational Behavior and Theory* Analysis of the fundamental behavioral concepts and processes of organization. Evaluation of approaches to major behavioral issues such as motivation, communication, leadership, organization climate, group behavior, authority and power, management development, and behavioral research and experimentation. Prerequisite: MGT 621 or equivalent.

703-3 *Seminar in Personnel Administration* Analysis of the principal functions, processes, and problems involved in the management of human resources. Development and evaluation of personnel systems, with emphasis on implications of personnel policy and practice. Prerequisite: MGT 621 or equivalent. Course will be offered at least once annually.

704-3 *Advanced Management Seminar* Designed to offer the graduate student an opportunity for intensive study of selected management theories and concepts. Students will have the opportunity to select a topic of their personal interest for in-depth research and seminar presentation. The course will center around such themes as evolution of management theory, current management trends and issues, and leadership and management development issues. Prerequisite: MGT 700.

705-3 *Seminar in Industrial Relations* Synthesis of background and development of labor-management relations. Analysis of contemporary employee relations problems, emphasizing negotiation, contract development, and administration and conflict resolution. Prerequisite: MGT 621 or equivalent. Course will be offered at least once annually.

706-3 *Organizational Development and Change* Interpersonal and organizational communication processes are examined within the context of needs for adaptation and change.

711-3 *Seminar in R & D Management* Seminar of research and development management problems together with the discussion of possible solutions. Case studies provide the framework for understanding technological change as an essential element of management. Course will be offered at least once annually. Prerequisite: MGT 621 or equivalent.

714-3 *Technology Assessment/Technological Forecasting* This course is designed to allow the student to consider and apply several techniques of forecasting rates of technological change. The techniques to be considered include trend extrapolation, envelope curve forecasting, methodologies using figures of merit, and the Delphi method. The course includes lessons from the past as well as exercises in applying technological forecasting techniques to long-range planning. The integration of the technological forecasting with long-range planning is stressed. Prerequisite: MGT 621 or equivalent.

731-3 *Administrative Policy and Decisions* This capstone course is designed to enable the student to bring together all aspects of administrative policy making through the use of specific case problems. Students should normally expect to work with other students in teams. Should be taken during the last quarter of course work.

741-3 *Operations Management* Introduction to the management of operating systems; techniques and methods employed to plan and control manufacturing and other operating systems. This course is designed for individuals who have had no previous course in production or operations management. Prerequisite: MGT 621 or equivalent.

751-3 *Production Methods and Controls* Seminar in policies, practices, and techniques of production control to include planning, routing, scheduling, etc. Prerequisite: MGT 741 or permission of instructor and QBA 724 or equivalent.

753-3 *Selected Topics in Management* Topics as given below. Prerequisites are announced in the quarterly schedule. 753A—Topics in Operational Management; 753B—Topics in Personnel Administration; 753C—Topics in Systems Management; 753D—Topics in Industrial Relations; 753E—Topics in Organizational Development.

754-3 *Dynamics of Organizational Design* Analysis of the problems which must be confronted in building or modifying organizations in order to attain predetermined organizational objectives and/or adapting to new challenges presented by a dynamic sociotechnical environment. Prerequisite: MGT 621 or equivalent. Course will be offered at least once annually.

761-3 *Management Planning and Control* Designed to assist the manager in establishing and implementing short-range and long-range plans. Provides for the development and use of advanced control techniques to enable achievement of predetermined objectives with available resources. Prerequisite: MGT 621 or equivalent. Course will be offered at least once annually.

763-3 *Systems Management* This course is designed to present management theory in a systems framework to facilitate the study, analysis, and operation of organization. Case studies provide an opportunity to match theory with business and industrial practice. Prerequisite: MGT 621 or equivalent. Course will be offered at least once annually.

781-1 to 3 *Special Studies in Management* Intensive reading or research in a selected field of advanced management. Prerequisite: approval of department chairman.

799-6 to 9 *Thesis* To be arranged.

Marketing/MKT

621-3 *Graduate Survey in Marketing* A survey course in marketing designed for persons having had no previous course work in marketing.

704-3 *Personal Selling and Sales Management* An overview of the personal selling function and the attendant sales management task as they relate to the total marketing field. Extension of concept and theory into practical application. Prerequisite: MKT 621 or equivalent.

705-3 *Advertising and Sales Promotion* Thorough examination of advertising and sales promotion with emphasis on practical application of concepts and theory. Includes project development and role playing. Prerequisite: MKT 621 or equivalent.

707-3 *Marketing Research and Analysis I* Understanding the marketing research function in both a basic and an applied sense with special attention to the concepts, methods, and techniques currently employed in its use as a tool of management. Prerequisite: MKT 741. Required of marketing majors in the M.B.A. program.

710-3 *Consumer and Industrial Buyer Behavior* Development of knowledge of the behavioral content of marketing in consumer, industrial, and international fields. Examination of applicable theory, research findings, and concepts that are provided by psychology, sociology, anthropology, and marketing. Understanding buyer behavior based on the sources of influence: individual, group, culture, environment. Prerequisite: MKT 621.

713-3 *Logistics Systems* An examination of the concept of a logistics system, its components, and their relationship. Emphasis on identification of logistics system components and the impact of logistics systems on the economy and the organization. Also consideration of institutions and managerial functions in marketing channels, inventory systems and transportation modes. Prerequisite: MKT 621 or equivalent.

716-3 *International Marketing I* This course introduces the concepts and language of international marketing and examines institutional, behavioral, and managerial aspects of a cross-section of national marketing systems and multinational organization operations. Prerequisite: MKT 621 or equivalent.

720-3 *Service and Nonprofit Organization Marketing* Demonstrates how marketing logic, concepts, and procedures are applied to problems faced by managers in service organizations and hospitals, school systems, universities, charitable organizations, museums, government agencies (police, fire, etc.), and other nonprofit operations.

730-3 *Consumerism and Social Issues* A critical study of marketing concepts and practices as related to contemporary social issues in the American economy: consumerism, ecology, product safety, truth in advertising, poverty, national interests, social responsibility, and government's role in consumer protection. The emphasis is on the institutional and managerial philosophy points of view, not a legal perspective. Prerequisite: MKT 621 or permission of instructor.

741-3 *Marketing Strategy* Marketing management in the administration of a business enterprise: product development, pricing, systems of distribution, financing, promotion, and consumer motivation. Cases and readings. Prerequisite: MKT 621 or equivalent. Required of all M.B.A. students, including marketing majors.

742-3 *Industrial Marketing Management* A seminar in the concepts and techniques of managing the marketing function of industrial organizations. Emphasis is on planning and problem-solving methodology. Readings and marketing strategy plan development. Prerequisite: MKT 741. Required of marketing majors in the M.B.A. program.

753-3 *Special Topics in Marketing* Special topic seminar in market analysis and research methodology, product planning, pricing decisions, promotional strategy, and distribution decisions. Specific topic and prerequisites provided in quarterly class schedule.

775-3 *Entrepreneurship* Problems and perspectives in starting new ventures. Concepts and techniques of searching for market opportunities, screening and evaluating potentials, negotiating, and financing to initiate or purchase a company. Prerequisite: MKT 741, FIN 741, or permission of instructor.

781-1 to 3 *Independent Studies in Marketing* Readings or research in a selected field of marketing. Advanced graduate standing and consent of instructor required.

799-6 to 9 *Thesis* To be arranged.

Quantitative Business Analysis/QBA

620-3 *Graduate Survey of Mathematics for Business Research* Topics to develop competence in quantitative methods for the analysis of business problems. This course is designed to strengthen the mathematics background of students having had little or no formal training in linear algebra and calculus. However, it is assumed that the student has an acquaintance with basic algebra.

621-3 *Graduate Survey in Statistics* A survey course of basic statistical techniques designed for persons having limited background in statistics.

723-3 *Quantitative Methods for Business Decisions I* A study of decision making under uncertainty, including such topics as decision theory, probability models, sampling, inference, estimation, regression, and time series. Prerequisite: QBA 621.

724-3 *Quantitative Methods for Business Decisions II* Various topics related to the mathematical analysis of business decisions: mathematical programming applications, inventory control, waiting line analysis, and simulation. Prerequisite: QBA 620.

725-3 *Business and Social Science Research Methods* Examines experimental designs with more than one variable. Analysis of variance, single and multiple regression, and correlation techniques; time series, including trend and periodic analysis and forecasting are offered. The concept of index numbers, construction, and uses will be examined. Basic nonparametric statistics are presented. Prerequisite: QBA 723.

753-3 *Selected Topics in Quantitative Business Analysis* Seminar in special topic areas of quantitative analysis. Subject matter will vary each time course is offered. Students should check with instructor of department to determine subject before registering. Permission of instructor required.

781-1 to 3 *Special Studies in Quantitative Business Analysis* Intensive reading or research in a selected field of advanced quantitative business analysis. Consent of instructor required.

Business Education

See Education.

Chemistry

The Department of Chemistry offers a graduate program leading to the Master of Science degree in chemistry. Balanced programs of course work and research are individually designed to prepare students for careers as professional chemists. Joint programs with other departments are encouraged for students interested in pursuing interdisciplinary research with emphasis in chemistry.

The Graduate Faculty

Professors Rubin Battino, physical chemistry; Charles Carraher, Jr. (chairman), polymer chemistry; Sue C. Cummings, inorganic chemistry; Frank W. Harris, organic and polymer chemistry; David J. Karl, polymer materials, physical chemistry, chemical education; M. Paul Servé, organic chemistry; Gordon B. Skinner, physical chemistry; Thomas O. Tiernan, physical, analytical, environmental chemistry

Associate Professors John J. Fortman, inorganic chemistry; George G. Hess, organic chemistry; James J. Kane, organic and polymer chemistry; Paul Seybold, physical and biophysical chemistry; Michael J. Smith, analytical and environmental chemistry; Paul J. Taylor, analytical chemistry
Assistant Professor William Feld, organic and polymer chemistry

Research Associate Professor Michael Taylor, medicinal and analytical chemistry

Admission Requirements

In order to meet the minimum requirements for admission to the graduate program in chemistry, applicants must fulfill the requirements for admission established by the School of Graduate Studies. In addition, applicants must have completed basic calculus, one year of physics, and approximately fifty quarter hours (thirty-three semester hours) of chemistry including lecture and laboratory courses in general chemistry, quantitative analysis, and introductory courses in organic, inorganic, and physical chemistry. Students who do not meet these requirements will be asked to do so in addition to fulfilling the usual degree requirements.

Degree Requirements

Following admission to the chemistry graduate program, the student must complete a series of tests in analytical, inorganic, organic, and physical chemistry. The tests will be administered by the departmental advisory committee and the results together with the student's goals will guide the advisory committee in formulating a proposed program of study for the student.

In order to qualify for the Master of Science degree, the candidate must fulfill the requirements of the School of Graduate Studies, complete thirty hours of course work and a minimum of fifteen hours of thesis research, submit an acceptable thesis, and pass a written or oral examination.

Courses The candidate for the Master of Science degree must complete thirty quarter hours of course work in chemistry and related fields. The chemistry courses must be numbered 600 or above and comprise a program acceptable to the advisory committee. The related courses must be numbered 500 or above and be acceptable to the advisory committee.

Language Requirement A reading knowledge of a foreign language is not required for the Master of Science degree in chemistry. However, certain students, because of the nature of their specific area of interest in chemistry, may be required to demonstrate an ability to read chemical literature in a foreign language.



Residency Requirement Full-time residence is not required to qualify for the Master of Science degree. However, a student must be registered for three consecutive quarters of full or part-time study.

The candidate must enroll in Chemistry 899 (thesis research) under the supervision of an adviser approved by the advisory committee. An acceptable thesis based on a minimum of fifteen hours of laboratory or theoretical research (Chemistry 899) must be submitted to an examining committee (chaired by the candidate's adviser and selected by the adviser and the department chairman). The thesis must be submitted in final form by the candidate no later than six months following the last quarter of enrollment in Chemistry 899. Four copies of the final draft of the thesis must be submitted to the committee and the department chairman for approval prior to binding. After approval by the School of Graduate Studies, two copies will be deposited in the library. One copy is kept by the adviser and one copy is kept by the department chairman.

After the presentation of the thesis and at least two weeks prior to the date proposed for conferring the degree, the candidate must pass a written or oral examination. If the student's record is satisfactory, the scope of the examination will generally be confined to the candidate's field of specialization. The examination committee is chosen by the student's research adviser in consultation with the department chairman.

Graduate Courses

Chemistry/CHM

- 511-7.5 *Qualitative Organic Analysis* Systematic classification and identification of organic compounds by chemical and instrumental methods. 3 lect., 3 lab. Prerequisite: CHM 213, 217.
- 512-3 *Quantitative Analysis* An introduction to chemical methods of analysis covering traditional as well as modern techniques and equipment; emphasis on calculations and interpretation of analytical data. 3 lect. Prerequisite: CHM 141. Concurrent enrollment in CHM 514.
- 513-3 *Instrumental Analysis* Introduction to the theory and practice of modern chemical instrumentation. Topics include elementary electronics, spectrophotometry, atomic absorption, electrochemical techniques, chromatography and other instrumental techniques. 3 lect. Prerequisite: CHM 452, 512. Concurrent enrollment in CHM 515.
- 514-4.5 *Quantitative Analysis Laboratory* Experimental methods of analysis. Practical applications of the lecture material presented in CHM 512. 9 lab. Prerequisite: CHM 141. Concurrent enrollment in CHM 512.
- 515-4.5 *Instrumental Analysis Laboratory* Introduction to experimental instrumental analysis. Practical experience in the operation of chemical instrumentation; emphasizes applications of the material presented in CHM 513. 9 lab. Prerequisite: CHM 512, 452. Concurrent enrollment in CHM 513.
- 520-3, 521-3 *Inorganic Chemistry* The principles and concepts of inorganic chemistry, including the periodic table, atomic structure, bonding, coordination compounds, and an introduction to group theory. 3 lect. Prerequisite: CHM 453 or consent of instructor. Must be taken in sequence.
- 551-3, 552-3, 553-3 *Physical Chemistry* A course in the theoretical aspects of chemistry including thermodynamics, chemical kinetics, molecular structure and spectra, and the structure of solids and liquids. 3 lect. Prerequisite: CHM 141, MTH 134, PHY 242 or consent of instructor. Must be taken in sequence.
- 555-3 *Physical Chemistry Laboratory* A course in the experimental methods of physical chemistry. 6 lab. Prerequisite: CHM 452.
- 556-4 *Physical Chemistry for Nonchemists* Introduction for nonchemistry majors to the ideas of physical chemistry, including thermodynamics, properties of liquids and solids, solution properties, and kinetics. Intended for biologists, geologists, physicists, premedical students, and others with an interest in physical chemistry. 4 lect. Prerequisite: one year each of college chemistry and physics and two quarters of calculus.
- 561-4 *The Organic Chemistry of Engineering Materials* The molecular structure, stereochemistry, properties, and reactivities of selected organic substances of industrial importance including fuels, lubricants, solvents, coatings, plastics, dyes, and naturally occurring engineering materials; intended for engineering students. Prerequisite: CHM 122. 4 lect.
- 588-1 to 3 *Independent Reading* Consent of department required.
- 599-1 to 4 *Special Problems in Chemistry* Graduate standing and consent of department required.
- 610-3.5 *Environmental Chemistry I: Air* A study of the earth's atmosphere including its normal composition and atmospheric reactions with emphasis on the nature, causes, effects, detection and abatement of various types of air pollution. Classroom, laboratory, and field training in the principles and practice of monitoring for the common atmospheric pollutants are included in the course. 2 lect. and lab or field project. Prerequisite: CHM 213 and 312 or concurrent registration in CHM 614.
- 611-3.5 *Environmental Chemistry II: Water* A comprehensive introduction to the chemistry of natural waters and wastewaters and the chemical transformations that occur in these systems. Emphasis is placed upon the analytical techniques commonly used to determine water quality. No previous technical knowledge of water chemistry is required although more experienced personnel should also benefit from the course. 2 lect. and lab or field project. Prerequisite: CHM 213 and 312 or concurrent registration in CHM 615.
- 612-3.5 *Environmental Chemistry III: Solids* A study of the problems of solid wastes, pesticides, food additives and radioactive materials including their chemical composition, effects, detection, disposal and natural breakdown. 2 lect. and lab or field project. Prerequisite: CHM 213 and 312 or concurrent registration in CHM 616.

614-1, 615-1, 616-1 *Directed Study in Prerequisite Material for Environmental Chemistry I, II, and III* A survey of topics in organic and analytical chemistry for students in CHM 610, 611, and 612, respectively, who do not have previous course work in these two areas of chemistry. The structure and reactions of related compounds and principles of some analytical techniques are briefly covered each week prior to their inclusion in the concurrent environmental chemistry course. 1 rec. Prerequisite: CHM 121. Corequisite: CHM 610, 611, and 612, respectively. Not open to students having credit for CHM 213 and 312 or their equivalent.

625-3 *Inorganic Preparations* Preparation of representative inorganic compounds. 2 lab. Prerequisite: CHM 421.

665-5 *Introduction to Polymer Science I* The principles and applications of the science of high polymers, with laboratory illustrations of the lecture material and the techniques of polymer science. Emphasis on physical properties. Permission of instructor required. 3 lect., 4 lab.

666-5 *Introduction to Polymer Science II* Emphasis on synthesis of polymers including vinyl, condensation, and organometallic polymers. Structural-property relationships emphasized.

671-4.5, 672-4.5 *Crystal Structure Analysis: I, II* Advanced methods of crystal analysis including X-ray, electron and neutron diffraction as tools for determination of crystal structures followed by familiarization with basic crystallographic computations. 3 lect., 3 lab. Consent of instructor required.

700-3 *Principles of Instruction in Chemistry* A survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. Limited to chemistry majors.

720-3 *Advanced Inorganic Chemistry I* A study of the modern theories of valence, structural inorganic chemistry, and the chemistry of nonmetals. 3 lect. Prerequisite: CHM 453, its equivalent, or consent of instructor.

721-3 *Advanced Inorganic Chemistry II* A thorough examination of the chemistry of the metals stressing the transition elements, ligand field theory, and mechanisms of inorganic reactions. 3 lect. Prerequisite: CHM 720, its equivalent, or consent of instructor.

722-3 *Advanced Inorganic Chemistry III* A survey of the applications of physical methods in the examination of inorganic compounds. 3 lect. Prerequisite: CHM 721, its equivalent, or consent of instructor.



725-3 *Inorganic Preparations* A laboratory course demonstrating the techniques of preparation, separation, and characterization of representative inorganic compounds. 6 lab. Prerequisite: CHM 421, its equivalent, or consent of instructor.

730-3 *Instrumentation* Introduction to the theory and practice of modern chemical instrumentation; elementary electronics, spectrophotometry, atomic absorption, electrochemical techniques, chromatography and other instrumental techniques. 3 lect. Prerequisite: CHM 453 and 512 or its equivalent, or consent of instructor.

732-4.5 *Instrumentation Laboratory* Introduction to experimental instrumental analysis; practical experience in the operation of chemical instrumentation; emphasizes application of material in CHM 730. 9 lab. Prerequisite: CHM 512 or its equivalent and 453, or consent of instructor. Concurrent enrollment in CHM 730.

735-3 *Selected Topics in Analytical Chemistry* A selected topic in the field of analytical chemistry such as chromatography, electroanalytical chemistry such as trace analysis, bioanalytical chemistry, advanced instrumental analysis, analytical spectroscopy, or separation methodology. 3 lect. May be repeated for credit with consent of adviser.

740-3 *Elements of Organic Reactions* A discussion of the more important organic reactions including their scope, limitations, and mechanisms. 3 lect. Prerequisite: CHM 213, its equivalent, or consent of instructor.

- 741-3 *Synthetic Organic Reactions* A systematic treatment of organic reactions including, where applicable, some theoretical basis for the nature of the reaction. The uses of these reactions in organic synthesis will be stressed. 3 lect. Prerequisite: CHM 740, its equivalent, or consent of instructor.
- 742-3 *Structural Concepts in Organic Chemistry* A study of molecular orbital theory, reactive species, theories of acids and bases and an introduction to stereochemistry. 3 lect. Prerequisite: CHM 741, its equivalent, or consent of instructor.
- 745-3 *Organic Preparations* An advanced laboratory course in the synthesis, isolation, and characterization of organic compounds with emphasis on recent advances and techniques. Prerequisite: CHM 213, its equivalent, or consent of instructor. 6 lab.
- 750-3 *Introduction to Quantum Chemistry* An introduction to the ideas and mathematical techniques of quantum theory, including applications to some simple chemical systems. 3 lect. Prerequisite: CHM 453, its equivalent, or consent of instructor.
- 751-3 *Chemical Kinetics* Characterization of simple kinetic systems, experimental methods, energy distributions in molecules, the transition state method, chain reactions in solution. 3 lect. Prerequisite: CHM 453, its equivalent, or consent of instructor.
- 752-3 *Thermodynamics* Chemical thermodynamics, fundamentals; first, second, and third laws; applications to solutions. 3 lect. Prerequisite: CHM 453, its equivalent, or consent of instructor.
- 760-3 *Chemical Equilibrium and Chemical Measurement* An in-depth treatment of ionic equilibria. Topics include pertinent mathematical operations used in equilibrium calculations. Chemical systems discussed will include strong and weak acids and bases, polyprotic and monoprotic acids and bases, precipitation complex formation, and oxidation-reduction equilibria. 3 lect. Prerequisite: CHM 512, 514, or consent of instructor.
- 761-3 *Advanced Analytical Chemistry* Survey of the more popular and useful modern analytical methods. Topics include separation techniques, selective ion electrodes, spectroscopy, electrochemistry, mathematical techniques of data optimization, methods of sample preparation, precipitate formation, and organic analytical reagents. 3 lect. Prerequisite: CHM 513 or permission of instructor.
- 789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.
- 800-1 *Seminar* Weekly discussions of recent topics and problems in chemistry.
- 820-3 *Radiochemistry* A course in nuclear structure, radioactivity, nuclear reactions, and the application of radioactive isotopes to chemical problems. 3 lect. Prerequisite: CHM 453, its equivalent, or consent of instructor.
- 825-3 *Selected Topics in Inorganic Chemistry* A selected topic in the field of inorganic chemistry, such as the reactions of substances in nonaqueous solvents, metal chelate compounds, inorganic reaction mechanisms, ligand field theory or the chemistry of the lanthanides and actinides. 3 lect. Prerequisite: consent of instructor. May be repeated for credit with consent of adviser.
- 830-3 *Nuclear and Electron Magnetic Resonance Spectroscopy* An examination of the theories and practices of nmr and epr including examples of their applications to structural and kinetic studies of both organic and inorganic molecules. 3 lect. Prerequisite: consent of instructor.
- 840-3 *Theoretical Organic Chemistry* An advanced treatment of the influence of structure on the properties of organic molecules. 3 lect. Prerequisite: CHM 740, its equivalent, or consent of instructor.
- 841-3 *Stereochemistry* A detailed study of the geometries of organic compounds, with particular emphasis on the classification and reactions of optical and conformational isomers. 3 lect. Prerequisite: CHM 740, its equivalent, or consent of instructor.
- 842-3 *Organic Chemistry of High Polymers* The chemistry and properties of high polymers including the organic chemistry of their preparation and the kinetics of polymerization. 3 lect. Prerequisite: CHM 740, its equivalent, or consent of instructor.
- 845-3 *Selected Topics in Organic Chemistry* A selected topic in the field of organic chemistry, such as organic spectroscopy, heterocyclic chemistry, organometallic chemistry, the chemistry of natural products. 3 lect. Prerequisite: consent of instructor. May be repeated for credit with consent of adviser.

- 850-3 *Quantum Chemistry* Principles and applications of quantum theory to chemical problems. Electronic structure of molecules and its correlation with the chemical and physical properties of substances. 3 lect. Prerequisite: CHM 750, its equivalent, or consent of instructor.
- 851-3 *Statistical Thermodynamics* Definition of partition function; translational, rotational, vibrational, and electronic partition functions and their calculation and application to thermodynamic problems. Calculation of thermodynamic functions from spectroscopic information. 3 lect. Prerequisite: CHM 752 or equivalent or consent of instructor.
- 852-3 *Theory of Solutions* Survey of modern theories of solutions and the liquid state. 3 lect. Prerequisite: CHM 752.
- 853-3 *Group Theory* An introduction to group theory stressing its application in the areas of hybridization schemes, molecular orbitals, ligand field theory, and spectroscopy. 3 lect. Prerequisite: CHM 750, its equivalent, or consent of instructor.
- 855-3 *Selected Topics in Physical Chemistry* A selected topic in the field of physical chemistry such as molecular spectroscopy, advanced molecular structure, magnetic resonance, X-rays, and crystal structure, statistical mechanics, precision physical-chemical measurements. 3 lect. Prerequisite: consent of instructor. May be repeated for credit with consent of adviser.
- 899-1 to 18 *Research* Research for the thesis. Consent of instructor required.

Classroom Teacher

See Education.

Computer Science

The Department of Computer Science offers a program of graduate study leading to the Master of Science degree. The program permits study in four major areas of computer science: computer engineering, computing systems, data base management and information systems, and numerical computing applications. The program in computer science is offered in the late afternoon to serve the educational needs of practicing computer professionals.

The Graduate Faculty

Professors Robert Dixon, communications, modeling, and software design; Donald Schaefer, numerical analysis, computer center management, operating systems

Associate Professors James Brandeberry (chairman), minicomputer systems, circuit and interface design, control theory; Larry Crum, interface design, computer organization, microprocessors, systems programming; Henry Davis, artificial intelligence, scientific applications; Joseph Kohler, programming languages, software design and compiler design; Leon Winslow, user-oriented operating systems, information retrieval systems, computer science education
Assistant Professors Charles B. Ross, minicomputers, computer hardware, numerical analysis; Alton F. Sanders, large software systems, artificial intelligence, compilers, systems programming; Jin W. Soh, analysis of software systems, computer modeling, computer architecture, microprocessors

Research and Facilities

The program is supported by an IBM 360/65 with a remote batch terminal which provides very rapid turnaround on most jobs. The department has a minicomputer laboratory with a PDP-11 system with card reader, line printer, moving head disc. It also has a GT-40 graphics processing system with disc, card reader, and line printer. The department also has a microprocessor laboratory equipped with INTEL 8008 and 8080 and the Motorola MC-6800 microprocessor systems. These laboratories are equipped with modern electronic equipment to enable study of all areas of computer hardware design.

Current research projects include: design of a time-shared terminal system using minicomputers; design of a medical computing system; design of a language for computer communication systems design; special purpose compilers for small machines; hardware using microprocessors; pattern recognition; operating systems; and data base management.

Thesis research could be related to one of the ongoing research projects or some other problem of interest to the student, possibly job-related.

Research at Wright State University is not limited to on-campus laboratory facilities. Several industrial companies, laboratories, and Wright-Patterson Air Force Base laboratories are involved in joint research efforts with the university and have unique facilities which are available for faculty and graduate research.

Admission and Prerequisites

A student may be admitted to the Master of Science program in computer science with a bachelor's degree in computer science or related areas and appropriate experience and satisfaction of the

admission requirements of the School of Graduate Studies.

The student should come to the program with a knowledge of Fortran or another higher level language, data structures, assembly language, I/O programming, computer organization, and operating systems; however, it will be possible to make up deficiencies after admission to the program by taking courses or independent study.

Degree Requirements

Requirements for the Master of Science degree are:

- 1 a minimum of forty-five graduate credit hours in an approved program of study;
- 2 at least twenty-two credit hours of nonthesis credit must be taken in courses available to graduate students only (700/800 level courses);
- 3 completion of the following core courses:
 - CS 621 Computer Organization II
 - CS 634 Operating Systems II
 - CS 670 System Simulation
 - CS 730 Systems Programming I
 - CS 780 Compiler Design and Construction I
- 4 satisfactory completion of a thesis. The level of sophistication must be approximately that expected of a computer science professional in an area in which the student is seeking preparation. The student will be examined orally by a committee concerning the thesis; and
- 5 a maximum ten credit hours from CS 700, 795, and 799 can be counted within the forty-five credit hours required for the degree.

Graduate Courses

Computer Science/CS

Computer Science 500, 501, 516, 517, 600, 620, 630, 631, and 633 are considered background for entering students and thus are not counted in the forty-five credit hours required for the degree.

- 500-4, 501-4 *COBOL Programming* Elements of COBOL language; techniques for debugging and interpreting computer output, linkage to subroutines and overlays; file structures involving both sequential and random access; case studies with business applications. 3 hrs. lect., 2 hrs. lab. Prerequisite: for 500: QBA 103 or some computer science course or programming experience; for 501: CS 500.
- 516-4, 517-4 *Numerical Methods for Digital Computers* An introduction to numerical methods used in the sciences. Included will be methods of interpolation, data smoothing, functional approximation, integration, solutions of systems of equations, and solutions of ordinary differential equations. 3 hrs. lect., 2 hrs. lab. Prerequisite: for 516: MTH 233 and CS 210 or CS 141; for 517: CS 516.

600-4 *Data Structures* Basic concepts of information. Modeling structures—linear lists; modeling structures—multi-linked structures; machine-level implementation structures; storage management; programming language implementation structures; sorting and searching; examples of the use of information structures. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 142 or 210 or consent of instructor.

602-4 *Introduction to Computer Communication* A survey of modern digital communications techniques. Specific focus is on serial transmission to public communications channels. Topics include information content and coding, asynchronous and synchronous formats, concentrating and multiplexing, channel properties, modulation techniques, common carrier services, error sources and control, regulatory policies, networks and their analysis. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 260 or equivalent; knowledge of Fortran.

605-4 *Case Studies in Information Systems* Existing and proposed computer-based information systems will be considered by the case studies method. Systems covered will include those referred to as "Management Information Systems." Particular systems chosen for examination will be selected on the basis of general interest of the system itself and availability of high-quality written material describing the system in detail. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 600.

620-4 *Computer Organization I* Describes the functional organization and sequential operation of a digital computer. Stored-program computer description using a computer design language; microprogramming; fixed-point arithmetic units; floating-point arithmetic units; serial arithmetic units. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 260 or consent of instructor.

621-4 *Computer Organization II* Describes the functional organization and sequential operation of a digital computer. Memory organization; memory addressing; channels; interface; microprogramming software. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 620.

630-4, 631-4 *Advanced Programming* Machine language programming and the use of assembly language programming systems for internal processing and control of external devices. A particular computer, machine language, and programming system will be used extensively to illustrate the concepts covered and to give the student actual programming experience. Prerequisite: for 630: CS 141 or 210 or consent of instructor; for 631: CS 630.

- 633-4 *Operating Systems* The role of software organization in general computer systems is studied. The problems, techniques, and concepts that arise in multi-access, multiprogram, and multiprocess systems are emphasized. A historical approach is used. 3 hrs. lect., 2 hrs. lab. Prerequisite: any 600-level computer science course.
- 634-4 *Operating Systems II* The concepts introduced in CS 633 are developed in greater detail and depth. Prerequisite: 633 or equivalent.
- 640-4 *Introduction to Systems Approach* An introduction to the use of computers for systems analysis. Examples from and applications to a broad range of systems will be presented. FORTRAN is the current implementation language used. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 141 or previous programming experience. Open to seniors and graduate students majoring in education.
- 641-4 *Data Processing Systems* Computer structure, machine language, addressing techniques, and digital representation of data. Symbolic coding, program segmentation, and linkage. Systems and utility programs. Discussion of I/O hardware and software. Hands-on experience using a small computer system. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 640. Open to seniors or graduate students majoring in education.
- 642-4 *Survey of Programming Languages* Concepts and special purpose facilities in programming languages examined through languages of basic Cobol, Fortran, and RPG. Interactive programming in the language basic. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 640. Open to seniors or graduate students majoring in education.
- 653-4 *Design of Small Computing Systems* Projects in the laboratory which combine engineering hardware and computer science software concepts in the design and implementation of small special-purpose computer systems. 2 hrs. lect., 4 hrs. lab. Prerequisite: CS 621, 631.
- 670-4 *Systems Simulation* Introduction to simulation and comparison with other techniques. Discrete simulation models. Introduction to queuing theory and stochastic processes. Comparison of simulation languages. Simulation methodology. Selected applications of simulation. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 600 and statistics.
- 680-4 *Comparative Languages* Basic concepts and special purpose facilities in programming languages, examined through several representative languages, 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 600.
- 699-1 to 5 *Selected Topics* A study of selected topics in computer science. Permission of the instructor required. Repeatable.
- 700-3 *Principles of Instruction in Computer Science* A survey of available instruction materials and discussion of educational theory and techniques leading to more effective instruction. Required of and limited to those who hold graduate teaching assistantships in the Department of Computer Science.
- 701-4 *Information Retrieval System Design* Introduction to basic goals and techniques in design and implementation of information retrieval systems. Input, file organization, search strategies, output, language design, and evaluation techniques covered. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 600.
- 710-4 *Artificial Intelligence* Problem-solving methods in artificial intelligence with emphasis on heuristic approaches. Topics include methods of representing and searching the problem-state space, problem reduction analysis, and/or trees, resolution principle, survey of a number of AI projects. Prerequisite: CS 600.
- 720-4, 721-4 *Computer Architecture* A study of constructing highly specific and individual computers from basic building blocks such as memories, arithmetic units and busses. Topics included are stack mechanism, parallel computers, pipeline processing, processors based on programming languages, multiprocessing computers, and computer network. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 621, 634, 670.
- 730-4 *Systems Programming I* Detailed study of the design and source code of a sample multiprocess operating system. A major design and implementation project will be required for successful completion of the course. Lecture material will include a selection of topics concerning assemblers, macro languages, macroprocessors, loaders, and I/O programming. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 631, 634.
- 731-4 *Systems Programming II* Detailed study of the design and implementation of communication software components. A major project will be required for successful completion of the course. Lecture material will include synchronous and asynchronous line control, interactive and remote job entry user systems, interface with processing and file facilities. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 730.

735-4 *Evaluation and Prediction of System*

Performance An introduction to the modeling and analysis of computer system performance as a function of the hardware and software components of the system. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 670, 634, 600, and one course in statistics.

750-4 *Microprocessors*

A study of microprocessors and the use of microprocessors in digital systems. Fundamentals of microprocessor software, assembly-level programming for microprocessor applications, memory and interface considerations, and systems employing microprocessors. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 621.

780-4 *Compiler Design and Construction I*

A complete compiler for a small programming language will be discussed. Topics covered will be scanning, syntax analysis and code generation. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 631 or permission of instructor.

781-4, 782-4 *Compiler Design and Construction II, III*

These courses are an extension of CS 780. Topics will be covered in greater depth. 3 hrs. lect., 2 hrs. lab. Prerequisite: CS 780.

789-1 *Continuing Registration*

A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.

790-4 *Selected Topics in Computer Science*

Lectures and study on selected topics in current research and recent developments in computer science and computer engineering. 3 hrs. lect., 2 hrs. lab. Consent of instructor required.

795-1 to 4 *Independent Study*

Special problems in advanced computer science and engineering topics. Repeatable. Consent of instructor required.

799-1 to 8 *Thesis* Consent of adviser required.

Counseling and Guidance

See Education.

Curriculum and Supervision

See Education.

Earth Science

See Geology.

Economics

The Department of Economics offers an action-oriented and interdisciplinary graduate program which leads to a Master of Science degree in social and applied economics.

This program, accredited by the North Central Association of Colleges and Schools, is designed to bridge the gap which exists between research and the application of research in developing public policy for the solution of contemporary economic and social issues. Students will be encouraged to develop and evaluate new approaches to problem solving in our society. Research and field experience are stressed.

The Graduate Faculty

Professors Norman S. Anon, political economy, economic education; Mark Fabrycy, economic theory, econometrics, applied economics, forecasting; John L. Iacobelli (chairman), labor economics, manpower and human resource development; John J. Treacy, economic theory, public finance, socioeconomic data bases
Associate Professors Charles H. Blake, political economy, human resources and collective bargaining; Joseph T. Chao, monetary economics, economic theory, international economics; Robert Premus, regional-urban economics, public finance, economic theory, monetary economics; Steve M. Renas, cost-benefit analysis and public project evaluation, macroeconomics, monetary theory, environmental economics, financial institutions and markets

Assistant Professors Rishi Kumar, international economics, economics of development, comparative economic systems, economic theory, human resource economics; Robert Weinstein, labor economics, urban-regional economics, applied economics; John A. Whippen, socioeconomic systems, economic history and thought, consumer economics

Admission

An applicant for graduate study in the social and applied economics program is required to meet the general requirements of the School of Graduate Studies and also to be accepted by the graduate studies committee of the Department of Economics. Students need not have an undergraduate degree in economics to enter this program. The Graduate Record Examination is recommended and may be required for specific applicants.

Applications for admission and for the Graduate Record Examination are available in the office of the chairman of the Department of Economics or from the School of Graduate Studies. Part-time students are accepted for admission to the program.

Basic Degree Requirements

Candidates for the Master of Science degree in social and applied economics must successfully complete a minimum of forty-eight quarter hours in courses numbered 600 or above. Of the total forty-eight hours, thirty-six must be taken in the department (twenty-four hours of courses plus twelve hours internship). Students must achieve a cumulative grade point average of 3.0 in all graduate courses exclusive of the internship seminar, should it be taken, which requires a grade of satisfactory. No more than nine hours of C grades may be applied toward the degree.

The graduate studies committee of the Department of Economics may require a student to take and pass a comprehensive written and/or oral examination as a degree requirement.

All candidates will take an internship (twelve hours). Prior to the internship, the student must have completed twenty-four quarter hours (including QBA 723 and 725). Approval by the student's adviser and the Graduate Studies Committee of the department is also required. Detailed information on internship objectives, standards, and supervision is available upon request.

Prerequisites for the Program

Prerequisites for the program are Principles of Economics, Introductory Statistics, and College Algebra or its equivalent. Upon approval of the Graduate Studies Committee of the Department of Economics, a student may erase deficiencies in program prerequisites after admission to the program but before taking courses requiring these specific prerequisites.

The Program

<i>Required Courses</i>	18
EC 715 Advanced Price Theory	3
EC 717 Advanced National Income Theory	3
EC 721 Political Economy	3
EC 725 Economic and Social Systems I	3
QBA 723 Quantitative Methods for Business Decisions I	3
QBA 725 Business and Social Science Research Methods	3
<i>Two economic problems seminars (EC 780-3)</i>	6
One or both taken in the Department of Economics	
<i>Electives</i>	12
<i>Internship (EC 760)</i>	12
<i>Total</i>	48

Graduate Courses

Economics/EC

- 500-3 *Consumer Economics for K-12 Teachers* An examination of consumers' major responsibilities as they affect and are affected by the total economy.
- 511-3, 512-3, 513-3 *Graduate Survey, Principles of Economics for Teachers* Basic economic principles for teachers with some background in the social sciences, but without previous instruction in economics. Consent of instructor required.
- 514-3, 515-3, 516-3 *Economic Studies for Teachers* Selected economic topics for teachers. Prerequisite: EC 511, 512, 513 or equivalent.
- 601-3 *Intermediate Managerial Economics* Role of economic analysis in management decision making.
- 602-3 *Monetary Theory* The development of the theories of money, role of interest and monetary policy, and their relationship to national income, output, prices, and balance of payments.
- 609-3 *Introduction to Econometrics* An application of statistics to the testing of economic theory. Prerequisite: college algebra or consent of instructor.
- 610-3 *Introduction to Mathematical Economics* An application of mathematical tools in the formulation of economic theory. Prerequisite: college algebra or consent of instructor.
- 612-3 *Economic Analysis and Forecasting of Business Cycles* Techniques and theories used in forecasting the business cycle. Prerequisite: EC 717 or consent of instructor.
- 621-3, 622-3 *Graduate Survey in Principles of Economics* A survey course in basic micro and macroeconomics theory designed for persons having had no previous work in economics.
- 631-3 *Federal Public Expenditure and Taxation Analysis* Examines the political economy of public expenditures, development of U.S. budget system, analytical techniques of benefits-cost analysis and federal taxation.
- 632-3 *State and Local Public Finance* Studies property, sales taxes, and the efficient provision of public and quasi-public goods such as education and public health services within the context of multilevel systems of government and intergovernmental grant programs.
- 641-3 *International Economics I* The economic basis of international trade; the nature and mechanism of international payments.
- 642-3 *International Economics II* International economic policies and problems. Prerequisite: EC 641 or consent of instructor.

- 644-3 *Economics of Development* Theoretical and empirical analysis of cultural change and industrial development; emphasis on emerging economies.
- 654-3 *Economics of Collective Bargaining* Development of collective bargaining in the United States; economic cost of labor-management relations. Prerequisite: EC 651 or approval of instructor.
- 715-3 *Advanced Price Theory* Examination of the general principles and analytical tools of microeconomic analysis at a graduate level.
- 717-3 *Advanced National Income Analysis* Examination of the general principles and analytic tools of macroeconomic analysis at a graduate level.
- 719-3 *Welfare and Evaluation Theory* A development of welfare theory which will attempt to apply theoretical constructs to concrete issues such as the development of cost-benefit studies and program planning budgeting. Prerequisite: EC 715.
- 721-3 *Contemporary Political Economy* History of economic policy and the evolution of contemporary institutions.
- 725-3 *Economic and Social Systems I* Exploration of the philosophical issues in the social sciences, with emphasis on the scientific analysis of value. Comparison of positivist versus instrumental approaches to the scientific analysis of human behavior and their applications to real world problem sets.
- 726-3 *Economic and Social Systems II* Contemporary controversial social issues and problems. Emphasis on applying the combined knowledge of the social sciences to the analysis of problem areas. Critical analysis of evolutionary versus revolutionary approaches to problem solving. Prerequisite: EC 725 or consent of instructor.
- 730-3 *Regional and Urban Economics* Analysis of the basic forces that shape the economic, social and physical environment of urban and non-urban regions. Emphasis will be on regional income determination and developmental models, location of economic activity, the structure of urban centers, intraurban economic relationships, and economic policy.
- 740-3 *Cost-Benefit Analysis and Social Project Evaluation* Application of economic analysis to the evaluation of highway, electricity, water supply, educational, and business investment projects. Prerequisite: EC 715 and QBA 723 or consent of instructor.
- 760-12 *Internship* One-quarter internship working in a selected private, social, or governmental organization under the direction of a faculty adviser and work supervisor. Details to be arranged in consultation with student's adviser and intern director. Monthly field reports and participation in field seminars are required. A grade of pass or unsatisfactory will be awarded, upon completion, by the faculty adviser.
- 765-3 *Labor Market Theory and Policy* Blends theoretical analyses of the forces affecting labor market processes with empirical investigation of labor market conditions and analyses of existing and proposed labor market programs and policies. Prerequisite: intermediate microeconomics and intermediate statistics or departmental approval.
- 777-3 *Economic Studies* An examination of special issues. Prerequisite: approval of the instructor.
- 780-3 *Economic Problems Seminars* Six hours of seminar must be selected from the following topics: Economics of Manpower; Regional and Urban Problems; Environmental Issues; Technological Change; Economic Development; Economics of Poverty; Income Maintenance. Each seminar is three credits.
- 781-1 to 3, 782-1 to 3, 783-1 to 3 *Research in Economics* Intensive reading or research in selected fields of advanced economics. Consent of instructor required.



Education

The College of Education offers programs leading to the Master of Arts or Master of Education degree in the following areas: Educational Leadership, with programs in curriculum and supervision and school administration; Human Services, with programs in school counseling, rehabilitation counseling (M.R.C. degree), and personnel counseling (M.S. degree); and Teacher Education, with programs in elementary and secondary education.

Concentrations in these programs are listed in the graduate programs section.

The Graduate Faculty

Professors Gary C. Barlow, art education; Carl V. Benner, mathematics education; Marlene Bireley, school psychology, special education; Beatrice F. Chait, elementary education, language arts, reading; James A. Dillehay, educational administration; Robert D. Earl, science education; Hal Gaddis, administration, curriculum; Lilburn Hoehn, curriculum, supervision; Wesley Huckins, guidance; Roger C. Iddings, science education; Harold Silverman, guidance; James K. Uphoff, social studies education, curriculum, supervision; Earl T. Zwetschke, guidance

Associate Professors Oris E. Amos, special education; Madeline Apt, evaluation, educational psychology; Dennis Badaczewski, English education, curriculum; Robert L. Clark, educational foundations; William E. Collie, curriculum and instruction, social studies education; Doris Dittmar, early childhood; S. Joseph Emanuel, Jr., guidance; Darold Engebretson (adjunct), guidance; Diane E. Frey, guidance; Glenn T. Graham, educational research; Perry Hall II, counseling; Thomas Matczynski, social studies education, curriculum, supervision; Lawrence T. Payne, educational psychology; Ruth B. Schumacher, educational psychology; Lewis Shupe, art education; Ralph E. Stuckman, educational administration, curriculum; Barbara F. Tea, administration, supervision; Eugene W. Wade, educational psychology; Mary Lou White, children's literature, language arts; Craig D. Willis (adjunct), educational foundations

Assistant Professors William Brown, evaluation, research; Charlene Carlock, guidance; Larry Chance, reading, language arts; John Chiodo, social studies education; Joseph Cobb, administration; Harry Ertel, business education; Eileen Fernandez, guidance; Gilbert R. Hutchcraft, educational psychology, evaluation, research; Albert Leonard, educational foundations; June Marable, reading; Peter O'Boyle, art education; Vincent Presno, curriculum; Jerome J. Schultz, special education; Alice Swinger, language arts; Joseph Young, administration

Admission

In addition to meeting the requirements for admission as established by the School of Graduate Studies, candidates for these degrees must also submit scores on the Miller Analogies Test and successfully complete a twelve quarter-hour competency-based core program. The specific core requirements are listed in the section describing the various programs and concentrations in education.

Core is the initial four graduate courses required before actual admission to the College of Education as a master's degree student. It is a competency-based program which relates a student's present achievement level directly with entry into a master's degree program. The initial four courses are designed so that the concepts and skills derived from these courses will be used as fundamental experiences for later course work in the program.

The following chart outlines the procedures for admission to the College of Education. The candidate's undergraduate cumulative grade point average is based on a 4.0 grading system.

Undergraduate grade point average

2.5 or better

Admission procedure

Conditional admission. After successful completion of core with a grade of B or better in each course, student is granted regular admission to College of Education.

Undergraduate grade point average

Between 2.3 and 2.5 but 2.7 or better in last half of undergraduate work

Admission procedure

Conditional admission. Upon successful completion of core with a grade of B or better in each course, student is granted regular admission to College of Education.

Undergraduate grade point average

Between 2.3 and 2.5 but less than 2.7 in last half of undergraduate work

Admission procedure

Admitted to nondegree graduate category. Complete core courses as nondegree student. Upon successful completion of core with a grade of B or better in each course, student is granted conditional admission to College of Education. Conditional admission consists of next twelve hours of courses. Regular admission requires a 3.0 cumulative average upon completion of these twelve hours.

Undergraduate grade point average

Less than 2.3

Admission procedure

Denial of admission to graduate school

Alternative

Admission as an unclassified undergraduate student. Completion of twelve quarter hours of upper level undergraduate courses approved in advance by Director of Graduate Studies, College of Education. These undergraduate courses will not apply toward work for the master's degree. Upon completion of the twelve hours with grades of B or better in each course, the student is admitted to the nondegree graduate category. Complete core courses as a nondegree student. Upon completion of core with grades of B or better in each course, student is granted conditional admission for an additional twelve hours of graduate work in the College of Education. Regular admission will require a 3.0 cumulative average upon completion of these twelve hours.

Any student considering graduate level courses in education should do so with the understanding that graduate study differs in quality from undergraduate study. Graduate study requires that the student be increasingly self-directed. It should be noted that attending and completing courses does not guarantee a master's degree.

Requirements for the Master of Arts Degree

The Master of Arts (M.A.) in education may be obtained in any of the programs offered by the College of Education. This is a thesis degree consisting of forty-five quarter hours, including nine quarter hours for the thesis. The program in guidance and counseling or personnel counseling requires a minimum of fifty hours including nine quarter hours for the thesis.

For students pursuing the M.A. degree with a major in art education, required courses include fewer studio and elective hours, and nine hours of thesis credits.

Requirements for the Master of Education Degree

The Master of Education degree is awarded only to those individuals qualified for at least a provisional teaching certificate. Individuals who have degrees in disciplines other than education, and who are not qualified for a provisional certificate, can obtain Ohio certification in either elementary or secondary teaching concurrently with the master's degree. Such programs are individualized and must be approved by the College of Education.

A program of concurrent degree and certification typically will require more course work than the standard master's degree program, and may necessitate the individual's taking undergraduate courses. These undergraduate courses apply to certification requirements, but do not apply as graduate credit toward a master's degree.

The Master of Education degree may be obtained by following one of two patterns: either (a) a minimum of forty-eight quarter hours of course work; or (b) a minimum of forty quarter hours of course work, plus five quarter hours of a research project. Guidance and counseling requires fifty-four quarter hours of course work, or forty-five quarter hours plus five hours of a research project.

Each graduate degree student will be assigned an adviser upon admission as a degree student. The student is required to consult with the adviser to plan the program of study during the first quarter of graduate study and to review the procedure for admission to candidacy.

Requirements for the Master of Science in Personnel Counseling

The purpose of the Master of Science with specialization in personnel counseling is to prepare individuals for counseling and guidance work in such fields as pastoral counseling; rehabilitation; personnel service work in higher education, government, business, and industry; or counseling positions in private or public service agencies.

Final Examination for Graduate Education Programs

For students in the M.A. programs, the oral defense of the thesis constitutes the major emphasis of the final evaluation. The examining committee will consist of three members of the graduate faculty selected with the student's adviser. For students writing a research project, the oral defense of the project constitutes the major emphasis of the final evaluation. The examining committee will consist of two members of the graduate faculty selected by the student and adviser.

For students in the M.Ed. programs, the final evaluation may be chosen from four options: a research project, a written comprehensive examination, a scholarly paper, or a clinical approach. The individual student must choose from one of these options after completing twenty-four graduate degree credit hours, and sign a contract with the adviser. A student may change the final evaluation choice up to the completion of thirty-six graduate degree credit hours with the adviser's consent.

Should the student fail to pass any of the above evaluations, the student and adviser will plan a program of study in preparation for reevaluation. Such a program could include independent study, further course work, or both. As a result, the quarter hour requirements for the degree may also be extended. Reevaluation will not take place until a minimum of one quarter has elapsed from the time of the last evaluation. Students may retake all or any part of the final evaluation a maximum of three times.

Thesis and/or Project Procedures for Master's Programs

Students planning to write a thesis or do a research project in partial fulfillment of the requirements for a master's degree should:

- 1 Complete ED 752 and ED 754.
- 2 Prepare a preliminary thesis or project proposal following the college outline for proposals. (This proposal may be done in conjunction with ED 754.)
- 3 Establish a thesis or project committee. It is customary, although not required, for a student's adviser to be a member of the committee. The remainder of the committee may include persons in education or other disciplines and should be chosen as resource persons relative to the research. The function of the committee is to facilitate the student's progress toward completing the proposal, conducting the study, and preparing the final report or thesis. Further, the committee serves as the primary source of evaluation of the student's oral defense.
- 4 Upon completion of the oral defense, submit three bound copies, following the College of Education and School of Graduate Studies style manuals, of the final project or thesis to the Director of Graduate Studies, College of Education. The outline for thesis and project proposals may be obtained from the Director of Graduate Studies, College of Education.

Curriculum and Supervision Program

Within the curriculum and supervision master's program, the student may select one of six areas of concentration. Five of the concentrations lead to state certification in supervision. (The teacher leader concentration does *not* lead to new certification.) Each concentration is designed to prepare the student as an educational leader in an organizational setting. The number of hours required to complete the program ranges from forty-eight to fifty-four. Courses may be waived by approval of appropriate staff members. It is strongly recommended that the student consult an adviser to plan a program.

Admission and Retention Policy

Following admission to the School of Graduate Studies and the successful completion of core, students are admitted to the curriculum and supervision program and complete the general requirements. Admission to candidacy is based on the following:

- 1 The student's statement of short- and long-range professional goals related to how the curriculum and supervision program might assist in the achievement of those goals. This statement should be filed in the coordinator's office during the quarter the student finishes the general requirements.

- 2 Letters of recommendation from two educators who know the student's professional capabilities and competencies. The student should file the names of two educators (one administrator and one teaching colleague) in the coordinator's office during the term of completion of the general requirements.
- 3 Performance in core and general requirement courses in terms of meeting the designated competencies.
- 4 Faculty appraisal of each student in the two curriculum and supervision courses in the basic and professional core.
- 5 Interview with faculty group (optional).

Elementary, Middle, Secondary, and Central Office Concentrations

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 743 Supervision of Teaching	3
<i>General Requirements (may be taken in any sequence)</i>	15
ED 754 Research Design and Analysis (highly recommended for central office concentration)	3
or	
ED 756 Introduction to Educational Research	3
ED 747 Leadership Skills	3
ED 701 Advanced Educational Psychology: Learning Theory	3
ED 732 Principles and Practices of the Middle School (to be taken by students in the middle school concentration)	3
or	
ED 735 Curriculum Processes	3
ED 796 Organization and Administration of Public Schools	3
<i>Professional Courses (taken in sequence after admission to candidacy. The order of 745 and 746 may be reversed.)</i>	18
ED 744 Analysis of Curriculum	4
ED 745 Curriculum Development in the Public School	4
ED 746 Supervision: Analysis of Teaching	4
ED 834 Practicum in Curriculum and Supervision	3
ED 840 Seminar in Curriculum and Supervision	3
<i>Electives</i>	3
<i>Total</i>	48

Special Education

This concentration is primarily for students who desire to seek curriculum and/or supervision positions in special education in a central office setting.

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to the Foundations of Education	3
ED 743 Supervision of Teaching	3
ED 751 Educational Statistics I	3
<i>General Requirements (may be taken in any sequence)</i>	12
ED 754 Research Design and Analysis or	3
ED 756 Introduction to Educational Research (advised for this concentration)	3
ED 747 Leadership Skills	3
ED 701 Advanced Educational Psychology: Learning Theory	3
ED 796 Organization and Administration of Public Schools (highly desirable elective)	3
<i>Professional Courses (taken in sequence after admission to candidacy; the order of 745 and 746 may be reversed)</i>	18
ED 744 Analysis of Curriculum	4
ED 745 Curriculum Development in the Public School	4
ED 746 Supervision: Analysis of Teaching	4
ED 834 Practicum in Curriculum and Supervision	3
*ED 840 Seminar in Curriculum and Supervision	3
<i>Other Requirements</i>	9
ED 765 Pupil Personnel Services in the Schools	3
*ED 850 Seminar in Special Education	3
ED 857 Classroom Implications of Psycho-Educational Assessment	3
<i>Electives</i>	2-8
Candidate should choose appropriate electives from 600, 700, and 800 level courses with advice-consent of adviser.	
Total	48

*Student may choose between ED 840 and 850.

Teacher Leader Concentration

This concentration is primarily for students who wish to continue teaching in an elementary, middle, or secondary setting but who desire to develop leadership skills appropriate to a building setting.

This concentration does not meet certification requirements for a supervisory certificate.	
<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 735 Curriculum Processes	3
<i>General Requirements (may be taken in any sequence)</i>	9
ED 756 Introduction to Educational Research	3
ED 603 Child Development or	3
ED 604 Adolescent Development or	3
ED 701 Advanced Educational Psychology: Learning Theory	3
ED 747 Leadership Skills	3
<i>Professional Courses (must be taken in sequence)</i>	9
Three courses which are designed to assist the student in becoming a leader at the building level are afforded in this group	
ED 741 Instructional Management I	3
ED 742 Instructional Management II	3
ED 835 Supervised Field Experience	3
<i>Electives</i>	18-22
ED 641 Education of Mentally Retarded	3
ED 649 Audiovisual Materials and Methods	4
ED 655 Education of Children with Learning and Behavior Disorders	3
ED 661 Principles of Guidance	3
ED 757 Student Appraisal	3
ED 733 Improvement of Teaching	3
ED 796 Organization and Administration of Public Schools	3
Any advanced methods courses appropriate to the candidate's certification	
Total	48

School Administration Program

Within the school administration master's program, the student may select one of seven areas of concentration. All concentrations lead to state certification in administration. Each concentration is designed to prepare the student as an educational leader in an organizational setting. Courses may be waived by approval of appropriate staff members. It is strongly recommended that the student consult an adviser to plan a program.

Admission and Retention Policy

Following admission to the School of Graduate Studies and the successful completion of core, students are admitted to the school administration program and complete the general requirements. Admission to candidacy is based on the following:

- 1 The student's statement of short- and long-range professional goals and how the school administration program might assist in the achievement of those goals. This statement should be filed in the coordinator's office during the quarter the student finishes the general requirements.
- 2 Letters of recommendation from two educators who know the student's professional capabilities and competencies. The student should file the names of two educators (one administrator and one teaching colleague) in the coordinator's office during the term of completion of the general requirements.
- 3 Performance in core and completion of the other prescribed course requirements for candidacy.
- 4 Faculty appraisal of each student in at least two administration courses in the basic and professional core.
- 5 Interview with faculty group (optional).

Administration: Principalship

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to the Foundations of Education	3
ED 751 Educational Statistics I	3
ED 796 Organization and Administration of Public Schools	3
<i>Courses taken prior to candidacy</i>	12
ED 756 Introduction to Educational Research	3
ED 701 Advanced Educational Psychology: Learning Theory	3
ED 798 The Secondary School Principalship	3
or	
ED 797 The Elementary School Principalship	3
or	
ED 795 The Middle School Principalship	3
ED 735 Curriculum Processes	3

<i>Other requirements</i>	15
ED 661 Principles of Guidance	3
ED 743 Supervision of Teaching	3
or	
ED 746 Supervision: Analysis of Teaching	4
ED 783 School Law and Finance for School Principals	3
ED 790 Practicum in School Administration	3
ED 791 Seminar in School Administration	3
<i>Recommended electives</i>	9
<i>Total</i>	48

Educational Administrative Specialist in Instructional Services

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 796 Organization and Administration of Public Schools	3
<i>Courses taken prior to candidacy</i>	12
ED 756 Introduction to Educational Research	3
or	
ED 757 Student Appraisal Methods	3
ED 701 Advanced Educational Psychology: Learning Theory	3
ED 735 Curriculum Processes	3
or	
ED 732 Principles and Practices of the Middle School	3
ED 743 Supervision of Teaching	3
<i>Other required courses</i>	17
ED 744 Curriculum Analysis	4
ED 745 Curriculum Development in the Public School	4
ED 746 Supervision: Analysis of Teaching	4
ED 790 Practicum in School Administration	3
ED 791 Seminar in Educational Administration	3
<i>Electives (adviser approval required)</i>	7
<i>Total</i>	48



Educational Administrative Specialist in Pupil Personnel

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 796 Organization and Administration of Public Schools	3
<i>Courses taken prior to candidacy</i>	12
ED 752 Educational Statistics II	3
ED 754 Research Design and Analysis	3
CNL 763 Theories of Counseling	3
CNL 667 Group Background and Theory or	3
CNL 767 Group Processes in Counseling and Guidance	3
<i>Other required courses</i>	18
ED 765 Pupil Personnel Services in the Schools	3
CNL 864 Practicum in Counseling I	3
CNL 761 Psychometrics	3
CNL 863 Techniques of Counseling	3
ED 790 Practicum in School Administration	3
ED 791 Seminar in Educational Administration	3
<i>Electives (adviser approval required)</i>	12
<i>Total</i>	54

Educational Administrative Specialist in Special Education

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 796 Organization and Administration of Public Schools	3
<i>Courses taken prior to candidacy</i>	12
ED 756 Introduction to Educational Research	3
ED 701 Advanced Educational Psychology: Learning Theory	3
ED 735 Curriculum Processes or	3
ED 732 Principles and Practices of the Middle School	3
ED 857 Implications of Psycho-Educational Assessments	3
<i>Other required courses</i>	15
ED 661 Principles of Guidance	3
ED 765 Pupil Personnel Services in the Schools	3
ED 850 Seminar in Special Education	3
ED 790 Practicum in School Administration	3
ED 791 Seminar in School Administration	3
<i>Electives (adviser approval required)</i>	9
<i>Total</i>	48

Educational Administrative Specialist in Educational Research

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 796 Organization and Administration of Public Schools	3
<i>Courses taken prior to candidacy</i>	12
ED 752 Educational Statistics II	3
ED 754 Research Design and Analysis	3
ED 701 Advanced Educational Psychology: Learning Theory	3
ED 757 Student Appraisal Methods	3
<i>Other required courses</i>	17-21
ED 753 Educational Statistics III	3
ED 755 Research Project or	5
ED 899 Thesis	9
ED 854 Intellectual Assessment for School Psychologists	3
ED 790 Practicum in School Administration	3
ED 791 Seminar in School Administration	3
<i>Electives (adviser approval required)</i>	7
<i>Total</i>	45-48

Counseling and Guidance Program

The counseling and guidance program, leading to the Master of Arts or Master of Education degree, offers concentrations in school counseling, visiting teacher, or school psychology. This program is designed for students with professional backgrounds in education.

Students are expected to take electives in areas other than counseling and guidance. Elective courses are mutually decided upon by the student and the adviser. Graduate courses in the behavioral sciences (anthropology, psychology, sociology) are suggested electives. Depending upon the student's background and educational objectives, other electives may be more appropriate.

The following requirements and procedures must be met by students applying for candidacy for the M.Ed. or M.A. degrees within counseling and guidance: complete appropriate graduate core requirements for area of concentration; complete an interview with the assigned adviser and file a planned program of study; demonstrate proficiency with specified counseling behaviors during CNL 863; and complete the application for a counseling practicum during the first week of the term preceding the quarter in which the practicum is offered, except for fall quarter which is done during the first week of spring quarter.



School Counseling Concentration

<i>Core</i>	12
ED 601 Communication in Education	3
ED 704 Foundations of Education	3
ED 751 Educational Statistics I	3
CNL 763 Theories of Counseling	3
<i>Professional requirements</i>	36
CNL 662 Problems in Student Personality and Development	3
CNL 667 Group Background and Theory or	3
CNL 767 Group Processes in Guidance and Counseling	3
ED 756 Introduction to Educational Research	3
ED 758 Standardized Tests	3
CNL 762 Career Development	3
ED 765 Pupil Personnel Services in the Schools	3
ED 766 Occupational and Educational Information	3
CNL 769 Techniques of Child Counseling (recommended for students interested in working with children)	3
CNL 863 Techniques of Counseling	3
CNL 864 Individual Practicum I	3
CNL 865 Individual Practicum II	3
CNL 866 Group Practicum	3
<i>Electives</i>	6
<i>Total</i>	54

Visiting Teacher Concentration

<i>Core</i>	12
CNL 667 Group Background and Theory or	3
CNL 767 Group Processes in Guidance and Counseling	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
CNL 763 Theories of Counseling	3
<i>Professional requirements</i>	37-42
ED 604 Adolescent Development	3
ED 603 Child Development or	3-4
PSY 541 Developmental Psychology	4
PSY 633 Exceptional Child	4
CNL 662 Problems in Student Personality and Development	3
ED 756 Introduction to Educational Research	3
ED 758 Standardized Tests or	3
PSY 643 Tests and Measurements	4
ED 765 Pupil Personnel Services in the Schools	3
CNL 768 Community Resources	3
CNL 779 Marriage and Family Counseling	3
CNL 863 Techniques of Counseling	3
CNL 864 Individual Practicum I	3
CNL 866 Group Practicum	3
CNL 865 Individual Practicum II (see note below)	3
or	
ED 867 Internship	6
<i>Electives</i>	0-5
<i>Total</i>	54

Note: CNL 865 is required for students with one or more years experience as a teacher, counselor, or school psychologist; ED 867 is required for those with no previous experience in those areas.

School Psychology

Core	12
ED 601 Communication in Education	3
ED 751 Educational Statistics I	3
ED 701 Advanced Educational Psychology: Learning Theory	3
CNL 763 Theories of Counseling	3
<i>Required courses</i>	19-21
ED 756 Introduction to Educational Research (see note below)	3
ED 603 Child Development	3
or	
PSY 541 Developmental Psychology	4
PSY 731 Theories of Personality	4
CNL 761 Psychometrics	3
or	
ED 758 Standardized Tests	3
or	
PSY 643 Tests and Measurements	4
CNL 863 Techniques of Counseling	3
or	
CNL 769 Techniques of Child Counseling	3
CNL 864 Practicum in Counseling	3
<i>School psychology sequence</i>	33
ED 854 Individual Assessment for School Psychologists	3
ED 855 Individual Assessment of Learning Disabilities	3
ED 856 Individual Assessment of Behavior and Personality Disorders	3
ED 857 Classroom Implications of Psycho-educational Assessment	3
ED 868 Role and Function of School Psychologist	3
ED 829 Internship in School Psychology	18
<i>Strongly suggested electives</i>	6
CNL 667 Group Background and Theory	3
or	
CNL 767 Group Processes in Guidance and Counseling	3
ED 655 Educational Management of Children with Learning Disabilities/Behavior Disorders	3
<i>Total</i>	66-68

Note: M.A. students should take the following in lieu of ED 756:

ED 752 Statistics II	3
ED 754 Research and Design Analysis	3
ED 899 Thesis	39

Students without a teaching certificate must take 20-25 additional hours in education. Contact the program consultant for details.

Alternate Route Courses

(To be completed by students who are not certified teachers)

Pattern I

<i>Curriculum in the schools</i>	3-4
ED 735 Curriculum Processes	3
or	
ED 745 Curriculum Development in the Public Schools	4
<i>Purpose and organization of the school</i>	4
ED 702 Social Foundations of Education	4
or	
ED 703 Philosophy of Education	4
<i>Directed participation in the schools</i>	3
ED 650 Minor Problems	3
<i>Educational administration</i>	3
ED 796 Organization and Administration of Public Schools	3
or	
ED 797 The Elementary School Principalship	3
<i>Remedial instruction and education disability</i>	6
ED 655 Education of Children with Learning and Behavior Disorders	3
ED 656 Clinical Practice in Learning Disabilities I	3
<i>Educational psychology</i>	4
ED 701 Advanced Educational Psychology (students must take PSY 561 to fulfill Psychology of Learning requirement)	4
<i>Total</i>	23-24

Pattern II (leads to EMR certification)

ED 655 Education of Children with Learning and Behavior Disorders	3
ED 641 Introduction to Mental Retardation	3
ED 642 Curriculum Development for the Mentally Retarded	3
ED 643 Skill Subjects for the Mentally Retarded	3
ED 644 Materials for the Mentally Retarded	3
ED 645 Occupational Training for the Mentally Retarded	3
ED 419 Supervised Teaching	3
and	
ED 422 Student Teaching Seminar	15-18
<i>Total</i>	33-36

Personnel Counseling Program

The personnel counseling program, leading to the Master of Science or Master of Arts degree, offers a business and industrial, mental health, or rehabilitation counseling concentration. This program is designed primarily for students with noneducation interests or backgrounds. The M.A. degree requires a thesis.

As in the M.A. or M.Ed. programs in counseling and guidance, students are expected to take electives outside their major field. Electives are mutually decided upon by student and adviser. Graduate courses in the behavioral sciences are suggested, but other electives may be more appropriate.

The following requirements and procedures must be met by students applying for candidacy for the M.S. or M.A. degrees within personnel counseling: complete appropriate graduate core requirements for area of concentration; complete an interview with the assigned adviser and file a planned program of study; demonstrate proficiency with specified counseling behaviors during CNL 863; and complete the application for a counseling practicum during the first week of the term preceding the quarter in which the practicum is offered, except for fall quarter which is done during the first week of spring quarter.

Mental Health Concentration

<i>Core</i>	12
ED 601 Communication in Education	3
ED 751 Educational Statistics I	3
CNL 663 Mental Health	3
CNL 763 Theories of Counseling	3
<i>Professional requirements</i>	33
CNL 667 Group Background and Theory	3
or	
CNL 767 Group Processes in Guidance and Counseling	3
ED 756 Introduction to Educational Research	3
CNL 761 Psychometrics	3
CNL 762 Career Development	3
CNL 768 Community Resources	3
CNL 769 Techniques of Child Counseling (recommended for students interested in working with children)	3
CNL 779 Marriage and Family Counseling	3
CNL 863 Techniques of Counseling	3
CNL 864 Individual Practicum I	3
CNL 865 Individual Practicum II	3
CNL 866 Group Practicum	3
<i>Advised electives</i>	9
<i>Total</i>	54

Rehabilitation Concentration

<i>Core</i>	12
ED 601 Communication in Education	3
ED 751 Educational Statistics I	3
CNL 763 Theories of Counseling	3
RHB 771 History and Philosophy of Rehabilitation Counseling	3
<i>Professional requirements</i>	43
CNL 667 Group Background and Theory	3
or	
CNL 767 Group Processes in Guidance and Counseling	3
RHB 774 Selected Problems	3
RHB 775 Graduate Seminar	3
ED 756 Introduction to Educational Research	3
CNL 761 Psychometrics	3
CNL 762 Career Development	3
CNL 766 Occupational and Educational Information	3
RHB 773 Rehabilitation Medicine	3
CNL 863 Techniques of Counseling	3
CNL 864 Individual Practicum I	3
RHB 873 Clinical Internship in Rehabilitation	13
<i>Total</i>	55

Business and Industrial Concentration

Core	12
ED 601 Communications	3
* MGT 621 Graduate Survey in Management	3
CNL 667 Group Background and Theory or	3
CNL 767 Group Processes in Guidance and Counseling	3
ED 751 Educational Statistics I or	3
QBA 621 Graduate Survey in Statistics	3
<i>Professional requirements</i>	42
CNL 663 Mental Health	3
MGT 700 Organization Theory	3
MGT 703 Seminar in Personnel Administration	3
MGT 706 Interpersonal and Organizational Communication and Change	3
ED 756 Introduction to Educational Research	3
CNL 761 Psychometrics	3
CNL 762 Career Development	3
CNL 763 Theories of Counseling	3
CNL 768 Community Resources	3
CNL 779 Marriage and Family Counseling	3
CNL 863 Techniques of Counseling	3
CNL 864 Individual Practicum I	3
CNL 865 Individual Practicum II	3
CNL 866 Group Practicum	3
*Can be waived with equivalent experience or course work and permission of College of Business management department. If waived, student should substitute from among the following:	
MGT 705 Seminar in Industrial Relations	3
MGT 704 Advanced Management Seminar	3
MGT 754 Dynamics of Industrial Design	3
MGT 763 Systems Management	3
<i>Total</i>	54

Master of Rehabilitation Counseling

The Master of Rehabilitation Counseling program prepares individuals for professional counseling and rehabilitation of the severely physically impaired. Admission into the program is based upon a comprehensive profile which includes undergraduate major, grade point average, Miller Analogies Test score, work experience, references, and personal interviews with the faculty. A new class begins during the first term of each academic year.

The program consists of the following professional course sequence:

<i>First Quarter</i>	15
RHB 701 Rehabilitation Counseling	5
RHB 702 Medical Assessment	5
RHB 703 Rehabilitation Research	5
<i>Second Quarter</i>	15
RHB 704 Rehabilitation Counseling	5
RHB 705 Behavioral Assessment	5
RHB 706 Counseling Techniques	5
<i>Third Quarter</i>	10
RHB 707 Job Development	5
RHB 801 Internship/Behavioral Assessment	5
<i>Fourth Quarter</i>	10
RHB 802 Internship/Medical Assessment	5
RHB 803 Internship/Counseling	5
<i>Total</i>	50

Classroom Teacher Program

The classroom teacher program includes a variety of concentrations in elementary education, secondary education, or specialized areas such as art education, business education, and special education. The college also offers a specialized program to prepare individuals as language arts and reading supervisors.

All elementary classroom majors are required to complete a concentration as part of the elementary classroom program. The following concentrations are representative and others are possible if approved by the adviser.

Elementary Education—Art Education

Core	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations in Education	3
ED 751 Educational Statistics I	3
One of the following:	
AED 731 Development of Art Education	3
AED 751 Current Problems in Art Education	3

<i>Admission to program</i>	15	One of the following:	
ED 733 Improvement of Teaching		ED 701 Advanced Educational Psychology	3
Elementary	3	ED 702 Social Foundations of Education	3
ED 735 Curriculum Processes	3	ED 703 Philosophy of Education	3
ED 756 Introduction to Educational Research	3	ED 707 History of Education	3
ED 757 Student Appraisal Methods	3	ED 708 Comparative Education	3
One of the following:		<i>Concentration in early childhood</i>	26
ED 701 Advanced Educational Psychology	3	ED 612 Kindergarten: Curriculum and Materials	4
ED 702 Social Foundations of Education	3	ED 614 Early Childhood Education Curriculum and Materials: Language	4
ED 703 Philosophy of Education	3	HPR 641 Perceptual Motor Theories and Curriculum	3
ED 707 History of Education	3	ED 713 Working with Parents of Young Children	3
ED 708 Comparative Education	3	ED 714 Creativity and Self-Concept of Young Child	3
<i>Art education concentration</i>	15-17	ED 715 Role of Administrator in Early Childhood Education	3
AED 641 Art Appreciation for the Public School	3	ED 717 Early Childhood Curriculum and Materials: Math and Science Readiness	3
One of the following:		ED 810 Elementary Seminar: Early Childhood	3
AED 751 Current Problems in Art Education	3	<i>Total</i>	48
AED 731 Development of Art Education	3		
AED 635 International Art Education	4	Elementary Education—Mathematics Education	
AED 630 Independent Reading in Art Education	3	<i>Core</i>	12
Three courses from the following:		ED 601 Communication in Education	3
AED 620 Art Metal	3	ED 704 Introduction to Foundations of Education	3
AED 621 Jewelry I	3	ED 751 Educational Statistics I	3
AED 623 General Fabrics	3	ED 613 Elementary Geometry: Curriculum and Materials	3
AED 624 Weaving	3	or	
AED 626 Fibers and Fabrics	3	ED 618 Improving Mathematics Instruction in the Elementary School	3
AED 627 Sculpture in the Public School	3	<i>Admission to program</i>	15
AED 642 Advanced Problems in Art Education: Ceramics	3	ED 733 Improvement of Teaching: Elementary	3
AED 643 Architectural and Environmental Awareness	3	ED 735 Curriculum Processes	3
Open credit in media (instructor's approval)	3	ED 757 Student Appraisal Methods	3
AED 633 Problems for the Elementary School	4	ED 756 Introduction to Educational Research	3
<i>Advised electives</i>	4-6		
<i>Total</i>	48	One of the following:	
		ED 701 Advanced Educational Psychology	3
Elementary Education—Early Childhood Education		ED 702 Social Foundations of Education	3
<i>Core</i>	13	ED 703 Philosophy of Education	3
ED 601 Communication in Education	3	ED 707 History of Education	3
ED 704 Introduction to Foundations of Education	3	ED 708 Comparative Education	3
ED 751 Educational Statistics I	3	<i>Mathematics education concentration</i>	16
ED 611 Early Childhood Education	4	ED 613 Elementary School Geometry: Curriculum and Materials	3
<i>Admission to program</i>	9	or	
ED 733 Improvement of Teaching	3	ED 618 Advanced Mathematics Instruction in the Elementary School	3
ED 756 Introduction to Education Research	3	ED 718 Curriculum and Instruction in School Mathematics	3

ED 818 Diagnosis and Remediation of Learning Difficulties in Elementary School Mathematics	3
MTH 545 Geometry for Elementary Teachers	4
ED 810 Seminar in Elementary Education (to be taken toward end of program)	3
<i>Advised electives</i>	5
Total	48

Elementary Education—Reading

This program leads to a validation of a standard elementary certificate as a reading teacher.

<i>Core</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to the Foundations of Education	3
ED 751 Educational Statistics I	3
ED 716 Advanced Reading Instruction	3
<i>Admission to program</i>	15
ED 733 Improvement of Teaching: Elementary	3
ED 735 Curriculum Processes	3
ED 757 Student Appraisal Methods	3
ED 756 Introduction to Educational Research	3
One of the following:	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education	3
ED 703 Philosophy of Education	3
ED 707 History of Education	3
ED 708 Comparative Education	3
<i>Reading concentration</i>	15
ED 655 Education of Children with Learning and Behavior Disorders	3
ED 656 Clinical Practices in Learning Disabilities	3
ED 721 Literature for Children or LCS 616 Literature for Adolescents and Young Adults	3
ED 810 Seminar in Elementary Education: Reading (to be taken toward end of program)	3
ED 832 Diagnosing and Correcting Secondary Reading Problems	3
<i>Advised electives</i>	6
Total	48

Elementary Education—Science Education

<i>Core</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 616 Improving Science Instruction in the Elementary School	3

<i>Admission to program</i>	15
ED 733 Improvement of Teaching: Elementary	3
ED 735 Curriculum Processes	3
ED 757 Student Appraisal Methods	3
ED 756 Introduction to Educational Research	3
One of the following:	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education	3
ED 703 Philosophy of Education	3
ED 707 History of Education	3
ED 708 Comparative Education	3
<i>Science concentration</i>	10-12
ED 626 Outdoor Education	3
ED 670 Curriculum and Instruction Workshop: Science Education	3
ED 650 Minor Problems: Science Education	1-3
ED 810 Elementary Seminar: General (to be taken toward end of program)	3
<i>Advised electives</i>	9-11
Total	48

Elementary Education—Social Studies Education

<i>Core</i>	12-13
ED 601 Communication in Education	3
ED 704 Introduction to the Foundations of Education	3
ED 751 Educational Statistics I	3
A content course selected from economics, history, geography, political science, religion, sociology	3-4
<i>Admission to program</i>	15
ED 733 Improvement of Teaching: Elementary	3
ED 735 Curriculum Processes	3
ED 757 Student Appraisal Methods	3
ED 756 Introduction to Educational Research	3
One of the following:	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education	3
ED 703 Philosophy of Education	3
ED 707 History of Education	3
ED 708 Comparative Education	3
<i>Social studies concentration</i>	12
Courses selected from economics, history, geography, political science, religion, sociology	9
ED 810 Elementary Seminar: Social Studies (to be taken toward end of program)	3
<i>Advised electives</i>	8-9
Total	48

Elementary Classroom Teacher: Student Learning and Behavior

This concentration is designed for elementary classroom teachers who wish to improve their skills related to: diagnosing and facilitating child learning patterns; fostering the personal and social growth of children; and maximizing teaching effectiveness in the classroom. Emphasis is placed on the application of principles derived from theory and related research.

<i>Core (may be taken in any sequence)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 701 Advanced Educational Psychology	3
<i>Admission</i>	9
ED 603 Child Development	3
ED 757 Student Appraisal Methods	3
ED 754 Educational Research Design and Analysis	3
<i>Concentration</i>	25
ED 802 Behavior Analysis in the Classroom	3
ED 705 Affective Education: Principles and Application	3
ED 615 Improvement of Elementary Reading Instruction	3
ED 733 Improvement of Teaching: Elementary	3
ED 745 Curriculum Development in the Public School	4
ED 655 Educational Management of Children with Learning Disabilities or Behavior Disorders	3
ED 810 Seminar in Elementary Education: Student Learning and Behaviors	3
ED 658 Practicum in Education	4
<i>Electives (with adviser approval)</i>	1
<i>Total</i>	48

Elementary Classroom Teacher: Student Learning and Behavior/Middle School

This concentration is designed for middle school classroom teachers who wish to improve their skills related to: diagnosing and facilitating child learning patterns; fostering the personal and social growth of children; and maximizing teaching effectiveness in the classroom. Emphasis is placed on the application of principles derived from theory and related research.

<i>Core</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 701 Advanced Educational Psychology	3
<i>Admission</i>	9
ED 603 Child Development	3
or	
ED 604 Adolescent Development	3
ED 757 Student Appraisal Methods	3
ED 754 Educational Research Design and Analysis	3
<i>Concentration</i>	25
ED 802 Behavior Analysis in the Classroom	3
A 700 level course in affective education	3
ED 615 Improvement of Elementary Reading Instruction	3
or	
ED 632 Improving Reading in the Secondary School	3
ED 733 Improvement of Teaching: Secondary	3
ED 745 Curriculum Development in the Public School	4
ED 655 Educational Management of Children with Learning Disabilities or Behavior Disorders	3
ED 810 Seminar in Elementary Education: Student Learning and Behaviors	3
ED 658 Practicum in Education	4
<i>Electives (with adviser approval)</i>	1
<i>Total</i>	48

Secondary Education

<i>Core</i>	12-13
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
Course from academic content field	3-4
<i>Other required courses</i>	12
ED 733 Improvement of Teaching in the Secondary School	3
ED 756 Introduction to Educational Research	3
ED 820 Seminar in Secondary Education	3
One of the following courses:	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education	3
ED 703 Philosophy of Education	3
ED 707 History of Education	3
ED 708 Comparative Education	3

Courses in academic teaching areas **24**
 At least 24 hours must be taken outside the College of Education including the fourth core course. At least 15 of these hours must be taken in one area of concentration.

Programs are individualized and must be established with an adviser.

Total **48-49**

Options are available in most secondary school teaching fields. For example, the following shows how a student wishing to concentrate in political science can complete this requirement.

American Politics Sample Concentration

Required course **4**

PLS 630 Seminar in American Politics and Government **4**

Two of the following: **8**

PLS 526 Government of Ohio **4**

PLS 528 Political Aspects of Urban Development **4**

PLS 540 Constitutional Law **4**

PLS 541 Civil Liberties **4**

PLS 542 The American Criminal Justice System **4**

PLS 546 Public Personnel Administration **4**

PLS 625 Seminar in Metropolitan Studies **4**

PLS 633 Public Opinion **4**

PLS 634 Political Socialization **4**

One of the following: **4**

PLS 572 International Organization **4**

PLS 580 American Foreign Policy **4**

PLS 603 Twentieth Century Political Thought **4**

PLS 645 Comparative Public Administration **4**

PLS 660 Seminar on Comparative Political Systems **4**

PLS 670 Seminar in International Relations **4**

Two courses from offerings in geography, history, political science, religion, sociology, or anthropology. These courses must be approved by the adviser.

Other concentrations may be designed to meet students' interests. Above is a sample of a concentration developed with the adviser.

Secondary Classroom Teacher: Student Learning and Behavior

This concentration is designed for secondary school classroom teachers who wish to improve their skills related to: diagnosing and facilitating student learning patterns; fostering the personal and social

growth of students; and maximizing teaching effectiveness in the classroom. Emphasis is placed on the application of principles derived from theory and related research.

Core (may be taken in any sequence) **12**

ED 601 Communication in Education **3**

ED 704 Introduction to Foundations of Education **3**

ED 751 Educational Statistics I **3**

ED 701 Advanced Educational Psychology: Learning Theory **3**

Admission **9**

ED 604 Adolescent Development **3**

ED 757 Student Appraisal Methods **3**

ED 754 Educational Research and Design Analysis **3**

Concentration **15**

ED 802 Behavior Analysis in the Classroom **3**

A 700 level course in affective education **3**

ED 820 Seminar in Secondary Education: Student Learning and Behavior **3**

ED 632 Improving Reading in the Secondary School **3**

ED 658 Practicum in Education **3**

Electives (outside the College of Education) **12**

Courses to be taken in academic teaching fields. These electives are individualized and must be approved by the program consultant in the teaching field.

Total **48**

Secondary Classroom Teacher: Religion Studies

Core **12**

ED 601 Communication in Education **3**

ED 704 Introduction to Foundations of Education **3**

ED 751 Educational Statistics I **3**

REL 629 Foundations for Religion Studies **3**

Education requirement **15**

ED 733 Improvement of Teaching: Secondary **3**

ED 756 Introduction to Educational Research **3**

ED 820 Seminar in Secondary Education **3**

ED 630 Teaching About Religion in Public Schools **3**

One of the following:

ED 707 History of Education **3**

ED 701 Advanced Educational Psychology **3**

ED 702 Social Foundations of Education **3**

ED 703 Philosophy of Education **3**

ED 708 Comparative Education **3**

<i>Religion component</i>	21	<i>Requirements of business education</i>	12
Three courses in non-Western religions	9	ED 607 Cooperative Office Education	3
A three course sequence selected from the following areas:		ED 608 Intensive Office Education	3
Western Religions		ED 624 Consumer Education in the Schools	3
Religion in American Life		ED 606 Survey of Vocational Education	3
Religion and the Social Sciences		ED 725 Administration and Supervision in Business Education	3
Philosophy of Religion		ED 726 Vocational Business Education Programs for Adults	3
Religious Literature		ED 727 Current Trends in the Basic Business Subjects	3
Individually designed sequence	9	ED 729 Current Trends in Bookkeeping and Data Processing	3
One religion elective	3	ED 730 Current Trends in the Technical Business Subjects	3
<i>Total</i>	48	* ED 820 Seminar in Secondary Education: Business Education	3
Art Education		<i>Requirements in business administration</i>	15
<i>Core</i>	12	Courses to be selected from	
May be taken in any sequence		accountancy, business, economics, finance, management, and marketing.	
ED 601 Communication in Education	3	Only one Economics for Teachers course may apply.	
ED 704 Introduction to Foundations of Education	3	<i>Electives</i>	3
ED 751 Educational Statistics	3	Electives as required to meet hourly requirements. Must have adviser approval.	
AED 751 Current Problems in Art Education	3	<i>Total</i>	48
or		*required	
AED 731 Development of Art Education	3	Reading Specialist	
<i>Required courses</i>	12-13	This prepares students for specialized work in reading in the elementary and/or secondary school. Completion of this concentration, and evidence of at least twenty-seven months of successful classroom teaching experience under a standard teacher's certificate, qualify the student for an Ohio provisional reading supervisor's certificate.	
AED 632 The Adolescent and the Creative Process	3	<i>Core</i>	12
AED 731 Development of Art Education	3	ED 601 Communication in Education	3
AED 752 Research in Art Education	3	ED 704 Introduction to the Foundations of Education	3
AED 633 Problems for the Elementary School	4	ED 751 Educational Statistics I	3
or		ED 716 Advanced Reading Instruction	3
AED 634 Problems for the Secondary School	4	<i>General requirements</i>	13
or		LCS 635 Production of Instructional Materials	4
AED 644 Art Education and the Special Student	3	or	
<i>Field of concentration</i>		ED 649 Audiovisual Materials and Methods	4
One of the following: Art Teacher, General Course; Art Teacher, Studio Concentration; or Art Therapy Concentration		ED 701 Advanced Educational Psychology	3
Business Education		ED 744 Curriculum Analysis	4
<i>Core</i>	12	ED 756 Introduction to Educational Research	3
ED 601 Communication in Education	3		
ED 704 Introduction to Foundations of Education	3		
ED 751 Educational Statistics I	3		
ED 724 Foundations of Business Education	3		
<i>Professional education courses</i>	6		
ED 756 Introduction to Educational Research	3		
ED 733 Improvement of Teaching: Secondary	3		

<i>Reading concentration requirements</i>	21
ED 721 Literature for Children	3
or	
LCS 616 Adolescent Literature	3
ED 655 Education of Children with Learning Disabilities and Behavior Disorders	3
ED 656 Clinical Practice in Learning Disability I	3
ED 743 Supervision of Teaching	3
or	
ED 747 Leadership Skill	3
ED 816 Individualized Reading	3
ED 832 Diagnosing and Correcting Secondary Reading Problems	3
ED 810 Seminar in Elementary Education: Reading (to be taken toward end of program)	3
<i>Electives</i>	2
<i>Total</i>	48

Special Education: Mental Retardation, Learning Disabilities and Behavior Disorders Concentrations, and/or Children and Youth with Multiple Impairments

Students who desire to work with exceptional children can meet state certification requirements in either mental retardation or learning disabilities/behavior disorders. Secondary education and non-education majors may add mental retardation certification by adding the background courses listed. Learning disabilities/behavior disorders requires prior or simultaneous certification in another area of education. Non-education majors who are interested in this latter area should contact an adviser in special education. Students with undergraduate special education certification should consider certification in curriculum and supervision or administrative specialist in special education (outlined elsewhere).

<i>Core (must be taken first)</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 641 Mental Retardation and Developmental Disabilities	3

<i>Certification Prerequisites</i>	
Students without elementary certification must take the following or demonstrate equivalent practical background prior to enrolling in the certification sequence.	
ED 701 Advanced Educational Psychology (or ED 202, 203)	3
ED 603 Child Development (undergraduate child or adolescent psychology courses are accepted as equivalent)	3
ED 615 Advanced Reading Instruction	3
ED 318 Elementary School Mathematics (MTH 343 is a prerequisite)	3

Learning Disabilities/Behavior Disorders Certification

The following sequence must be maintained.	
ED 641 Mental Retardation and Developmental Disabilities	3
ED 655 Educational Management of Children with Learning Disabilities and Behavior Disorders	3
ED 642 Curriculum Development and Materials for Exceptional Children	4
ED 641, 655, and 642 may be taken simultaneously.	
ED 656 Clinical Practice in Basic Skill Remediation	5
ED 802 Behavior Analysis in the Classroom	3
ED 656 and 802 may be taken simultaneously.	
Either ED 419 or 429, 422, or 658 (see below)	

EMR/TMR Certification

Complete LD/BD requirements <i>plus</i> ED 645 Occupational Training for the Mentally Retarded	3
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Student Teaching Requirements

For students with no previous certification—carries no graduate credit **12-15**

ED 419 Supervised Teaching, Elementary or	
ED 429 Supervised Teaching, Secondary	
ED 422 Student Teaching Seminar	

For students with prior certification

ED 658 Practicum in Special Education (may be on the job in the appropriate disability area or placement with a certified teacher)	4-9
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Additional requirements (master's degree; no certification)

ED 756 Introduction to Educational Research	3
ED 850 Seminar in Special Education (to be taken at end of program)	3
ED 701 Advanced Educational Psychology (proficiency test available for students with adequate background)	3
ED 735 Curriculum Processes	3
<i>Preferred electives (chosen by student and adviser)</i>	
ED 765 Pupil Personnel Services in the Schools	3
ED 857 Classroom Implications of Psycho-Educational Assessment	3
ED 659 Techniques in Counseling Parents of Exceptional Children	3
HPR 661 Adapted Physical Education	3
AED 644 Art Education and the Special Student	3
ED 611 Early Childhood Education	4
COM 621 Speech and Language Development	3
ED 615 Improvement of Elementary Reading Instruction	3
ED 702 Social Foundations of Education	3
RHB 674 Rehabilitation of the Emotionally Disturbed	3
RHB 675 Rehabilitation of the Disadvantaged	3
RHB 773 Rehabilitation Medicine	3
ED 740 Education of Children with Severe Emotional Problems	3
ED 739 Education of Orthopedically Handicapped Children	3

Special Education: Children and Youth with Multiple Impairments

This concentration emphasizes the trainable mentally retarded, the autistic, and children and youth with severe physical and mental impairments. It fulfills current standards for certification in TMR.

<i>Core</i>	12
ED 601 Communication in Education	3
ED 704 Introduction to Foundations of Education	3
ED 751 Educational Statistics I	3
ED 736 Introduction to Multiply Impaired Children (fall quarter only)	3
or	
* ED 641 Mental Retardation and Developmental Disabilities	3

Prerequisites

Students without equivalent undergraduate courses must complete these requirements before entering ED 737	
ED 641 Mental Retardation and Developmental Disabilities	3
ED 642 Curriculum and Materials for Exceptional Children	3
ED 645 Occupational Training for the Mentally Retarded	3
<i>Concentration in the multiply impaired</i>	
ED 737 Education and Training of the Multiply Impaired (winter quarter only)	3
ED 659 Counseling Parents of Exceptional Children	3
ED 739 Education of Orthopedically Handicapped Children (spring quarter)	3
ED 802 Behavior Analysis in the Classroom	3
ED 658 Practicum in Education	6
<i>Related requirements (M.Ed.)</i>	
ED 756 Introduction to Educational Research	3
ED 850 Seminar in Special Education	3
<i>Related requirements (M.A.)</i>	
ED 752 Educational Statistics II	3
ED 754 Educational Research Design and Analysis	3
ED 899 Thesis	9
<i>Electives (jointly decided by student and adviser)</i>	3-12

*to be taken only by students lacking ED 641, 642, 645, or equivalent

Library and Communication Concentration

The Division of Library and Communication Science offers courses for the professional preparation of library media specialists. The courses may be applied for teacher certification. A master's in education with a concentration in library media is available.

The objectives of the library media program are:

- 1 to acquaint students with the social and educational role of the library media center as a service institution in contemporary society;
- 2 to familiarize students with the field of librarianship as a profession;
- 3 to establish a foundation for service by developing professional attitudes toward the responsibilities of library media centers;
- 4 to acquaint students with current trends and issues in the profession; and
- 5 to qualify personnel to meet certification requirements of school media specialists in Ohio and other states.

Excellent facilities support the offerings of the Division of Library and Communication Science. These include the University Library, computer services, graphic production laboratory, television studio, and access to the resources of the Dayton-Miami Valley Consortium.

Graduate Courses

Art Education/AED

- 611-4 *Design: Process and Material* Advanced course in two- and three-dimensional design problems involving a wide range of techniques and materials related to teaching. Personal involvement in experimental approaches related to course problems. Prerequisite: three quarters design and eight advanced quarter hours in art education.
- 612-4 *Interior Design* Problems to help the public school art teacher develop an understanding of art appreciation for contemporary interior design. Areas such as furniture, fabrics, and interior architecture explored. Prerequisite: sixteen quarter hours in art education.
- 620-3, 621-3, 622-3 *Art Metal, Jewelry I, Jewelry II* 620: Development of skill in the manipulation of materials and tools for metal work. Creative problems in contemporary functional design. 621: Creative designing and making of jewelry. Technique and craftsmanship for various materials. 622: Advanced problems in the design and making of jewelry forms. Prerequisite: nine hours design.
- 623-3, 624-3, 625-3 *General Fabrics, Weaving, Textiles* 623: Introduction to fabrics as an art form. Beginning techniques of batik, weaving, stitchery, silkscreen printing. 624: Use of loom and other hand techniques in weaving. Experimental approaches explored in the completion of original ideas. 625: Methods of silkscreen printing on fabrics; emphasis on silkscreen as it may be used in the public school program; analysis of textile design in contemporary living. Prerequisite: nine quarter hours design.
- 626-3 *Fibers and Fabrics* A study of the various methods and procedures to use in working with stitchery and appliqued forms; exploration of ways to work with flat and stitched fabrics that lead to wall hangings and other fabric art forms. Prerequisite: nine quarter hours design.
- 627-3 *Sculpture in the Public School* Three-dimensional expression providing an overall view of sculpture and its relationship to the student and the creative process. Studio work in wire, clay, casting, plaster, wood, stone, and wax. Prerequisite: nine quarter hours design.
- 628-4 *Pupil Expression through Mural Painting* The development of individual creative expression through mural painting; the application of the mural technique to the public school program. Prerequisite: sixteen quarter hours of art education, four of which must be advanced.
- 629-2 to 6 *Workshop in Art Education* A workshop dealing with problems, processes, and techniques for the development of art activities in the elementary and secondary school. Work consists of the development of craft processes concerned with suitable projects for classroom work and public art education curricula.
- 630-3 *Independent Reading in Art Education* Independent work which extends and amplifies the student's knowledge of philosophy, aesthetics, creative and mental growth as related to art teaching and art education curricula. Emphasis is placed on current books, magazines, and research in art education.
- 632-2 *The Adolescent and the Creative Process* Fundamental course to help the prospective teacher to become aware of the adolescent. Laboratory experiences include problems of implementing a secondary art curriculum. Prerequisite: AED 431 or AED 331 or consent of instructor.
- 633-4 *Problems for the Elementary School* Integration of art in the general public school program. Discussions, library research, and individual problems. Prerequisite: sixteen quarter hours of art education, eight of which must be advanced.
- 634-4 *Problems for the Secondary School* Integration of art in the general public school program. Discussions, library research, and individual problems. Prerequisite: sixteen quarter hours of art education, eight of which must be advanced.
- 635-4 *International Art Education* A study of creative expression as it is seen in various cultures, with emphasis on contemporary issues in art education. A course to provide the teacher with a better understanding of art education on an international scope. Stress is given to method and procedures of implementing creative expression in various cultures, and understanding of these cultures is gained through their creative efforts. Prerequisite: sixteen quarter hours art education, eight of which must be advanced.

- 636-1 to 4, 637-1 to 4 *Minor Problems in Art Education* Individual problems in specified areas for the purpose of intense and concentrated work in one or more media; the development of a proficiency in one or more craft areas. Prerequisite: sixteen quarter hours of art education advanced crafts.
- 640-1 to 3 *Workshop/Field Trip in Art Education* Survey of visual and performing arts. Visits to museums, galleries, and commercial sources of contemporary design and architecture. Participants will be required to submit a written and/or visual evaluation of the places visited. Prerequisite: a bachelor's degree or equivalent.
- 641-3 *Art Appreciation for the Public School* Understanding the influences and the interaction of the creative arts in our present culture. Emphasis on the importance of developing appreciation in the public school and its application to teaching. Prerequisite: sixteen quarter hours of art education, eight of which must be advanced.
- 642-3 *Advanced Problems in Art Education* Concentrated and advanced work with a specific art medium such as ceramics, metals, and fabrics. Emphasis on creative work and methods of teaching advanced procedures applicable to the public school art room. Prerequisite: work in area of studio concentration.
- 643-3 *Architectural and Environmental Awareness* A combination seminar and studio focusing on curriculum development for the public school in architectural space and environmental awareness. Emphasis on human behavior and resources, ecology and human needs, aesthetics and history.
- 644-3 *Art Education and the Special Student* Experiences to help the teacher become aware of creative philosophy, art media, and therapeutic procedures. Approaches in working with the handicapped individual in creative activity. Prerequisite: ED 203, AED 331 or equivalent, or permission of instructor.
- 721-3 to 5 *Graduate Study in Crafts* Individual problems in several craft areas to meet the needs of teachers of art. Prerequisite: sixteen quarter hours of art or art education.
- 731-3 *Development of Art Education* Critical evaluation of the growth and development of the trends, principles, and theories in the field of art education as they have emerged in the U.S. and abroad. Prerequisite: a bachelor's degree in art education, elementary or secondary education, or art; and consent of instructor.
- 732-4 *Creative and Nonverbal Communication* A study of the comparative relationship between the creative process and the human need for nonverbal communication as it affects art and education. Prerequisite: a bachelor's degree.
- 734-4 *Art Education and Personality* A course in which human potentialities as related to the creative process are explored, with emphasis on human change resulting from creative expression and adjustment. Prerequisite: a bachelor's degree in art education, elementary or secondary education, or art; advanced educational psychology; graduate standing.
- 751-3 *Current Problems in Art Education* As seen in books, journals, and other professional publications; to encourage research and/or experimental investigations leading to writing for publication. Prerequisite: a bachelor's degree in art education or consent of instructor.
- 752-3 *Research in Art Education* A course to provide research techniques in art education from the initial planning stages to the completion of a thesis or paper. Emphasis is given to the study of current and past research, and to the development of a problem utilizing appropriate research techniques. Prerequisite: a bachelor's degree in art education.
- 821-4 to 16 *Special Problems in Art Education* Advanced study in a specific creative area in art education. A written report of research and investigation is required. Students may repeat this course for credit in different areas. Prerequisite: a major or minor in art education or art, beginning course or courses in the areas of specialization, graduate standing, and consent of instructor.
- 831-4 *Supervised Art in the Public Schools* Problems of teaching and supervising art in various types of communities and schools. Developing the ability to organize art materials and to interpret creative art methods. Prerequisite: a bachelor's degree in art education, elementary or secondary education, or art.
- 899-1 to 9 *Thesis*

Counseling/CNL

- 661-3 *Principles of Counseling* Overview of major counseling theories and techniques, review of historical foundations of the mental health movement, social, psychological, and philosophical influence are considered.
- 662-3 *Problems in Student Personality and Development* Considers student physical, psychological, and personality development in terms of the interrelationship of these factors and their effects upon student functioning. Family, school, and other social-psychological environments are studied in terms of their effect upon behavior.
- 663-3 *Mental Health* Factors influencing the behavior of individuals; methods a counselor may use in observing, analyzing, and improving attitudes and behavior. Graduate standing in education required.
- 667-3 *Group Background and Theory* Surveys the background, theory, patterns of function, techniques of facilitating, and the uses of small groups in counseling.
- 670-1 to 6 *Counseling Workshop* Selected topics in the human services area on a workshop or a one-time class basis will be considered. Topics will vary according to participant needs and interests. Specific subtitles to be added with individual workshops.
- 761-3 *Psychometrics* Surveys psychological tests and measurements with particular emphasis on attitude, interest, and personality tests. Understanding of basic principles and their application to counseling will be stressed. Prerequisite: ED 751.
- 762-3 *Processes of Career Development* Presents career development as a series of vocational-avocational choices in the process of self-realization and considers the effect of rapid social and technological change upon this process.
- 763-3 *Theories of Counseling* An investigation of the theoretical models that are basic to counseling function and practice as applied to the therapeutic situation. Graduate students only.
- 767-3 *Group Processes in Counseling and Guidance* Serves as an introduction to group counseling practice. Considers interaction patterns and dynamics within small groups, and understanding of individual and group behavior as it relates to the individuals within the course. Evaluation and research of group processes will also be considered. Advanced registration required.
- 768-3 *Community Resources in Counseling and Guidance* Surveys social agencies, both public and private, with which counselors should be familiar. An analysis of the referral process and the methods of interagency cooperation. There will be actual on-the-site visitation. Voids in services and areas of unmet human needs will be outlined, and the methods of social action essential to changing old agencies will be developed. Graduate students only.
- 769-3 *Techniques of Child Counseling* Stresses the theories and techniques of counseling children. Discusses the differences between counseling with adults and counseling with children. Specific aspects considered are role and function of a child counselor, group and individual counseling with children, vocational information for children, scholastic and personality testing of children, treatment methodology (including play therapy, family counseling, and teacher collaboration). Prerequisite: CNL 763.
- 770-1 to 3 *Independent Study/Minor Problems* Planned reading and/or project under the guidance of a counselor education program faculty member. Prerequisite: regular standing in graduate school, nine quarter hours of graduate credit in education, and permission of the instructor and Office of the Dean of Education. Repeatable to a maximum of nine quarter hours.
- 778-3 *Techniques of Play Therapy* An investigation of the techniques of play therapy for children ages three to twelve. This course is an advanced seminar for students interested in individual and group play and its therapeutic implications for schools and agencies. Prerequisite: CNL 863 or consent of instructor.
- 779-3 *Marriage and Family Counseling* Considers principles and techniques of marriage and family counseling from a variety of theoretical orientations. Laboratory and/or field experience may be required. Prerequisite: CNL 763.
- 860-3 to 6 *Advanced Seminar in Counseling* Provides an opportunity for advanced students to work on problems of their own selection under faculty supervision. Consent of instructor required.

- 861-3 *Individual Intelligence Testing I* Focuses upon theories and techniques of individual intellectual appraisal. The student learns to administer, score, and interpret the Stanford-Binet Intelligence Scale, Form L-M, for individuals of varying age levels. Prerequisite: CNL 761 or ED 758.
- 862-3 *Individual Intelligence Testing II* Focuses upon the Wechsler Intelligence Scale for Children and the Wechsler Adult Intelligence Scale. The student studies the background and learns to administer, score, and interpret the Wechsler tests for individuals of varying ages. Prerequisite: CNL 761 or ED 758.
- 863-3 *Techniques of Counseling Laboratory* practice in individual counseling techniques; focuses on the development of basic skills and procedures. Prerequisite: CNL 763, or may be taken concurrently with CNL 763. Student must have completed preadmission procedures. Consent of program coordinator is required.
- 864-3, 865-3 *Practicum in Counseling I and II* Provides an experience in counseling and guidance in which the student, under supervision, actually counsels individuals in educational, vocational, and personal areas. Prerequisite: CNL 863 and permission of adviser through application.
- 866-3 *Practicum in Group Counseling* Provides an opportunity to do group counseling under staff supervision. Prerequisite: CNL 864, 865.
- Education/ED**
- 601-3 *Communication in Education* Designed to acquaint students with the effect of their own inputs in communication-interpersonal transaction situations with the objective of developing self-directed behavior and the ability to facilitate self-expression in others. Small groups will be used as learning laboratories for this purpose.
- 603-3 to 4 *Child Development Factors* which influence growth and development. Prerequisite: ED 203 or equivalent.
- 604-3 *Adolescent Development* An examination of the period in the sequence of development known as adolescence; with particular attention given to physical development and its psychological and social concomitants and to the effect upon the adolescent of social forces, especially schools. Prerequisite: ED 203 or equivalent.
- 605-3 *Current Tendencies in Education A* consideration of current trends and theories in education, and the development of criteria and procedures for their evaluation and implementation. May be repeated to a maximum of twelve hours.
- 606-3 *Survey of Vocational Education* An overview of the instructional programs in vocational education with emphasis on the types of programs, their administration, and their relationship to other phases of education. The vocational services covered include business and office education, distributive education, agricultural education, home economics education, industrial arts education, health occupations, technical education, trade and industrial education, and vocational guidance.
- 607-3 *Cooperative Office Education* Qualifying course for cooperative office education programs. Overview with emphasis on coordinating techniques applicable in high school, post-high school, and adult training areas. Prerequisite: ED 633 or equivalent and graduate standing in business education.
- 608-3 *Intensive Office Education* Qualifying course for intensive office education programs. Comprehensive study in developing procedures and principles in program construction, selection, improvement, implementation, and development of program guidelines. Prerequisite: ED 633 or equivalent and graduate standing in business education.
- 611-4 *Early Childhood Education* Study of growth and development of preschool child with emphasis on interpretation of anecdotal records and case studies. For persons planning to teach in nursery schools and kindergartens. One half-day per week participation experience required during enrollment in course. Prerequisite: ED 119 or teaching experience and ED 203 or equivalent.
- 612-4 *Kindergarten: Curriculum and Materials* Study of various types of early childhood education programs in the United States; research in their historical background. Review of basic human growth and learning principles significant for understanding young children ages prenatal through 8. Focus on planning effective preschool programs. One half-day per week participation experience required during enrollment in course. Prerequisite: ED 119 or teaching experience and ED 203 or equivalent.

- 613-3 *Elementary School Geometry: Curriculum and Materials* A course designed to prepare elementary school teachers to teach geometrical concepts included in today's K-6 mathematics program. Emphasis will be on an informal approach to teaching the use of experimentation, intuition, and guided discovery. Prerequisite: MTH 545 and ED 203 or equivalent.
- 614-4 *Early Childhood Education Curriculum and Materials: Language* Review of developmental patterns of language, sequence of stages, general language patterns, and characteristics of speech of the young child. Study of linguistic differences as basis for preparation of curriculum and materials for instruction of young children. Basic emphasis: study of existing commercial materials for preschool language development, evaluation of these materials, and design and presentation of supplementary and basic teacher-made materials. Prerequisite: ED 403; recommended preparation: COM 421. One half-day per week participation experience required during enrollment in this course.
- 615-3 *Improvement of Elementary Reading Instruction* Curriculum, methods, materials, and evaluation in reading designed to improve the teacher's instructional skills. One half-day per week participation experience required during enrollment in course. Prerequisite: ED 317 or equivalent or instructor's permission and graduate standing.
- 616-3 to 4 *Improving Science Instruction in the Elementary School* Consideration of selected scientific principles which have particular application in the elementary school. Inquiry through a laboratory approach is emphasized. Prerequisite: BIO 111, 112, 113; ED 241, 242, 243 or equivalent; or consent of instructor.
- 617-3 to 4 *Elementary School Social Studies: Curriculum and Materials* Objectives, principles, and trends in elementary social studies education. Prerequisite: ED 119 or teaching experience and ED 203 or equivalent. One half-day per week participation experience required during enrollment in course.
- 618-3 to 4 *Improving Mathematics Instruction in the Elementary School* For teachers or supervisors who desire study in improvement in instruction. Prerequisite: ED 318 or equivalent.
- 623-3 *Human Factors in Driver and Traffic Education* Normal and abnormal characteristics of human beings as operators of motor vehicles. Special attention to the relation of personal characteristics to potential accident causation.
- 624-3 *Consumer Education in the Schools* Problems of the consumer: money management, credit and borrowing, life and other forms of insurance, real estate ownership, savings, and investment problems. Means of incorporating consumer education in the curriculum.
- 625-3 *Organization and Administration in Distributive Education* Understanding the organization and administration of distributive education in Ohio as it relates to federal concept in the U.S. Office of Education. Includes federal and state funding patterns involved in Ohio as well as federal legislation and funding. Prerequisite: ED 203 or equivalent and graduate standing.
- 626-2 to 4 *Outdoor Education* A course designed to provide teachers and leaders seeking skills in the use of the out-of-doors as a resource for program or curriculum enrichment, with laboratory experiences and field work in a variety of biotic communities emphasizing the ecological relationships.
- 627-3 *Driver and Traffic Safety Education: Curriculum and Materials* An analysis of the driving tasks. Selection of curriculum materials and evaluation techniques to be used in teaching the various factors affecting driver and traffic safety. Prerequisite: ED 203 or permission of the instructor.
- 628-3 *Organization of Driver and Traffic Safety Education Programs* Organizational aspects of driver and traffic safety education as they relate to the total school program. Historical and philosophical aspects, related professional organizations and occupational opportunities will be considered. The objectives, role, and organization of driver education laboratories will be examined. Laboratory experience will be provided. Prerequisite: ED 203 and 427 (may be taken concurrently).
- 630-3 *Teaching About Religion in the Public Schools* Taught jointly with the Department of Religion; see REL 630. An introduction to the historical background and court decisions pertaining to teaching about religion in the public schools; current ways in which religion is taught in the public school; and new experimental approaches to teaching about religion.

- 631-3 *Secondary School Science: Curriculum and Materials* Curriculum and materials for teaching science with special emphasis on objectives, evaluation, planning, resources and facilities, and curricular trends in science education. Prerequisite: ED 119 or teaching experience and ED 203 or equivalent. One half-day per week participation experience required during enrollment in course.
- 633-2 *Introduction to Business and Distributive Education* A survey course designed to acquaint the student with business and distributive education philosophy, objectives, and curricula on the secondary and postsecondary levels of instruction. Participation experience expected during enrollment in course. Prerequisite: ED 119 or teaching experience and ED 203 or equivalent and graduate standing in business or distributive education.
- 634-3 *Business Education Curriculum and Materials: Typewriting and Office Procedures* Curriculum, methods, and materials in typewriting and office procedures in the secondary school; current trends in the teaching of typewriting and office procedures. Prerequisite: ED 633.
- 635-3 *Business Education Curriculum and Materials: Shorthand and Transcription* Curriculum, methods, and materials in shorthand and transcription in the secondary school; current trends in the teaching of shorthand and transcription. Prerequisite: ED 633.
- 636-3 *Business Education Curriculum and Materials: Basic Business, Accountancy, and Sales Communication* Curriculum, methods, and materials in the basic business subjects, bookkeeping, and sales communication; current trends in the teaching of these areas. Prerequisite: ED 633.
- 637-3 *Methods of Teaching Distributive Education* Selection, organization, and presentation of subject matter in a distributive education program on the high school level and in adult extension programs. Methodology and teaching techniques will be emphasized through theory and practice. Prerequisite: ED 119 or teaching experience and ED 203 or equivalent; graduate standing. One half-day per week participation experience required during enrollment in course.
- 638-3 *Coordination Techniques in Distributive Education* Procedures in organizing and implementing a distributive education program, including recruitment and selection of students and training stations; and an in-depth study of the duties, problems, and techniques involved in coordination. Prerequisite: ED 203 or equivalent and graduate standing.
- 639-3 *Secondary School Social Studies: Curriculum and Materials* Objectives, principles, and trends in secondary social studies education. Prerequisite: ED 119 or teaching experience and ED 203 or equivalent; for history majors, thirty hours of history; for social studies comprehensive majors, seventy hours in social studies. One half-day per week participation experience required during enrollment in course.
- 641-3 *Mental Retardation and Developmental Disabilities* Overview of causes and effects of mental retardation and related developmental disabilities in home, school, and community settings. Prerequisite: ED 119 or teaching experience and ED 701, 603, or equivalent.
- 642-4 *Curriculum Development and Materials for Exceptional Children* Practices and procedures in developing curricula for exceptional children, including preparation, selection, and adaptation of instructional materials. Emphasis on a persisting life problems approach, including social studies and science content. One half-day per week participation experience required during enrollment in course. Prerequisite: ED 119 or teaching experience; ED 701, 603, or equivalent; ED 641, 655 (may be taken concurrently).
- 645-3 *Occupational Training for the Mentally Retarded* Role of occupational training in the curriculum; relationships with the world of work; problems of organizing and administering; methods and techniques used in developing occupational interests and abilities at various levels. Direct work with clients required. Prerequisite: ED 641, 655, 642, or permission of department.
- 647-4 *Teaching in the Public School* Study, observation, and evaluation of practices. Offered only to students who have completed the pertinent curriculum and materials course and are seeking a waiver of all or part of student teaching on the basis of full-time teaching experience.
- 649-3 to 4 *Audiovisual Materials and Methods* Role of visual and auditory instruction; the psychology of and educational principles pertinent to such instruction. Prerequisite: curriculum and materials course or courses.

- 655-3 *Education of Children with Learning Disabilities/Behavior Disorders* Overview of specific problems and major remedial approaches to children with learning disabilities and behavior disorders. Major emphasis on classroom management techniques. Prerequisite: ED 704, 603, 641. (ED 641 may be taken concurrently).
- 656-3 to 5 *Clinical Practice in Remediation* Supervised clinical practice in the diagnostic teaching of exceptional children. Emphasis on assessment, reading, and math curriculum and materials. Prerequisite: ED 318, 615 or 632, 641, 655, 642 or equivalent.
- 658-4 to 9 *Practicum in Education A* supervised teaching experience for students who have completed student teaching (or its equivalent) and are seeking certification in another field. Prerequisite: at least six quarter hours of professional education at Wright State. Permission of instructor required.
- 659-3 *Techniques in Counseling Parents of Exceptional Children* An overview of the exceptional child's effects on the family unit and the concerns and feelings of the family about the child. Techniques in counseling parents of these special children. Prerequisite: ED 455/655, ED 441/641 or permission of instructor.
- 661-3 *Principles of Guidance* Emphasizes the student's understanding of his or her personal frame of reference with respect to guidance and counseling principles and services. Social, psychological, and philosophical influences are considered.
- 670-1 to 6 *Curriculum and Instruction Workshop* (Specific subtitles to be added with individual workshops.) An intensive study of a selected area of the school curriculum designed to meet the particular needs of the participating preservice and in-service teachers, administrators, and curriculum supervisors. Graduate standing in education or consent of instructor required.
- 681-3 *Curriculum in Distributive Education* Securing, evaluating, and organizing instructional material and development of curriculum and experiences for high school distributive education cooperative classes and adult distributive education courses. Prerequisite: Educational Psychology and Organization and Administration of Distributive Education and graduate standing.
- 700-3 *Graduate Assistant Seminar* Orientation of graduate assistants to the organization and responsibility of the College of Education. Selected topics related to specific programs, services, and procedures in the college will be considered. Required of and limited to those holding first-year graduate assistantships in the College of Education.
- 701-3 *Advanced Educational Psychology* Investigates selected theories of learning and examines the relationship between the theories and instructional practice. Prerequisite: completion of graduate core.
- 702-3 *Social Foundations of Education* Relation between public education in a democracy and the critical social issues and social forces. Prerequisite: completion of graduate core including ED 704 and graduate standing.
- 703-3 *Philosophy of Education* In-depth analysis of the major philosophy of education and emphasis on its implications to the teaching-learning process and the development of a personal philosophy of education. Prerequisite: completion of graduate core including ED 704 and graduate standing.
- 704-3 *An Introduction to Foundations of Education* An investigation into the past and present social, philosophical, and psychological trends and issues in education in a democratic society. Prerequisite: admission to the graduate education core program.
- 705-3 *Affective Education: Principles and Applications* Designed to enable teachers to analyze affective aspects of classroom instruction and interaction, and to facilitate utilization of affective strategies within the classroom setting. Prerequisite: ED 603 or 604 or permission of instructor.
- 706-1 to 6 *Workshop in Social Foundations in Education* This course, through a workshop format, will enable the educator to receive immediate information and techniques to aid students in relation to specific social, legal, and philosophical aspects which directly affect the total educational offering. Graduate standing or permission of the instructor required.
- 707-3 *History of Education* Origin and development of educational institutions in the United States with emphasis on development of early childhood, elementary, secondary, and higher education. Prerequisite: completion of graduate core including ED 704 and graduate standing.
- 708-3 *Comparative Education* An analysis of educational systems as they relate to the values and cultures of selected countries. Prerequisite: completion of graduate core including ED 704 and graduate standing.

- 712-3 to 4 *Elementary School Curriculum (K-6)* An overview of past and present curricular developments. Major emphasis is placed on the curriculum in relation to identifying student needs, societal considerations, innovations, evaluation, objectives, and professional techniques of curriculum development.
- 713-3 *Working With Parents of Young Children* Study and practicum in homebound, early-intervention, and parent-involvement programs. Prerequisite: ED 611 or consent of instructor and graduate standing.
- 714-3 *Creativity and Self-Concept of the Young Child* Relationship of self-concept and creativity in the young child; exploration of commercial materials for self-concept; planning and presentation of student-constructed evaluation materials. Prerequisite: ED 611 or consent of instructor and graduate standing.
- 715-3 *Role of Administrator in Early Childhood Education* Planning, implementation, coordination, supervision, and direction of early childhood programs. Prerequisite: ED 611 or 612 or consent of instructor and graduate standing.
- 716-3 *Advanced Reading Instruction* Development of effective reading instruction with emphasis on assessment and diagnosis. Prerequisite: ED 317 or 415/615 or equivalent and graduate standing.
- 717-3 *Early Childhood Curriculum and Materials: Mathematics and Science Readiness* Development of numerical and scientific concepts in young children, with emphasis on development of suitable curriculum and materials for nursery, preschool, and kindergarten children. Prerequisite: ED 611, 612, or consent of instructor and graduate standing.
- 718-3 *Curriculum and Instruction in Elementary School Mathematics* An analysis of the current curriculum, techniques of instructional improvement, and classroom management strategies in elementary school mathematics. Prerequisite: ED 618 or equivalent.
- 719-3 *Supervision of Student Teachers* A course designed for inservice elementary and secondary teachers who wish to prepare themselves for the responsibilities of cooperating teachers in the University Student Teaching Program. The principles and methods of supervision, including observation, analysis, and guidance are considered.
- 721-3 *Literature for Elementary Children* Extension and enrichment of knowledge of children's books. Introduction to research and scholarly and critical writing about children's literature in relation to classroom practices. Prerequisite: ED 335, 421 or equivalent or permission of instructor.
- 722-3 *Gifted Children and Youth* An overview of the characteristics of gifted children and youth; the historical and current aspects of education of the gifted and family problems and vocational concerns of the gifted. Prerequisite: teaching certification.
- 723-1 to 3 *Teaching the Gifted* Direct experience in the teaching of gifted children and youth. Subject content will vary according to the specific subtitle. Participation required. Prerequisite: ED 722.
- 724-3 *Foundations of Business Education* Philosophy and objectives of the total business education curriculum on the secondary and postsecondary levels of instruction. Guidance, selection, and placement of students and contemporary influences on business education will be included. Graduate standing in education required.
- 725-3 *Administration and Supervision in Business Education* Organization of business education in the United States, examination of evaluative criteria for departments of business education, teacher selection and supervision, and the impact of federal legislation on business education. Graduate standing in education required.
- 726-3 *Postsecondary Programs in Business Education* Investigation of business education programs in community, junior, and technical colleges, including curriculum, special methods, development of curriculum materials suitable to such programs, and field participation. Graduate standing required.
- 727-3 *Curriculum Trends in the Basic Business Subjects* Recent developments in the teaching of basic business subjects and the development of appropriate teaching.
- 728-3 *Curriculum and Materials in Economic Education* A critical analysis of the material available in economic education, the development of appropriate teaching units, and the application of special methods in the teaching of economics on the elementary, secondary, and postsecondary levels of instruction.
- 729-3 *Curriculum Trends in Bookkeeping and Data Processing* An analysis of the curriculum in bookkeeping and data processing and the development of appropriate teaching units in this area.

- 730-3 *Curriculum Trends in the Technical Business Subjects* Trends, application of new teaching media, and the development of teaching units in typewriting, shorthand, transcription, office procedures, and office machines.
- 731-3 to 4 *The High School Curriculum* An overview of past and present curricular development for grades 9-12. Major emphasis is placed on curriculum in relation to identifying student needs, societal considerations, innovations, evaluation, objectives, and professional techniques of curriculum development.
- 732-3 *Principles and Practices of the Middle School* A study of the historical and underlying philosophy of the middle school concept based upon the nature of the student. Current and possible future instructional and curricular practices will be viewed in relation to this philosophy.
- 733-3 *Improvement of Teaching* A course in principles and practices for improving instruction. Emphasis is on alternative instructional techniques, goal-oriented teaching, instructional self-analysis, and improvement and research findings related to teaching effectiveness. Prerequisite: completion of core.
- 735-3 *Curriculum Processes* Overview of past and present curricular trends and development processes. Primary focus on curriculum development models, organizational patterns, developing goals and objectives, innovations, and curriculum materials.
- 736-3 *Introduction to the Multiply Impaired Child* A review of etiological aspects, educational and training programs, concerns, and issues related to the multiply impaired including trainable retarded, autistic, and severely and profoundly physically and mentally handicapped. Observation in local facilities required. Prerequisite: ED 641 and 642.
- 737-3 *Education and Training of the Multiply Impaired* A review of organizations, methods, and techniques for educating and training multiply impaired children, youth, and adults. The course will also survey opportunities available for recreation, leisure time, and work habilitation. One half-day per week participation required. Prerequisite: ED 736 or permission of instructor.
- 738-3 *Supervision of Secondary School Mathematics* An analysis of curriculum, materials, techniques of instruction, and classroom management strategies to improve mathematics programs of secondary schools. Prerequisite: at least thirty hours of upper-level mathematics.
- 739-3 *Education of Orthopedically Handicapped Children* An overview of the etiology of physical handicaps in children. Emphasis will be placed on psychoeducational and physical needs and the adaptation of instructional methods and materials. Participation required. Prerequisite: ED 641, 655, 642 or equivalent.
- 740-3 *Education of Children With Severe Emotional Problems* An introduction to the emotionally disturbed child and his problems in the classroom. An overview of the major intervention and prevention strategies. Prerequisite: ED 641 or permission of the instructor.
- 741-3 *Instructional Management I* Management and leadership skills as related to organizational patterns, staffing, utilization of space, time, and facilities at the building level. Prerequisite: completion of core and general requirements.
- 742-3 *Instructional Management II* This course is focused on management and leadership skills as related to the development and organization of curriculum and materials and implementation of the learning program with students. Prerequisite: completion of core and general requirements.
- 743-3 *Supervision of Teaching* Principles, methods, and techniques of leadership in improving the educational programs of elementary and secondary schools. Prerequisite: ED 735; ED 701 recommended.
- 744-3 *Curriculum Analysis* A course for teachers, administrators, and curriculum specialists interested in improving curriculum. The focus is on research and evaluation of curriculum, the application of curricular models, learning theory, and management systems. Prerequisite: ED 735, ED 701, and ED 756 recommended.
- 745-4 *Curriculum Development in the Public School* A K-12 curriculum development process course. The focus of the course will be a practical application of principles and techniques of curriculum design, development, implementation, and evaluation. Prerequisite: ED 735 and 744.
- 746-4 *Supervision: Analysis of Teaching* A study of processes and techniques useful in analyzing and improving the instructional behavior of classroom teachers. Data gathering and feedback techniques such as interaction analysis, student feedback, performance objectives, etc., that expand teachers' and supervisors' alternative behavior opportunities. Prerequisite: completion of core and general requirements.

- 747-3 *Leadership Skills* This course is focused on the development of leadership skills and abilities and the dynamics of team functioning including decision-making models and processes, problem-solving techniques, communication skills, conflict management, and self-improvement. Prerequisite: completion of core requirements.
- 748-4 *Administration and Supervision of the Audiovisual Program* Qualifications and duties of the director: planning and administering the program, preparation of budget, buying equipment, handling materials, in-service training, and evaluation of the program. Prerequisite: ED 449, 743 or approval of the department.
- 749-4 *Developing Materials for Classroom Instruction* Advanced course in the development of a wide range of techniques and materials for the improvement of instruction. The student will use understandings from ED 449 for developing and creating specific instructional materials for a particular class or grade level. Prerequisite: ED 449.
- 751-3 *Educational Statistics I* Computation and interpretation of descriptive statistics and linear correlation as they apply to educational measurement. An introduction to inferential statistics emphasizing the interpretation from a consumer point of view.
- 752-3 *Educational Statistics II* The computation and interpretation of inferential statistics as they relate to the design of educational research. Procedures include regression, z, t, chi square, and one- and two-way analysis of variance. Prerequisite: ED 751.
- 753-3 *Educational Statistics III* Multivariate analysis, including analysis of variance, analysis of covariance, and factor analysis. Prerequisite: ED 752 or consent of instructor.
- 754-3 to 6 *Educational Research Design and Analysis* Critical study of research techniques, design, and reporting methods with emphasis on the preparation of a thesis or research project. Prerequisite: ED 751 and 752.
- 755-1 to 5 *Research Projects* Conference course; individual research to satisfy requirements of research study for the Master of Education degree. Prerequisite: ED 754.
- 756-3 *Introduction to Educational Research* Surveys descriptive and experimental approaches to nomothetic and idiographic research. Particular emphasis is placed upon interpretation, evaluation, and synthesis of extant research and its application to current, practical educational issues. Prerequisite: ED 751.
- 757-3 *Student Appraisal Methods* An intensive study of methods constructed by and used by teachers for appraisal of student progress and adjustment. Prerequisite: ED 751 or equivalent.
- 758-3 *Standardized Tests: Achievement, Aptitude, and Interest Inventories* An intensive study of standardized achievement and aptitude tests, and interest inventories with special emphasis on selection, use, and interpretation of instruments used most commonly in schools. Prerequisite: ED 751 or equivalent.
- 765-3 *Pupil Personnel Services in the Schools* Presents theoretical aspects concerning the organization and administration of guidance services; practical application of principles to schools and other organizations. Graduate students only.
- 766-3 *Occupational and Educational Information* Considers the development of an educational-occupational library for students; the classification of the world of work and its implications for vocational counselors; the evaluation of vocational and scholarship materials; the use of occupational data in career counseling. Graduate students only.
- 770-1 to 3 *Independent Reading and Minor Problems* Planned reading and/or project under the guidance of a College of Education faculty member. Prerequisite: regular standing in the graduate school, nine quarter hours graduate credit in education, and permission of the instructor and Office of the Dean of Education. Repeatable to a maximum of nine quarter hours.
- 783-3 *School Law and Finance for School Principals* Procedures related to the management of school funds by the principal with special emphasis on budgeting and accounting procedures. Statutes and judicial decisions related to legal authority of school principals. (This course does not meet state requirements for the superintendent's certificate.)
- 785-3 *Introduction to Community Education* History, implementation, progress, publications, role of personnel, and current status of community education. Enrollment limited to graduate students.
- 786-3 *Community School* Introduction to and exploration of the community school concept. Enrollment limited to graduate students.
- 787-3 *School and Community* Development of understanding of home and community factors and their relationship to the educational process. Enrollment limited to graduate students.

- 790-3 to 4 *Practicum in School Administration* Provides an experience in school administration in which the student actually performs administrative tasks under supervision. This field experience will be planned jointly by the student and the adviser. Prerequisite: ED 795 or 797 or 798 and permission of the department.
- 791-1 to 4 *Seminar in School Administration* Individual and group study of administrative problems and concerns. Prerequisite: ED 796 and permission of instructor.
- 795-3 *The Middle School Principalship* Duties, problems, and roles of the middle school principal; relations with central administration, staff, students, and community. Prerequisite: ED 796.
- 796-3 *Organization and Administration of Public Schools* Principles of democratic school administration; management of teaching and nonteaching personnel; role of administration in facilitating teaching and learning; school-community relations. Graduate standing required.
- 797-3 *The Elementary School Principalship* Duties, problems, and roles of elementary school principals; relations with central administration, staff, students, and community. Prerequisite: ED 796.
- 798-3 *The Secondary School Principalship* Duties, problems, and roles of secondary school principals; relations with central administration, staff, students, and community. Prerequisite: ED 796.
- 801-3 *Current Issues and Problems in Education* Issues and problems in elementary and secondary education with special emphasis on changing needs, instructional patterns, and curricular organization.
- 802-3 *Behavior Analysis in the Classroom* Analyzes individual and group behavior in educational classrooms. Also, intervention strategies will be developed for selected behaviors. Prerequisite: ED 701 and/or PSY 637. One half-day per week participation experience required during enrollment in course.
- 810-3 *Seminar in Elementary Education* Special areas or problems in elementary education. Specific area announced each time course is offered. May be repeated once.
- 815-3 *Advanced Language Arts Instruction for the Elementary School* Designed for advanced study in current research, theories, and teaching practices in elementary language arts. Prerequisite: ED 316 or equivalent or permission of instructor.
- 816-3 *Individualized Reading* Ways of organizing and implementing a program of individualized reading, independent activities of students, and skill programs, including the place of flexible small groups and whole group activities. Prerequisite: ED 716 and ED 721 or LCS 616 or equivalent.
- 817-3 *Organization and Supervision of the Reading Program* Principles, methods, and techniques of giving leadership in improving the reading program. Special attention to the problems involved in initiating and sustaining change. Prerequisite: adviser's approval, ED 615 or ED 632 and ED 621.
- 818-3 *Diagnosis and Remediation of Learning Difficulties in Elementary School Mathematics* An examination of how children learn mathematics and why children have difficulty in computation. Participants will organize and administer mathematics diagnostic inventories, administer standardized diagnostic tests, interpret the results, and design appropriate remedial activities. Prerequisite: completion of a curriculum and materials course in mathematics or instructor's permission.
- 820-3 to 6 *Seminar in Secondary Education* Individual and group study of problems related to the several teaching areas in secondary school instruction. May be repeated once. Adviser's approval required.
- 829-6 *Internship in School Psychology* Supervised field practice in school psychology. Repeated three consecutive quarters. Advanced standing in the school psychology program required for placement.
- 832-3 *Diagnosing and Correcting Secondary Reading Problems* Diagnosing and correcting reading problems of secondary students. Exploration of secondary reading programs with emphasis on skill development. Prerequisite: ED 203 and 716 or equivalent or permission of instructor.
- 834-3 to 4 *Practicum in Curriculum and Supervision* An experience in which students, under supervision, conduct supervisory sessions with teachers in several phases of teaching or teaching-related functions. Prerequisite: completion of required courses in curriculum and supervision concentration and permission of the department.
- 835-3 *Supervised Field Experience* A supervised field experience in which students apply knowledge and skills gained through the program. This course does not meet state requirements for certification in supervision. Prerequisite: completion of required courses in teacher-leader concentration.

- 840-3 *Seminar in Curriculum and Supervision* Small group study of problems in curriculum and supervision. Proficiency examinations for the curriculum and supervision masters will be administered during the course. Prerequisite: ED 745 and 834 or permission of instructor.
- 850-3 *Seminar in Special Education* Individual and group study of the problems of exceptional children. May be repeated once. Prerequisite: nine quarter hours in special education courses or permission of the instructor.
- 851-3 *Advanced Seminar in Educational Research Design and Analysis* Individual and group study of ongoing applied educational research. Prerequisite: ED 754.
- 853-3 *Nonparametric Statistical Techniques in Education* Computation, application, and interpretation of nonparametric inferential statistics. Computer exercises to be included. Focus on relevance to educational research designs. Prerequisite: ED 752 or consent of instructor.
- 854-3 *Intellectual Assessment for School Psychologists* An introduction to the theoretical aspects of individual intelligence testing. Supervised clinical practice in the administration of the Stanford-Binet, L-M, and the Wechsler intelligence scales for school psychology students only. Permission of the instructor required.
- 855-3 *Individual Assessment of Learning Disabilities* An introduction to the etiology and characteristics of learning disability. Supervised clinical practice in the administration of the Illinois Test of Psycholinguistic Abilities and other standardized and informal tests useful in the psycho-educational evaluation of learning disability. For school psychology students only. Prerequisite: ED 854 and permission of the instructor.
- 856-3 *Individual Assessment of Behavior and Personality Disorders* An introduction to the characteristics of children with behavior and personality disorders. Supervised clinical practice in the application of behavioral management techniques and selected projective tests for school psychology students only. Prerequisite: ED 854 and permission of the instructor.
- 857-3 *Classroom Implications of Psycho-Educational Assessment* Applications of individual assessment of children in specific case studies. Team planning of programs for exceptional children. Open to advanced students in school psychology, guidance and counseling, school administration, and special education programs. Permission of instructor required.
- 858-3 *Advanced Educational Measurement: Theory and Practice* Covers text construction, evaluation, standardization, validation, item sampling, norm setting, criterion referencing, accountability. Prerequisite: ED 751 and one other measurement course or consent of instructor.
- 867-1 to 9 *Visiting Teacher Internship* Supervised field practice for visiting teacher certification as required by the State of Ohio. Repeated two consecutive quarters. Prerequisite: ED 864 and permission of the instructor.
- 868-3 *The Role and Function of the School Psychologist* Presents an overview of the school psychologist's role and function. Considers the professional problems that psychologists face in a school setting; their collaboration with other school personnel, their work with parents and community agencies; their diagnostic and therapeutic roles; and their role and function with the varied classifications of exceptional children. This course should be taken as one of the last courses toward fulfilling the requirements for the school psychologist credential.
- 869-3 *Student Personnel Administration in Higher Education* Surveys student personnel services in colleges and universities. Consideration is given to the organization, administration, and rationale of these services. Designed particularly for those students who have an interest in student personnel work at the college level. Prerequisite: ED 461.
- 899-1 to 9 *Thesis* Research for thesis in education.
- 940-3 *Advanced Seminar in Curriculum and Supervision* Advanced study, research, and discussion on selected topics related to leadership in curriculum and supervision. Topics include system analysis, evaluation of teaching and curriculum, supervisory strategies, community involvement, curriculum research and development, group process, and other topics related to leadership development. Offered as an inservice course. Topics vary from term to term. Students should check the schedule each term. Prerequisite: master's in school administration or curriculum and supervision. Repeatable to a total of nine quarter hours.
- 960-3 to 12 *Advanced Seminar in School Psychology* Intensive study of current issues in school psychology. Prerequisite: certification in school psychology or consent of instructor.

- 981-3 *School Buildings and Equipment* Building types; efficient use of buildings and equipment. Prerequisite: master's degree or equivalent.
- 982-3 *School Law* Statutes and judicial decisions related to legal authority; responsibilities of boards of education, teachers, and administrators. Prerequisite: master's degree or equivalent.
- 990-4 *Staff Personnel in the Public School* Hypotheses, concepts, principles, and practices for dealing with school personnel problems in the areas of recruitment, selection, induction, appraisal, development, compensation, and motivation of personnel. Prerequisite: a master's degree and permission of the instructor.
- 991-3 *Advanced Seminar in Educational Administration* Individual and group study of the problems of school administration. Typical topics might include staff personnel, teacher evaluation, professional negotiations, decision making, and other topics. Topics vary from term to term. Students should check the schedule each term. Prerequisite: master's degree in school administration or curriculum and supervision. Repeatable to a total of nine quarter hours.
- 992-3 *The School Administrator's Public Relations* Designed to assist superintendents and principals in their relations with the public. Prerequisite: master's degree or equivalent.
- 993-3 *School Finance* Guiding principles for developing adequate financial programs, detailed study of sources of revenue, local, state, and federal; procedures in management of school funds with reference to budgeting, accounting, and auditing. Prerequisite: master's degree or equivalent.
- 995-3 *Advanced Institute for Educational Leaders* Individual and group study of current problems and new skill development for educational leaders. May be repeated as needed. Topics require multifaceted approaches and investigations. Typical topics might include personnel management related to negotiations, human rights, decision-making, etc. Topic will vary each term. Master's degree or permission of instructor required.

Health, Physical Education, and Recreation/HPR

- 641-3 *Perceptual-Motor Theories and the Curriculum in Elementary Physical Education* Analysis of theories of perceptual-motor development; current evaluation procedures for assessing perceptual-motor abilities; trends in elementary physical education curriculum. Graduate standing required.

- 661-3 *Adapted Physical Education* Developmental and conditioning activities suited to interests, capacities, and limitations of students with physical disabilities. Relationship with school personnel, medical and auxiliary services, family, and community personnel. Prerequisite: BIO 301.
- 689-1 to 6 *Workshop in Health, Physical Education, and Recreation* An intensive study of content, curriculum, method, or materials (subtitle to indicate specific area) designed to meet the needs of preservice and inservice professionals in health, physical education, and recreation.

Library and Communication Science/LCS

- 612-3 *Administration of the School Library Media Center* Administrative practices and services that relate to the school library media center. Considers problems pertaining to standards, legislation, personnel, planning facilities, materials, instruction, and management procedures.
- 614-3 *Storytelling* Fundamental principles of the art of storytelling including techniques of adaptation and presentation. Broad foundation in the materials of literature, styles of presentation, story cycles, methods of learning, and practice in storytelling. Planning the story hour for the school and public library, recreational center, and for radio and television.
- 616-3 *Literature for Adolescents and Young Adults* Study of literature appropriate for adolescents and young adults. Survey, evaluations, and selections of books, techniques of reading guidance, and promotion of books.
- 635-4 *Production of Instructional Materials* A nontechnical course with emphasis on production of locally made materials for classroom use including mounting, lettering, script writing, photography, tape recording, and transparency production.
- 649-3 to 4 *Audiovisual Materials and Method* See ED 649. Role of visual and auditory instruction; the psychology of, and educational principles pertinent to, such instruction. Prerequisite: curriculum and materials course(s).
- 651-3 *Educational Utilization of Broadcast Media*. A study of the potential, the limitations, and the techniques for the utilization of broadcast media in the educational process.

- 655-4 *Television Production* A survey of the elementary problems of television production. Introduction to television techniques, participation on television productions in a wide variety of capacities. Programming utilization within the educational setting will be emphasized. No prerequisite.
- 656-4 *Advanced Television Production* Designed to improve the skills, knowledge, and creativity used in television broadcasting. Programming and production for educational and informational broadcasts are emphasized. Prerequisite: LCS 455 or 655 or permission of instructor.
- 670-1 to 6 *Workshop in Library and Communication Science* (Specific subtitles to be added with individual workshops.) An intensive study of a selected area of library and communication science designed to meet the needs of librarians, audiovisual personnel, and others interested in the media and communication fields. No prerequisite.
- 700-3 *Principles and Application of Communication Theory* An examination of communication theory relevant to the role of the communication utilization specialist. Special consideration given to the changing pattern of communication roles and the application of communication theory to the problems of the utilization specialist. The course also focuses upon the possible consequences of the diffusion of communication innovations within the business, educational, and governmental institutions of American society.
- 711-3 *Development of Collections* The philosophy and methodology of building collections for libraries and information centers. The student learns basic national and trade bibliographic tools, selection aids, and the mechanics of development. The importance of a well-conceived development policy is emphasized. No prerequisite.
- 713-3 *Organization of Library Collections*. The student studies the development of the Dewey Decimal and Library of Congress classification schemes and their application to library and learning center situations. The student learns the basic principles of descriptive cataloging, and receives instruction in the application of current cataloging rules, including subject headings. No prerequisite.
- 715-3 *Utilization of Collections and Information Sources* Students examine their roles in the interaction between the user and the information environment. They develop strategies to identify and to satisfy informational needs using the collection and other sources. No prerequisite.
- 717-3 *Information Sources in the Humanities* Surveys the broad range of information sources in the humanities — philosophy, religion, music, the arts, and literature. Efficient retrieval and use of the sources will be emphasized. Suggested preparation: LCS 715.
- 718-3 *Information Sources in the Social Sciences* Surveys the broad range of information sources in the social sciences — history, political science, geography, anthropology, psychology, education, and business and economics. Suggested preparation: LCS 715.
- 719-3 *Information Sources in Science and Engineering* Students will become acquainted with the broad range of information sources and methods of access to specific data in science and engineering. In addition, students will examine the methods of information exchange and dissemination within each of the specific disciplines. They will acquire sufficient skills to enable them to provide reference and information services in a variety of libraries and information environments.
- 721-3 *Selection and Utilization of Media Materials* Students will become acquainted with the broad range of communication media, other than print, and equipment now used in various types of libraries, media centers, and information environments. They will become familiar with the tools of and the criteria for selection, as well as with the methods of equipment utilization. Media such as the cathode ray tube and other computer-assisted information systems will be examined as well as the more traditional film, microform, and audio materials.
- 723-4 *Principles of Information Organization* The purpose of the course is to analyze the theories and methods of organizing information and collection for efficient and effective use. The student will learn the principles underlying the organization of knowledge and the application of classification schemes and cataloging techniques to library and learning center situations. The development and utilization of abstracts and indexes will be examined. No prerequisite.

- 735-3 *Advanced Production of Media Materials* The course will examine the philosophy and methodology of producing media materials. The student learns basic and advanced techniques of media materials production including the tools, materials, and mechanics of each process. The importance of a well-conceived production and utilization policy is emphasized.
- 740-3 *History of Books and Printing* A historical survey of the book and printing: ancient writing materials, medieval manuscripts, early printed books, modern printing and book design, recent trends and developments.
- 790-1 to 4 *Independent Study* The student pursues an individualized course of study under the close supervision of a member of the faculty. It may include, but is not limited to, extensive readings, the performance of a research project, a paper, or a production. Permission of department required.

Rehabilitation/RHB

- 670-1 to 3 *Workshop in Rehabilitation* Special workshop courses to meet the needs of inservice rehabilitation professionals as well as providing courses on a one-time basis to meet special interest needs. Graduate standing required.
- 701-5 *Rehabilitation Counseling* An introduction to counseling with severely disabled clients. Includes examination of historical perspectives, philosophical basis, relevant counseling theories, and organizational structures.
- 702-5 *Medical Assessment: Severe Disability* Student will study severe and multi-handicapping physical impairments including systems involved, causal relationships and related problems.
- 703-5 *Applied Research in Rehabilitation* Introduction to current rehabilitation research and rehabilitation program evaluation models.
- 704-3 *Psychological Adjustment: Severe Disability* A study of psychological adjustment problems in severe disability. The student will study the interaction effect of severe disability on personality development, emotional adjustment, family structure, and self-image. Prerequisite: RHB 701, 702, 703.
- 705-5 *Behavioral Assessment: Severe Disability* A study of techniques for determining vocational and educational potential of severely disabled individuals. Includes special techniques for sensory and motor impairments. Prerequisite: RHB 701, 702, 703.
- 706-5 *Special Techniques in Counseling the Severely Disabled* Techniques of counseling individuals who are different by reason of disability. Includes counseling for adjustment to disability, problem-solving, and motivation. Prerequisite: RHB 701, 702, 703.
- 707-5 *Job Development: Severely Disabled* Acquaints the student with common problems of persons seeking employment who require assistive devices such as wheelchairs, guide dogs, and orthotic devices. Prerequisite: RHB 701, 702, 703.
- 770-1 to 3 *Independent Reading and Minor Problems in Rehabilitation* Independent study in areas of interest to the student but not readily available in any existing course.
- 771-3 *History and Philosophy of Rehabilitation Counseling* Explores the historical precedents for modern social service delivery systems based upon rehabilitation concepts. Provides an in-depth study of rehabilitation philosophy, rehabilitation counseling practices, and counseling techniques in vocational rehabilitation.
- 773-3 *Rehabilitation Medicine* A survey course designed to acquaint the student with medical, social, psychological, and vocational aspects of the more commonly encountered disabling physical impairments.
- 774-3 *Selected Problems* Course examines techniques of rehabilitation applied to selected disability groups such as mental retardation, drug abuse, emotional disturbances, alcoholism, and cultural, social deprivation. Prerequisite: RHB 771.
- 775-3 *Graduate Seminar* Includes the study of community-related rehabilitation program efforts in terms of individualized systems analysis. Prerequisite: RHB 771.
- 801-5 *Internship in Behavioral Assessment: Severely Disabled* Student will spend approximately ten hours per week in a medical setting assisting in evaluating and counseling severely disabled patients. Prerequisite: RHB 704, 705, 706, 707.
- 802-5 *Internship in Medical Assessment: Severely Disabled* Student will spend approximately ten hours per week in a medical setting assisting in evaluating and counseling severely disabled patients. Prerequisite: RHB 704, 705, 706, 707.

803-5 *Internship in Rehabilitation Counseling: Severely Disabled Student* will spend approximately ten hours per week in a rehabilitation setting providing counseling and rehabilitation services to severely impaired individuals. Prerequisite: RHB 704, 705, 706, 707.

873-6 to 12 *Clinical Internship in Rehabilitation Counseling* Provides an integrative experience in a clinical setting for advanced graduate students completing a concentration in rehabilitation counseling. The course will provide a direct interaction mode in counseling and assisting disabled persons in areas of psychological, social, physical, and vocational adjustment. Requires eighteen to thirty hours per week of work in a clinical setting while registered. Prerequisite: ED 866 and permission of instructor.

Elementary Education

See Education.

Engineering

See Systems Engineering.

English

The Department of English offers a flexible, professionally oriented graduate program leading to the Master of Arts degree. It is intended to help students improve their professional skills as well as their professional knowledge. Although designed especially to train those who teach or wish to teach in high schools, junior or community colleges, or four-year colleges, it is flexible enough to meet the needs of predoctoral students. The program is structured around work in language, literature, and writing, but a variety of options allow students to design individual programs to meet the special demands of their backgrounds and educational goals. Full- or part-time enrollment is possible.

The Graduate Faculty

Professors William D. Baker, American literature, creative writing; Peter S. Bracher, Victorian literature, English novel; Eugene B. Cantelupe, Renaissance literature and iconography; Elizabeth Harden, romantic period, English novel; Donald R. Swanson, nineteenth- and twentieth-century British literature, English novel; Thomas H. Wetmore, linguistics; Thomas R. Whissen, modern British literature, comparative literature, English novel
Associate Professors Cecile Cary, Shakespeare, Renaissance studies; Norman R. Cary, literary criticism, American literature; Robert M. Correale (chairman), Chaucer, Middle English literature; James J. Gleason., American literature, twentieth-century British literature; James M. Hughes, American literature, American studies, popular culture; Lawrence E. Hussman, American literature, literary criticism; Gary B. Pacernick, creative writing, modern poetry
Assistant Professor Martha C. Sammons, nineteenth-century English literature, literary criticism, science and literature

The Graduate Program

Admission

In addition to meeting the minimum requirements of the School of Graduate Studies, applicants for admission to regular standing in the M.A. program in English must present: an undergraduate major in English from an accredited college or university or its equivalent (a minimum of thirty semester hours or forty-five quarter hours of work in English beyond freshman English reasonably distributed between lower division and upper division courses); a minimum grade point average of 3.0 (on a 4.0 scale) in their undergraduate course work in English; and an overall undergraduate grade point average of 2.7 or better (on a 4.0 scale). Applicants with deficiencies in their undergraduate preparation may be admitted to the program but may be required to take additional courses.

Applicants whose overall grade point average is below 2.7 but not lower than 2.5 will be admitted to conditional standing by action of the English department graduate committee if they meet the first and second requirements listed above. Before students can attain regular standing, their performance must be reviewed by the graduate committee, and they must earn a grade of B or better in each of the first three graduate courses (twelve hours) taken at Wright State.

Reasonable exceptions to these admission requirements may be made for sufficient cause by action of the graduate committee and with the approval of the dean of the School of Graduate Studies.

Students enrolled in English graduate courses on a nondegree basis are subject to a review and to approval by the English department graduate committee.

Advising

No student should take graduate work without departmental advisement. All students enrolled in the program (even if attending on a part-time basis) must consult regularly each term with the Director of Graduate Studies, who serves as the department's graduate adviser. After the first quarter of study (for full-time students) or after the completion of twelve hours (for part-time students), each student in the program will be assigned a committee of three graduate faculty, to be appointed by the Director of Graduate Studies in consultation with the student. In consultation with the Director of Graduate Studies and with the approval of the committee, the student will design a program of study appropriate to his or her goals, to be filed on the Program of Study form with the School of Graduate Studies. The student's committee will also assist in designing and evaluating the student's examinations, and as appropriate, in supervising and evaluating the thesis or seminar papers. Students taking graduate English courses who are not enrolled in the M.A. program should also consult with the Director of Graduate Studies to determine the courses that will best meet their needs.

Degree Requirements

The master's program in English enables students to increase their knowledge of English and American literature and language and related matters and to improve their critical skills and their grasp of scholarly method. To meet these goals the program utilizes three component groups of English graduate courses:

The 600-level courses offer widely varied topics in literature and language and are especially suitable for students wishing to extend their knowledge of English and American literature and linguistics.

The 700-level core courses provide students with the necessary scholarly and critical skills for graduate-level work and strengthen their knowledge of language and writing; all students in the program are required to distribute sixteen credits among the core courses.

The 700-level seminar courses offer broad opportunities for intensive and specialized scholarly and critical study on a broad range of specific literary and linguistic topics; three seminars are required of all students in the program.

Additional elective courses are available.

<i>Core courses</i>	16
ENG 701 Methods and Materials of Research	4
One of the following:	
ENG 704 Theory of Literature	4
ENG 705 Critical Approaches to the Study of Literature	4
One of the following:	
ENG 680 History of the English Language	4
ENG 680 Modern Grammars	4
ENG 707 The Nature of Language	4
One of the following:	
ENG 710 The Creative Process	4
ENG 711 Rhetoric	4
ENG 712 Style in Writing	4
<i>Seminars</i>	12
Three seminar courses (ENG 730, 740, 750, 760, 770) each a different number.	
Prerequisite: ENG 701 and ENG 704 or 705	
<i>Elective options</i>	20
Course option	
Five additional courses at the 600 or 700 level	20
Plus submission of two seminar papers	
Interdisciplinary option	
One or two additional courses at the 600 or 700 level	4-8
Four or five graduate courses from outside the department	12-16
Plus submission of two seminar papers	
Internship option	
Two or three additional courses at the 600 or 700 level	8-12
ENG 795 (Internship) plus one or both of the following:	
ENG 716 (Teaching Literature) and/or	
ENG 717 (Teaching Writing)	8-12
Plus submission of two seminar papers	
Thesis option	
Three additional courses at the 600 or 700 level	12
ENG 799 (Thesis)	8
<i>Total</i>	48

Examination

During the last quarter in the program, a candidate for a degree must pass a written examination. This examination is not a comprehensive examination covering English and American literature, but will undertake to assess the candidate's analytical skills and comprehension of a particular area in the field of English. The examination will be designed and evaluated by the candidate's committee.

Thesis

Students who elect the thesis option are required to enroll for eight quarter hours of credit under ENG 799 and prepare a thesis under the supervision of an adviser approved by the director of graduate studies. This thesis will be read and approved by the candidate's committee, which will be chaired by the candidate's thesis adviser.

Seminar Papers

Students in all seminars are required to prepare a seminar paper as part of their work in the course. Students in the program who do not choose the thesis option must submit as part of the degree requirements two of the seminar papers they have written as evidence of their ability to write well and to perform satisfactorily at the graduate level. These papers may be revised before they are submitted to the candidate's committee for evaluation.

Foreign Language

A reading knowledge of a modern foreign language is not required of any student but is strongly recommended for students contemplating additional graduate work at the doctoral level. An adequate reading knowledge can be demonstrated either by course work or an examination which certifies competence at the third-year level.

Graduate Assistantships

The Department of English awards a limited number of graduate assistantships annually to qualified students. Assistants are usually assigned teaching responsibilities. Assistantships may be renewed for a second year, and assistants can complete the requirements for a degree in two academic years.

Graduate Courses

English/ENG

610-4 *Studies in English Literary History* Courses offered under this number provide intensive study of English literature from the point of view of literary history and are intended to develop an understanding of the historical approach to literature and an ability to deal critically with historical generalizations about literary periods and movements.

620-4 *Studies in American Literary History* Courses offered under this number provide intensive study of American literature from the point of view of literary history and are intended to develop an understanding of the historical approach to literature and an ability to deal critically with historical generalization about literary periods and movements.

630-4 *Studies in Major English Writers* Courses offered under this number provide intensive study of the work of single, major English authors—such as Shakespeare, Chaucer, Milton, and others—and are intended to develop an understanding of individual works of literature in the context of an author's life and total literary production.

640-4 *Studies in Major American Writers* Courses offered under this number provide intensive study of the work of single, major American authors—such as Melville, Whitman, James, and others—and are intended to develop an understanding of individual works of literature in the context of an author's life and total literary production.

650-4 *Studies in Literary Types and Modes* Courses offered under this number provide intensive study of important literary forms such as poetry, the novel, comedy, tragedy, satire, and the epic, and are intended to develop an understanding of the formal aspects of literature as approached theoretically, analytically, or historically.

660-4 *Studies in Literary Themes* Courses offered under this number provide intensive study of literary works in terms of significant and recurring literary themes as they can be traced in various eras, cultures, and literary traditions.

670-4 *Studies in Literary Criticism* Courses offered under this number provide intensive study of the theoretical, practical, and historical aspects of literary criticism in order to develop an understanding of important critical questions and approaches.

677-1 to 6 *Workshop* Intensive study of selected special topics or problems designed to meet the particular needs of participating students. Specific titles to be announced for each workshop. May be repeated for credit subject to departmental, college, and university limits.

680-4 *Studies in Linguistics* Courses offered under this number provide intensive study of the English language and linguistics and are intended to develop an understanding of the historical, comparative, and descriptive approaches to the study of language and of the nature and value of their findings. No prerequisite.

694-4 *Creative Writing Seminar* Writing of fiction and/or poetry, group discussion of manuscripts, and special assignments in technique, related criticism, and contemporary professional writing. Instructor's permission required; students must submit a sample of their work before registering. May not be repeated. Graduate students only.

- 697-4 *Linguistics of Language Arts* A linguistic analysis of modern English with special attention to features of phonology, morphology, and syntax basic to the teaching of reading and composition. This course does not count toward an M.A. in English.
- 700-3 *Seminar in Teaching College Composition* Inservice training in teaching college-level composition. Includes instruction, discussion, observation, and evaluation. Required of and limited to first-year graduate assistants in the Department of English. Does not count toward M.A. degree.
- 701-4 *Methods and Materials of Research* Examination of the aims and approaches of scholarly study and the tools and methods of research. Special attention to the problems of collecting, evaluating, and reporting the findings of scholarly study. Required of all candidates for the M.A. degree.
- 704-4 *Theory of Literature* Study of selected topics and critical documents dealing with the nature, function, and value of literature including problems of definition, form, convention, and evaluation.
- 705-4 *Critical Approaches to the Study of Literature* Survey of selected modern critical approaches to literary study examined both theoretically and practically, includes the application of specific approaches to particular works of literature and the writing of critical papers.
- 707-4 *The Nature of Language* Consideration of the sources and processes of language and its relationship to thought, imagination, and symbolic form. Special attention to the contributions of anthropology, linguistics, philosophy, psychology, and sociology to our understanding of language.
- 710-4 *The Creative Process* A survey of the theoretical and practical aspects of literary creativity including such considerations as the creative imagination and writers' practice of their craft. Includes practice in the creation of original work.
- 711-4 *Rhetoric* An introduction to rhetoric as related to the written word, to the history of rhetoric, to current rhetorical theory, and to the application of rhetorical theory and method of the study of literature and composition.
- 712-4 *Style in Writing* An introduction to the theoretical and practical study of style in writing, with attention to the development of English prose style and practice in stylistic analysis.
- 716-4 *The Study of Literature* Current approaches to the study of literature in the classroom. To include such topics as literary types, analysis, evaluation, and the relationship of literature to other disciplines.
- 717-4 *The Study of Writing* Current approaches to the study of composition in the classroom. To include such topics as rhetoric, usage, stylistics, and the analysis and evaluation of student writing.
- 730-4 *Seminar in Major Writers* Reading, research, reports, and discussion on topics dealing with a single writer or two closely related ones: for example, Chaucer, Melville, Joyce, or Wordsworth and Coleridge. Prerequisite: ENG 701 and 704 or 705.
- 740-4 *Seminar in Literary Genres* Reading, research, reports, and discussion on topics dealing with a single literary genre: for example, epic, novel, tragedy, lyric poetry, or historical drama. Prerequisite: ENG 701 and 704 or 705.
- 750-4 *Seminar in Cultural Periods* Reading, research, reports, and discussion on topics dealing with the literature and culture of particular historical periods or with literary movements: for example, the Middle Ages, the age of Johnson, romanticism, or the twenties. Prerequisite: ENG 701 and 704 or 705.
- 760-4 *Seminar in Special Literary Problems* Reading, research, reports, and discussion on topics dealing with special problems such as literary themes, literary conventions, literature in relation to other disciplines, literary backgrounds, critical approaches, and interdisciplinary study. Prerequisite: ENG 701 and 704 or 705.
- 770-4 *Seminar in the English Language* Reading, research, reports, and discussion on topics dealing with historical linguistics (for example, Old English or Middle English) or modern grammar (for example, generative phonology, theory of syntax, or dialectology). Prerequisite: ENG 701 and 680 or 707.
- 789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.
- 791-1 to 4 *Independent Study* Faculty-directed independent study in literature or language usually requiring reports and conferences with the instructor. Consent of instructor required. To be arranged with the director of graduate studies. Limited to one registration of one to four hours.

795-4 *Internship* Supervised teaching of a college-level English course. To be arranged with the director of graduate studies. A grade of pass or unsatisfactory will be awarded by the faculty supervisor upon completion of the teaching.

799-4 to 8 *Thesis* To be arranged with the director of graduate studies. Students will be allowed a maximum of eight hours thesis credit toward the degree.

Finance

See Business Administration.

Financial Administration

See Business Administration

Geology

The Department of Geology offers two graduate degree programs which are broadly interdisciplinary in scope and flexibility. They are designed to meet the needs of individual students in a contemporary geologic framework. These programs are Master of Science and Master of Science in Teaching (earth science). Candidates for the Master of Science degree are generally those seeking to assume a place in the professional practice of geology or to continue in graduate study. Candidates for the Master of Science in Teaching degree are primarily those seeking increased proficiency in teaching earth science in secondary schools and junior colleges.

The Graduate Faculty

Professors C. Bryan Gregor, historical geochemistry, paleomagnetism; James A. Noel, sedimentology, sedimentary environments, energy exploration and development; Karel Toman, crystallography, X-ray crystallography, materials science

Associate Professors Kenneth Kramer, geochemistry, mineralogy, optical crystallography; Philip Malone, paleoecology, marine geochemistry, paleontology; Paul Pushkar, isotopic geochemistry, igneous and metamorphic petrology, geochronology; Benjamin H. Richard, structural geology, field geology, hydrogeology, geophysics; Ronald Schmidt (chairman), engineering geology, environmental geology, hydrogeology
Assistant Professors Frederick L. Paillet, hydrology; Jo-Ann Sherwin, theoretical structures

Facilities and Research Capabilities

The Department of Geology is housed in Oelman and Fawcett Halls. Departmental facilities include eleven teaching and research laboratories. Active research programs exist in a wide range of theoretical and applied areas in the geologic sciences.

The mineralogy/crystallography/petrology laboratories have available a reference and display mineral collection, three X-ray diffraction units equipped with powder and single-crystal accessories, a Zeiss universal microscope, and several student model microscopes. Complete facilities for making of thin sections and for mineral separations are available. Projects relating to refinement of structures in plagioclases and in certain arsenide minerals and to the petrology of wallrocks enclosing ore-bodies are currently under way.

The geochemistry laboratory has complete facilities for rock analysis using atomic absorption techniques. A mass spectrometer for K-Ar dating is currently being put into operation. Facilities here are also being used for projects related to partition of elements in model crystal systems and for research in geochemical exploration.

The engineering geology/sedimentation laboratory includes equipment for soil mechanics measurements, and sedimentary analysis. A low temperature asher is being used for environmental analysis of coals. Supporting equipment for the engineering program includes truck-mounted drilling equipment for both soil and rock drilling and sampling.

The hydrogeology laboratory contains facilities for field and laboratory examination of water quality, water-level permeameters, and related instruments. Several projects involving studies of local municipal water supply systems are currently being completed.

The geophysics laboratory houses equipment for transposition and analysis of magnetically recorded seismic data, production and analysis of visual data displays, electronic digitizing and computer card equipment. Field equipment available for this program includes a gravity meter, magnetometers, two complete seismic units, truck-mounted drill rig, surface resistivity and equipotential instruments, and well-logging equipment. The university's computer center is a valuable supporting facility for the geological sciences research. Many of the geophysics projects have been related to investigation of bedrock valleys under the glacial materials.

Excellent cooperative academic and research relationships exist with other departments on campus and with surrounding colleges and universities through the Dayton-Miami Valley Consortium. The department has wide-ranging capabilities and can accommodate through its facilities a very broad range of research areas.

The department has established a summer field research and teaching program at Maryville College near the Smoky Mountains in Maryville, Tennessee. The field station offers the opportunity for teaching and research in a number of unusual geologic and physiological provinces.

Graduate Programs

Requirements for a Master of Science Degree in Geology

A candidate for the Master of Science degree must possess a Bachelor of Arts or Bachelor of Science degree from a recognized institution and is expected to have completed an appropriate geology field course. In addition to the general requirements of the School of Graduate Studies, the departmental requirements must be fulfilled as a part of degree candidacy. The requirements are:

- 1 completion of forty-five graduate quarter hours apportioned in the following way—nine quarter hours of graduate credit in supporting fields outside the geology department, nine quarter hours of thesis credit, and at least twenty-seven additional hours of graduate credit in an approved instructional program;
- 2 presentation of four copies of an approved thesis; and
- 3 satisfactory performance in a final thesis defense near the end of the degree program.

Because the department offers a wide range of specialization, student programs are planned on an individual basis to meet specific needs. Each graduate student is guided by an advisory committee of three faculty members who are responsible for advice concerning the student's academic program including thesis topic, supporting credit suitability, and electives. Ultimate responsibility for satisfactorily fulfilling all requirements rests with the student.

Requirements for a Master of Science in Teaching (Earth Science)

A candidate for the Master of Science in Teaching (earth science) degree must possess a Bachelor of Arts or Bachelor of Science degree from a recognized institution. In addition to the general requirements of the School of Graduate Studies, the departmental requirements must be fulfilled as a part of degree candidacy. The requirements are:

- 1 completion of a minimum of forty-five graduate quarter hours apportioned in the following way—a maximum of twelve quarter hours in the College of Education, three to six quarter hours of research credit, an approved geology field course, and additional graduate courses approved by the student's graduate committee to fulfill the minimum quarter hour requirement;
- 2 presentation of an approved research project report; and
- 3 satisfactory performance in a final examination.

Because graduate students working toward this degree are expected to have a wide range of backgrounds, programs must be designed on an individual basis. Graduate students are guided by an advisory committee consisting of two geology faculty members and one education faculty member who are responsible for advice concerning the academic program including research project, the number of education courses, and the selection of other courses to fulfill candidacy requirements. (Geology courses carrying graduate credit for nonmajors are acceptable for this program.) Ultimate responsibility for satisfactorily fulfilling all requirements rests with the student.

Graduate Teaching Assistantships

Teaching assistantships are available for qualified persons in both programs described above. These assistantships involve a commitment to laboratory and classroom teaching.

Graduate Courses

Geology/GL

- 500-3 *Introduction to Earth Physics* Essentials of the gravity, magnetic, seismic, electrical, and radioactive properties of the earth with discussions on the applications of those properties in the solution of geologic problems. Lects. Recommended preparation: GL 311. Not open to students with credit in GL 422/622.
- 501-6 *Crystallography and Optics* Introduction to symmetry of crystals and to crystal optics. Determination of optical constants of crystals by use of the polarizing microscope. Recommended preparation: GL 102, CHM 101, 102.

- 502-4 *Earth Resources in World Affairs* A brief survey of the geologic and geographic distribution of earth resources. Investigation and discussions of the importance of the distribution of earth resources on world history. Lects. and outside work. Consent of instructor required.
- 503-4 *Energy, Minerals, and Business* Provides student with training on the influence of the geology of energy and mineral resources and the business aspects of their recovery. Consent of instructor required.
- 505-4 *Mineral Deposits* Genesis, classification, and description of economic mineral deposits exclusive of petroleum deposits. Examination of the role of economic deposits in world affairs. Lects.
- 506-4.5, 507-4.5, 508-4.5 *Earth Science for Teachers* The sources and forms of energy operating on the earth and the results of these operations on the origin, history, and evolution of the earth. Lects., lab.
- 509-4 *Environmental Geology* The impact and interrelationship of geologic processes on the quality of life and the works of man. Lects., field trip.
- 510-6 *Mineralogy* Discussion of the chemistry and physics of minerals will be done in lectures. The identification of minerals by microscopic, macroscopic, and X-ray techniques will be done in the laboratory. Lects., lab. Recommended preparation: GL 301.
- 511-4.5 *Structural Geology* The geometry of the structural features of rocks, their geographic distribution and possible causes.
- 513-3 *Field Survey Techniques* Mapping of small areas and location of points within them to demonstrate the techniques and instruments of field surveys.
- 520-4 *Earth Systems* Provides graduate students in areas other than geology an opportunity to obtain adequate understanding of geologic principles to apply their field to geologic problems. Prerequisite: calculus.
- 521-4 *Evolution of the Earth* A core curriculum course stressing the evolution of the earth and its major features through geologic time. Prerequisite: GL 520.
- 522-4 *The Earth and Man* A core curriculum course emphasizing and relating subdisciplines and areas of geologic application. Prerequisite: GL 521.
- 523-4.5 *Stratigraphy* Principles, rules, and techniques of correlation. Relationships between surface and subsurface correlation. Geologic and geophysical correlation techniques are emphasized in the laboratory. Lects., lab.
- 530-4.5 *Paleontology I* The morphology, geologic record, and geographic distribution of major invertebrate groups characterized by significant fossil representation. Lects., lab.
- 531-4.5 *Paleontology II* The morphology, geologic record, and geographic distribution of major vertebrate and plant groups characterized by significant fossil representation. Lects., lab.
- 534-9 *Field Geology* Geologic phenomena illustrated in the field. Introduction of mapping techniques and the application of many geologic disciplines to geologic analysis. Recommended preparation: GL 311 or consent of the instructor.
- 565-3 *Regional Geomorphology* The distribution, position, and surface form of geologic regions of the United States; a study of the geologic structure that underlies them and the erosional processes that have modified their surface expressions.
- 600-3 *Introduction to Solid Earth Geophysics* The basics of seismic gravimetric, magnetic, and heat conduction principles as used to determine the geophysical properties of the solid earth. Emphasis is on the deeper parts of the crust, the mantle, and the core.
- 603-2 *Geologic Literature and Research Methods* Introduction to the literature sources in the geologic sciences and critical analysis of material in the literature is stressed. A research paper is required. Lects.
- 612-6 *Petrology* Study of the origin of igneous, metamorphic, and sedimentary rocks. Use of thin sections for mineral identification, microscopic structures, and rock classification emphasized in the laboratory. Lects., lab. Recommended preparation: GL 510.
- 613-5 *Geochemistry* The principles governing the distribution of the elements within the earth. Introduction to geochemical methods of research. Lects., lab. Recommended preparation: CHM 141 or equivalent.
- 615-4 *Metamorphic Petrology* Petrographic and chemical changes that take place during metamorphism are examined in lectures; laboratory focus on petrographic study of metamorphic rock suites. Lects., lab. Recommended preparation: GL 412.
- 616-4.5 *X-Ray Techniques* Generation, spectrum, and absorption of X-rays; diffraction of X-rays on crystals; identification of crystals using powder cell dimensions of crystals; solid solutions. Lects., lab.

- 617-3 *Theoretical Hydrology* Introduction to mathematical and physical concepts in hydrology; equations of flow of groundwater; mathematical modeling of boundary value problems in hydrology; steady state and unsteady state behavior. Lects. Recommended preparation: MTH 333 or consent of instructor.
- 618-4.5, 619-4.5 *Igneous Petrology* (Pushkar) Study of the occurrence, chemical geological features, and genesis of selected families of volcanic and plutonic rocks. Petrographic study of igneous rock suites in the laboratory. Lects., lab. Recommended preparation: GL 612.
- 620-3 *Regional Tectonics* Variations in regional tectonics style as determined by stratigraphy, structure, and geophysical measurements. Prerequisite: GL 311; consent of instructor recommended.
- 621-3 *Resource Laws and Management Principles* Fundamental principles involved in managing natural resources; environmental law; role of the geologist as an expert witness in policy making; watershed and air resources control; resources bidding, leasing, and taxation; resource valuation; court cases. Lects.
- 622-5 *Introduction to Geophysical Prospecting* Introduction to principles of the gravity, magnetic, seismic, electrical, and radioactive prospecting. 4 lect., 1 lab. Consent of instructor required.
- 623-4 *Seismic Exploration* Study of the theory, observation, and analysis of seismic phenomena as applied to geologic exploration. 3 lect., 1 lab. Prerequisite: GL 422 and consent of instructor.
- 624-4 *Gravity Exploration* Study of the theory, observation, and analysis of gravitational phenomena as applied to geologic exploration. Prerequisite: GL 422 and consent of instructor.
- 625-4 *Topical Concepts in Geophysics* Special topics in geophysics. Prerequisite: GL 400 or 422 and consent of instructor.
- 626-1 *Geophysics Seminar* Literature survey and student presentations on selected topics in geophysics. Repeatable. Prerequisite: GL 400 or 422.
- 628-1 *Geology Seminar* Selected geological topics discussed by students, guest speakers, and faculty. Graduate standing required.
- 629-4 *Sedimentology* Clastic rocks, their mineralogy, texture, provenance, and classification. Nonclastic carbonates and other nonclastic rocks. Depositional environments, sedimentary structures. Lects., lab.
- 635-4.5 *Paleoecology* The interpretation of environments of the geologic past based on the physical, chemical, and biological characteristics of the deposits. Emphasis is placed on recent analogues of past environments. Lects. (75 minutes each), lab. Prerequisite: GL 430, 431, or consent of instructor.
- 636-4.5 *Biogeochemistry* Study of effects of organisms in geochemical cycles and in the concentration and dispersion of elements on the earth's surface. Individual research projects pursued in the laboratory. Lects., lab. Prerequisite: GL 413, BIO 113 or 114.
- 640-3 *Economic Geology* Genesis, classification, and description of economic metal-bearing mineral deposits. Lects. Prerequisite: GL 412 or 413.
- 643-5.5 *Intermediate Structural Geology* Development of the theory of rock behavior. Finite strain and gravity tectonics will be discussed. Lects., recit., lab. Prerequisite: GL 311.
- 651-4.5 *Regional Hydrology* Survey of hydrology covering the hydrologic cycle, the hydrologic budget, precipitation, water losses, runoff, the drainage basin, and principles of statistical analysis of data. Analysis of physical properties of water-bearing materials, groundwater, movement, elementary well hydraulics, and the groundwater basin. Lects., lab. Prerequisite: MTH 133.
- 656-4.5 *Engineering Geology I* Principles of engineering geology; application of geologic principles to engineering works. The impact and interrelationship of geologic processes on man's construction efforts. Lects., lab.
- 657-4.5 *Engineering Geology II* Engineering geology case studies. Review of classic and unusual engineering geology projects which have been chosen from both published and unpublished sources especially to illustrate principles, problems, and solutions in this field. Lects., lab. Prerequisite: GL 656.
- 670-4.5 *Advanced Crystallography* Symmetry of crystals, plane groups, and space groups. Single crystal diffraction methods used to study symmetry and lattice of crystals. Consent of instructor recommended.

- 671-4.5 *Crystal Structure Analysis I* Theoretical and practical aspects of methods used to determine arrangements of atoms in crystals. Recommended preparation: GL 670 or consent of instructor.
- 672-4.5 *Crystal Structural Analysis II* Advanced crystal structure analysis. Partially disordered crystals. Recommended preparation: GL 671 or consent of instructor.
- 673-4.5 *Crystal Structure Imperfections* Imperfections in crystals. Their study using microscopy and diffraction. Effect of imperfections on transformations in solids. Recommended preparation: GL 670, 671, or consent of instructor.
- 695-4 *Geochemical Prospecting* Theory, techniques, and application of geochemistry to the exploration for economic mineral deposits including hydrocarbons. Consent of instructor required.
- 698-3 *Regional Geology* Literature on the geology of a region will be studied in seminars during the quarter; between terms specific areas of the region will be visited and examined in a field trip. Advanced standing required.
- 699-2 to 6 *Special Problems* Research and problems designed for specific needs and talents of the student. Graduate standing required.
- 700-3 *Principles of Instruction in Geology* A survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. Required of and limited to those who hold first-year graduate teaching assistantships in the Department of Geology.
- 710-4, 711-4 *Chemical Geology* Development of atomistic models consistent with laws of thermodynamics and application of these models to the solution of geochemical problems. Individual research projects will be pursued in the laboratory. Lects., lab. Recommended preparation: GL 413 or equivalent. Corequisite: physical chemistry.
- 714-3, 715-3 *Nuclear Geochemistry* The examination of the different types of atomic species and the reactions they undergo. The use of radioactive isotopes and of daughter isotopes produced therefrom to measure ages of geologic events and as geochemical tracers. The study of the distribution and formation of the different isotopes in the earth and the solar system. Lects. Recommended preparation: GL 613 or equivalent.
- 738-4.5 *Paleoenvironments* Analysis of techniques for evaluating ancient environments. An introduction to the research methods in study of organisms and ecologic relationships in the geologic past. Lects., lab.
- 740-4.5 *Sedimentary Analysis* The theories, techniques, and applications of microscopic, physical, statistical, and X-ray analyses of sedimentary rocks. Lects., lab. Recommended preparation: GL 501 or equivalent.
- 750-4.5 *Numerical Analysis in Geology* Theory, technique, and application of statistical models and computer analysis in geology. Introduction to linear programming, data systems, automatic mapping. Lects., lab. Recommended preparation: statistics.
- 762-4 *Groundwater Exploration and Evaluation* Exploration and delineation of aquifers. Interpretation of hydrologic tests. Case studies. Lects., lab.
- 789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.
- 799-1 to 5 *Special Problems*.
- 898-3 to 9 *Geologic Field Research* Specific areas in a region will be studied using a specific area of specialization in the geologic sciences. Data will be collected under close supervision and analyzed independently. Formal report of results to be prepared. Field work. Consent of instructor required.
- 899-2 to 5 *Thesis*



History

The purpose of the Master of Arts program in history is to provide broad but intensive training for students who intend to pursue careers as professional historians, whether in teaching, research, or archival or historical preservation fields, or for those who desire strong historical backgrounds for other vocational or avocational objectives. The program offers opportunities for specialized study and research, but without neglecting the breadth that characterizes historical work at its best. In recognition of the fact that students' interests and goals are varied, the program provides a choice of three plans (see details below), all of which lead to a Master of Arts degree. This program has approval of the Ohio Board of Regents and accreditation by the North Central Association of Colleges and Schools.

The Graduate Faculty

Professors Carl Becker, Ohio and Civil War; Edward Cox, twentieth century Europe and European intellectual; Kenneth I. Dailey, Russian; Jacob Dorn, twentieth century and United States intellectual; David Gordon (chairman), France, North Africa, and the Middle East; Andrew P. Spiegel, European intellectual and German

Associate Professors Charles R. Berry, Latin American; Paul Merriam, United States early national and Jacksonian, urban; Allan Spetter, United States diplomatic; Victor D. Sutch, Tudor and Stuart England, military; Tsing Yuan, East Asian

Assistant Professors Martin Arbagi, Roman and Byzantine; Peter Mark, African; Donald Spivey, Afro-American; F. Richard Swann, nineteenth and twentieth century British, Canadian; Harvey M. Wachtell, United States colonial and revolutionary

General Requirements for Admission

The candidate must satisfy the requirements of the graduate school, hold a bachelor's degree from a regionally accredited institution, and meet a minimum grade point average (3.0 or better in history and a 2.7 overall). In special cases a candidate may be admitted on conditional status with a grade point average below 3.0. Conditional status will be granted only after approval by the graduate committee of the Department of History. Conditional status may be granted upon a favorable committee recommendation based upon the candidate's performance on the Graduate Record Examination, letters of recommendation, and, whenever possible, a personal interview by the graduate committee.

The candidate should have a substantial background of undergraduate course work in history, preferably an undergraduate major in the field. An applicant without such background may enter the program but must take deficiency work as prescribed by the graduate committee.

A graduate student in any college of the university may take up to four graduate history courses without prior approval of the Department of History. Any student desiring more than twelve hours of graduate history courses must consult with an adviser in the Department of History.

The Master of Arts Program

The Master of Arts degree can be obtained through one of three programs. Plan A is intended primarily for those students who expect to continue graduate work or who need or desire the full range of professional experience, including intensive research and writing. It assures training in research techniques and the preparation of scholarly papers, culminating in the submission of a thesis. Students must meet all requirements of the School of Graduate Studies, demonstrate a reading knowledge of one foreign language, and successfully complete HST 799. Plan B is intended primarily for students interested in teaching on the primary or secondary levels or in other pursuits not requiring mastery of research and linguistic skills. Students under this plan must fulfill the requirements of the School of Graduate Studies and successfully complete six additional quarter hours beyond those required under Plan A. Plan C is a program designed for graduate students who are primarily interested in a career in historical and archival administration, or in museum employment. It provides the student with both theoretical and practical training in those areas. Students under this plan must fulfill the requirements of the School of Graduate Studies and successfully complete the curriculum detailed below.

For the purpose of planning advanced courses and seminars, each student should consult the graduate director regularly and be aware of the following:

- 1 Seminars are divided into reading seminars and research seminars. If they so choose, students in Plan A may take up to two research seminars in their program. The remainder of their seminars will be reading seminars. Students in Plan B and Plan C must take one research seminar, and may take two if they so choose. The remainder of their seminars will be reading seminars.

2 Students in Plan A and B must select three fields of concentration from the following:

- a ancient, medieval, early modern European history;
- b modern European history;
- c United States history to 1865;
- d United States history since 1865;
- e Latin American history;
- f East Asian history;
- g African history;
- h any other combination of available courses which will meet the special needs of a student; such a field will be arranged in consultation with an adviser in the history department.

One field must be in a or b; one field must be in c or d; and one field must be in e, f, g, or h or in the European or United States fields other than the one selected to meet the first or second requirement.

*Plan A**

<i>History courses numbered 701 to 710</i>	18
Seminars—ancient, medieval, early modern European history, or modern European history	6
Seminars—United States history to 1865 or United States history since 1865	6
Seminars—Latin American history, East Asian history, African history or an additional European history field or an additional United States history field	6
<i>Electives in History and Related Subjects</i> At least nine credit hours must be taken in history.	18
<i>History 799 Thesis</i>	9
Language Proficiency Examination** Oral examination over thesis	
Total	45

*If HST 300 and 400 (or 401) or comparable courses have not been completed, HST 700 must be taken at the beginning of the student's course work.

**In special cases where the graduate committee is convinced that statistical techniques would be more useful than a foreign language in the student's research program, the language requirement may be replaced by PLS 210 and 610, or 610; by a proficiency examination in statistical techniques; or by such equivalent courses or examinations as the graduate committee might approve.

*Plan B**

<i>History courses numbered 701 to 710***</i>	24
Seminars—ancient, medieval, early modern European history or modern European history	6 or 9
Seminars—United States history to 1865 or United States history since 1865	6 or 9
Seminars—Latin American history, East Asian history, African history or an additional European history field or an additional United States history field	6 or 9
<i>Electives in history and related subjects</i> At least eighteen credit hours must be taken in history.	27
<i>Written comprehensive examination</i> The student will be examined on the three fields of emphasis selected.	
Total	51

*If HST 300 and 400 (or 401) or comparable courses have not been completed, HST 700 must be taken at the beginning of the student's course work.

**In special cases where the graduate committee is convinced that statistical techniques would be more useful than a foreign language in the student's research program, the language requirement may be replaced by PLS 210 and 610, or 610; by a proficiency examination in statistical techniques; or by such equivalent courses or examinations as the graduate committee might approve.

***The student must select two fields in each of which nine credit hours will be taken, and one field in which six credit hours will be taken.

<i>Plan C*</i>	
<i>Professional core</i>	25-26
Archival Administration (HST 710 and 714)	6
Historical Administration (HST 712, 713)	6
Local History (HST 711)	3
Internship and report (HST 715)	7
Library and Communication Science (select from LCS 635, 649, 713, 740)	3-4
<i>History core</i>	18
Seminars in U.S. history (six hours in one field, three hours in a second field)	9
600-level U.S. history courses **	9
<i>Electives</i>	9
(May be taken in non-U.S. history or approved related areas)	
<i>Total</i>	52-53
Evaluation: submission of internship reports and projects and oral or written examination covering nonprofessional courses.	
*If HST 300, 400 (or 401), and 498 or comparable courses have not been completed, HST 700 and 698 must be taken at the beginning of the student's course work and will count as an elective, in the case of HST 700, or as part of the history core in the case of HST 698.	
**In individual cases non-U.S. courses may be substituted in consultation with the graduate adviser.	

Graduate Courses

History/HST

- 602-3 *Intra-Latin American Relations* Various policies of Latin American nations toward their neighbors, areas of tensions and attempts at solution from the period of the wars of independence to the present.
- 607-3, 608-3 *History of Mexico* In-depth study of the growth and development of the Mexican nation. 607: 1810-1876. 608: 1876 to present.
- 615-3, 616-3, 617-3 *The South, Old and New* Political, social, and economic developments; emphasis on the race problem. 615: To Civil War. 616: Reconstruction to 1929. 617: 1930 to present.
- 618-3 *Modern Japan* Focuses on the phenomenal success of Japan's modernization since the imperial restoration in 1868. Japanese expansionism and imperialism, and Japan's power as an example for non-Western areas embarking on modernization.
- 621-3, 622-3 623-3 *Tudor-Stuart-Hanoverian Britain* England through break with Roman Catholicism; religious upheavals of Civil War; Whig oligarchy. 621: 1485 to 1603. 622: 1603 to 1688. 623: 1688 to 1789.

- 625-3, 626-3 *Twentieth-Century Britain* Political, social, economic, and intellectual trends in 20th-century Britain. 625: Passing of Victorian life, 1890 to 1918. 626: Britain between the Wars; World War II and peace; contemporary Britain.
- 627-4, 628-4, 629-4 *History of Russia* Social, economic, political, and religious history of Russia. 627: Before 1801. 628: Imperial Russia, 1801 to 1917. 629: The Soviet State.
- 630-4 *Intellectual History of Russia* Cultural and intellectual developments in Russia beginning with origins and development of the intelligentsia as a social group in the late 18th century.
- 631-3, 632-3, 633-3 *Colonial and Revolutionary America* Political, social, economic, and religious development of the Colonies; struggle for independence; creation of the Constitution. 631: 17th century. 632: 1696 to 1763. 633: 1763 to 1789.
- 634-3, 635-3 *Counter-Currents of American Democracy* Conflicting forces in the development of the American nation during its formative years. 634: 1789 to 1815. 635: 1815 to 1850.
- 637-3, 638-3 *American War and Peace: Civil War and Reconstruction* Causes of and political issues during the war; fighting and financing the war; Reconstruction plans and politics; Blacks and Reconstruction; constitutional issues. 637: 1850 to 1865. 638: 1865 to 1877.
- 640-3 *America in Transition* Development of the United States from the end of Reconstruction to the end of the 19th century. Offered alternate years.
- 641-3, 642-3, 643-3 *Twentieth-Century America* Political, economic, social, and cultural forces shaping American life. 641: To 1920. 642: 1920 to 1940. 643: Since 1940. Offered alternate years.
- 644-3, 645-3, 646-3 *American Thought and Society* Aspects of American social, cultural, and intellectual life. 644: Colonial age. 645: 19th century. 646: Modern era. Offered alternate years.
- 647-3, 648-3 *Men, Markets, and Machinery: American Economic Life* Developments in agrarian and commercial economy; forces sponsoring economic change and growth; issues concerning "take off" of economy, mechanization, mass production, and rise of industrial economy. 647: To 1840. 648: Since 1840.

- 649-3, 650-3, 651-3 *Constitution, Law, and Society* Development of law in the United States with emphasis on history of the Supreme Court. 649: Britain to Taney. 650: Slavery to Progressivism. 651: Old Constitutionalism to the Burger Court.
- 653-3, 654-3 *Age of Renaissance and Reformation* Taught jointly with Department of Religion; see REL 653 and 654. Decline of European feudalism and rise of the nation-state; revival of culture and arts; decline of universal church and growth of religious diversity. 653: 1350-1500. 654: 1500-1648. Offered alternate years.
- 657-3, 658-3 *Nineteenth-Century Europe* Reaction, revolutions, reforms, industrial, and scientific progress; emergence of nationalism, liberalism, socialism, imperialism, industrialization, and international alliances. 657: 1815 to 1870. 658: 1870 to 1900.
- 661-3, 662-3, 663-3 *War and Peace in the Twentieth Century* Total wars and uncertain peace, Great Depression, new ideologies. Cold War between "Super-Powers," end of colonialism, and intellectual and cultural upheaval. 661: 1900 to 1929. 662: 1929 to 1945. 663: Since 1945.
- 664-3, 665-3, 666-3 *History of China* Unique institutions, paramount position in Asia, cultural values, and lifestyles. 664: To 1600. 665: Growing impact of West, decline during Manchu dynasty. 666: Growth of Chinese nationalism and communism during the 20th century.
- 667-3, 668-3, 669-3 *Medieval Eastern Europe and the Near East* Events that shaped the troubled Byzantine Empire, including the rise of the Slavs and Islam. 667: To 610. 668: 610 to 1025. 669: 1025 to 1453. Offered alternate years.
- 671-3 *Religion in American Life* (Taught jointly with Department of Religion; see REL 631.) Development of religious thought and institutional life in the United States viewed in relationship to American social change. Offered alternate years.
- 674-3, 675-3 *American Urban History* Development of American cities and urban civilization from formative years to age of the metropolis. 674: to 1870. 675: since 1870.
- 676-3 *Urban Crisis in Historical Perspective* Study of selected American urban problems of the 20th century. Consent of instructor required.
- 677-3, 678-3 *Russian-American Relations: American Revolution to the Present* Changing attitude of 19th-century United States toward Russia; post-1917 relations between the two "super-power" nations. 677: To 1945. 678: The Cold War
- 681-3, 682-3, 683-3 *Ideas and Men in European History* Intellectual and cultural history from antiquity to the age of the atom, changing ideas and cultural trends, their influence on mankind and his actions. 681: To 1300. 682: 1300 to 1789. 683: Since 1789.
- 684-3, 685-3, 686-3 *American Diplomacy* 684: Problems with Great Britain, France, Spain; Monroe Doctrine; Manifest Destiny. 685: The United States as a world power. 686: World Wars I and II.
- 689-2 to 4 *Ideas for Teaching History in the Secondary School* Examination and discussion of new materials, techniques, themes, and interpretations useful to teaching history in secondary schools.
- 690-1 to 4 *Studies in History* Group study and research under faculty supervision. Permission of instructor required. May be taken as often as topics vary.
- 691-4 to 4 *Independent Readings* Faculty-directed readings in field of student's choice. Usually requires reports and conferences with instructor. Consent of instructor required.
- 692-3, 693-3 *Nineteenth- and Twentieth-Century Africa* Economic, social, religious, and political development of Africa with emphasis on colonialism and independence. 692: 19th century. 693: 20th century. Prerequisite: HST 211 or consent of instructor.
- 694-3, 695-3, 696-3 *History of Rome* Roman Republic and Empire; pre-Roman cultures of Italy to the death of Constantine. 694: to 133 B.C.; 695: 133 B.C. to 68 A.D.; 696: 68 A.D. to 337 A.D.
- 697-3 *Century of Revolution: 1689 to 1789* Comparative view of the English Revolution of 1688, the American Revolution of 1776, and the French Revolution of 1789.
- 698-3 *Historiography* Introduction to the work of representative historians and important theories of historical interpretation. Offered in both American and European fields, one of which is required of majors. Prerequisite: eighteen quarter hours of history.
- 700-3 *Historical Methods* Intensive training in the research methods and materials of history. Required of all graduate students who have not had HST 300 and 400 (or 401), or equivalent courses.

701-708 *Reading Seminars* Graduate standing and permission of instructor required. Each may be repeated with content change for maximum credit of nine quarter hours.

701-3 *Seminar in United States History to 1865*

702-3 *Seminar in United States History since 1865*

703-3 *Seminar in Ancient, Medieval, and Early Modern European History*

704-3 *Seminar in Modern European History*

705-3 *Seminar in Latin American History*

706-3 *Seminar in Far Eastern History*

707-3 *Seminar in African History*

708-3 *Seminar in History* Topics to be arranged.

710-3 *Introduction to Archives and MSS* Acquaints the student with the fundamental problems and techniques of managing an historical archive or manuscript collection. Prerequisite: nine quarter hours in history.

711-3 *State and Local History: Its Nature and Practice* Defines the nature of state and local history by seeking to determine and explain characteristics of units that distinguish them from national history.

712-3 *The Management and Interpretation of History Museums* Furnishes students with background and special training needed to prepare them for positions in museums and other history museum specialties.

713-3 *The Preservation and Interpretation of Historic Sites and Buildings* Furnishes students with special training needed to prepare for positions with historical organizations as preservation officer, editor of historical publications, and historical surveys.

714-3 *Advanced Problems in Archival Work* Provides students with major problems in archival work and manuscript curatorship for careers as manuscript librarian, archivist, oral historian, and records management specialist. Prerequisite: HST 710.

715-7 *Historical Management Internship* Gives Plan C students a 300-clock-hour internship in cooperating historical agency. Will provide practical training in various aspects of historical management. Report must be written by student on the internship experience.

789-1 *Continuing Registration*

799-1 to 9 *Thesis* Enrollment by permission of department graduate committee.

Management

See Business Administration.

Marketing

See Business Administration.

Mathematics

The Department of Mathematics offers a flexible master's program which can be fitted to a student's individual needs. Programs can be slanted toward pure mathematics, applied mathematics, computing, or statistics. Graduate students are expected to select an adviser from the graduate faculty in mathematics (subject to the approval of the departmental graduate committee) at some time before they have registered for a total of thirty hours of graduate courses. Early selection of an adviser is recommended since the adviser works closely with the student in every phase of the program. Wright State's low student-faculty ratio allows each graduate student an unusually large amount of personal attention from the adviser as well as from the instructors in courses.

The Graduate Faculty

Professors Krishan K. Gorowara, differential geometry; David Sachs, ordered structures; Donald J. Schaefer, applied analysis
Associate Professors William E. Copping, algebra; Gerd Fricke, complex analysis; Robert M. Haber, combinatorics; Jack C. Lee, statistics; Raymond E. Lewkowicz, analysis; Leone Y. Low, statistics; Marc E. Low, number theory; Carl C. Maneri, algebra; Tapas Mazumdar, partial differential equations; Gerald Meike, logic; Won Joon Park, probability; Robert Silverman, combinatorics
Assistant Professors Joseph J. Bastian, analysis; Joanne Dombrowski, analysis; Alphonso L. Smith, analysis

As can be seen, the faculty has a broad range of interests; there are active research programs in pure and applied analysis, algebra, geometry, combinatorics, probability, and statistics. Thus, it is relatively easy to match the interests of a graduate student and those of the adviser.

The Graduate Program

Candidates for admission to graduate study in mathematics are expected to meet the general requirements for admission to graduate study as established by the School of Graduate Studies. In addition, a candidate should have completed a calculus sequence and several courses which have the calculus sequence as a prerequisite. The types of courses beyond calculus which are considered most important are sequences in analysis (advanced calculus) and algebra (linear and/or modern algebra).

Candidates with insufficient preparation in mathematics may be admitted on the condition that they complete certain prerequisite work defined by the Department of Mathematics at the time of admission. In general, a student presenting fewer than twenty-one quarter hours of mathematics beyond calculus at the time of admission should expect to take at least two years to complete the degree program. The well-prepared student could complete a strong program in one calendar year. The student who does not wish to attend during the summer could complete a strong program by continuing for one or more quarters of a second year. Students who are not well prepared should take one or both of the sequences: MTH 631-632-633 or MTH 651-652-653.

Requirements for a Master of Science Degree in Mathematics

In addition to the standard requirements for the master's degree as outlined by the School of Graduate Studies earlier in this catalog, the degree in mathematics requires:

- 1 Completion of a minimum of forty-five quarter hours credit in courses which have been approved by the Department of Mathematics. At least twenty-four of these hours must be in mathematics courses numbered 701 or above and may not include MTH 792 or 786. Departmental approval is normally given through the student's adviser.
- 2 The twenty-four quarter hours on the 700 level must include at least one full-year sequence.
- 3 A written final examination will be required of all master's candidates, and is to be taken at least one quarter before the expected graduation date.
- 4 The writing of a thesis is optional. Students who elect to write a thesis may count the thesis for not more than ten quarter hours of credit. The thesis must be prepared to conform with the standards established by the School of Graduate Studies and must be approved by the adviser. A thesis defense will be required.

Graduate Teaching Assistantships

Graduate teaching assistantships are available to qualified applicants and offer valuable experience to graduate students. Graduate assistants are assigned duties in the department commensurate with their training, experience, and interests. Such duties often include classroom teaching which can be a meaningful aspect of the education of any graduate student in mathematics since the presentation of detailed mathematical analysis or arguments is an important part of the training of a mathematician.

Graduate Courses

Mathematics/MTH

- 504-4 *Mathematics as a Human Activity* To show non-science students some of the applications and uses of mathematics.,510-3 *Set Theory and Boolean Algebra* Topics from set theory. Boolean algebra, logic, algorithm theory and formal languages. Permission of instructor required.
- 516-3, 517-3 *Numerical Methods for Digital Computers* See CS 516-3, 517-3.
- 531-3 *Vector Analysis* Algebra of vectors, vector valued function, gradient, curl, divergence, line and surface integrals, integral theorems, curvilinear coordinates, applications. Prerequisite: MTH 134 and 255 or equivalent.
- 532-3 *Complex Variables* Topics discussed include power series expansion, the formula of Cauchy, residues, conformal mappings, and elementary functions in the complex domain. This is an applied course intended for students of science and engineering. Prerequisite: MTH 134.
- 533-3 *Partial Differential Equations and Boundary Value Problems* Partial differential equations, boundary value problems, eigenfunctions, Fourier series, applications. Prerequisite: MTH 233 and 256.
- 540-3 *History of Mathematics* Development of calculus from antiquity through Newton, Leibnitz. Development of classical analysis. The rise of abstraction; set theory, algebra, topology. Modern analysis. Prerequisite: MTH 134, 451, and 471.
- 541-3, 542-3 *Foundations of Analysis I, II* Elementary logic, sets, whole numbers, modular systems, integers, rationals, complex extensions, real numbers, elementary functions. Prerequisite: for 541, MTH 280 or permission of instructor; for 542, 541.
- 543-4, 544-4 *Mathematical Foundations* Sets, relations, functions of the whole number system, place value notation, modular numbers, permutations and combinations, development of integers and rational numbers, fractional and basimal notations, polynomial and rational functions. Required for elementary education majors. Must be taken in sequence. 3 hrs. lect., 1 hr. recit. and lab. Prerequisite: for 543, none; for 544, 543.
- 545-4 *Geometry for Elementary School Teachers* Axioms, finite geometries, nonmetric and metric lengths, angles, area, volume, polygonal figures, elementary curves, 3 hrs. lect., 1 hr. lab. Prerequisite: MTH 344.

- 556-3 *Linear Algebra with Applications* Vector spaces, linear transformations, unitary and orthogonal transformations, inner products, triangularizations, diagonalizations, quadratic forms. Applications. Prerequisite: knowledge of matrices beyond MTH 255.
- 560-4, 561-4 *Applied Statistics I, II* Introduction to applied probability and statistics. Data handling using electronic calculators and packaged computer programs. Standard parametric statistical methods considered. Prerequisite: for 560, two courses in calculus; for 561, 560.
- 565-3 *Survey of Designs* Survey of experimental designs frequently used in applied research. Topics selected from among: analysis of covariance, Latin squares, factorial experiments, confounding, response surfaces, incomplete block designs, split plots, and combinations of experiments. Prerequisite: MTH 265 or 561 or equivalent.
- 568-4 *The Design of Sample Surveys* Introduction to all phases of survey work, including preparations to launch survey, actual conduct of operations, processing of data, and writing of report. Sampling methods covered selected from: unequal probability, stratified, cluster, replacement, double, and sample random sampling. Prerequisite: two statistics courses.
- 581-3 *Elementary Number Theory* Divisibility properties of integers, prime numbers, congruences, the Chinese remainder theorem, quadratic reciprocity law. Mobius inversion formula, Euler ϕ -function, other number-theoretic functions. Prerequisite: MTH 134. Junior standing required.
- 586-1 to 5 *Independent Reading in Statistics and Probability* Permission of instructor required.
- 596-1 to 5 *Topics in Statistics and Probability* Permission of instructor required.
- 623-3 to 4 *Advanced Logic* Offered jointly with Department of Philosophy. Treats logic as an object rather than as a subject. Although it contains extensions to higher order, its main concern is with use of logic and with limitations of logical systems. Prerequisite: PHL 123 and 323, or one of these with one mathematics course beyond calculus, or permission of instructor.
- 631-3 *Real Variables I* Functions, sequences, limits, continuity, differentiability, integration, and mean-value theorems. Prerequisite: completion of the calculus sequence.
- 632-3 *Real Variables II* Infinite series, uniform convergence, Taylor series, improper integrals, special functions, and Fourier series. Prerequisite: MTH 631.
- 633-3 *Real Variables III* Theory of functions of several variables, vector-valued functions. Prerequisite: MTH 632.
- 634-3 *Introduction to Complex Analysis I* Complex numbers, analytic functions, Cauchy-Riemann equations, classical integral theorems, Taylor series, Laurent series, singularities, Riemann surfaces, infinite products, analytic continuation. Prerequisite: MTH 256 or equivalent.
- 635-3 *Introduction to Complex Analysis II* Residues, conformal mappings, Schwarz Christoffel transformations, harmonic functions, Poisson integral formula, Dirichlet problem, argument principle. Prerequisite: MTH 634.
- 636-4 *Intermediate Ordinary Differential Equations* Review of elementary ordinary differential equations: phase space; stability; linear systems; Liapunow's direct method; existence and uniqueness theorems. Prerequisite: MTH 233, 355. MTH 456 is desirable prerequisite.
- 651-3, 652-3, *Introduction to Modern Algebra I, II* Introduction to abstract algebraic structures, including groups, rings, integral domains, fields. Prerequisite: for 651, MTH 255 and 134; for 652, 651.
- 655-3 *Matrix Algebra* Vector spaces, inner products, linear transformations; characteristic equations, roots and vectors; quadratic forms and symmetric matrices. Prerequisite: MTH 255 or a knowledge of Gaussian elimination, matrix manipulations, and determinants.
- 657-3, 658-3 *Combinatorial Theory I, II* Topics from permutations, combinatorics generating functions, recurrence relations, Polya's theory of counting, fundamental concepts of graph theory, trees, circuits, cutsets, planar and dual graphs, transport networks, matching theory. Prerequisite: for 657, MTH 255 and junior standing; for 658, 657.
- 660-4 *Applied Regression Analysis* Standard basic course in multiple linear regression with introduction to more complicated models and computing techniques. Prerequisite: mathematical maturity equivalent to one course in calculus, two in statistics, and one in matrix algebra, or permission of instructor.
- 661-3 *Probability* Probability models, density and distribution functions, expectation, marginal and conditional distributions, stochastic independence, classical models, moment generating functions, and central limit theorem. Prerequisite: MTH 256.

- 662-3, 663-3 *Mathematical Statistics I, II*
Continuation of topics in MTH 661 and estimation, testing, sufficient statistics, maximum likelihood estimation, multivariate normal distribution, and applications. Prerequisite: for MTH 662, 661; for 663, 662.
- 664-3, 665-3 *Stochastic Processes I, II* Wiener and Poisson processes, differentiation and integration of stochastic processes, stationary processes, Markov processes (chains), transformations and harmonic analysis of stochastic processes. Prerequisite: for MTH 664, 661; for 665, 664.
- 666-4, 667-4 *Time Series Analysis I, II* Stochastic models for discrete time series in the time-domain, moving average processes, autoregressive processes, forecasting, model identification, and model estimation. Prerequisite: MTH 661.
- 668-3 *Sampling Theory* Systematic presentation of sampling theory and basic methods of sampling selection. Simple random sampling, systematic sampling, sampling with probability proportionate to size, use of auxiliary estimators, and applications considered. Prerequisite: a course in mathematical statistics.
- 671-3 *Geometry* Topics in the foundation of Euclidean geometry, introduction to non-Euclidean and other geometries. Prerequisite: MTH 134 and 255.
- 672-3 *Projective Geometry* Projective and affine planes and spaces. Change of coordinates. Projective transformations. Conics. Prerequisites: MTH 134, 255.
- 675-4 *Differential Geometry* Calculus on Euclidean space, Frame fields, calculus on a surface, shape operators, geometry of surfaces in Euclidean 3 space. Prerequisite: MTH 256.
- 686-1 to 5 *Independent Reading in Statistics and Probability* Permission of instructor required.
- 688-1 to 5 *Independent Reading* Consent of instructor required.
- 692-1 to 5 *Seminar* Permission of instructor required.
- 696-1 to 5 *Topics in Statistics and Probability* Permission of instructor required.
- 700-3 *Principles of Instruction in Mathematics A* A survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. Limited to mathematics majors or by consent of department.
- 716-4 *Numerical Analysis I* Mathematical analysis of numerical methods used in the sciences. Course material includes selections from the following topics: matrix and iterative methods of solving systems of equations; computation of eigenvalues and eigenvectors; polynomial approximation; trigonometric approximation; interpolation; integration; ordinary differential equations; boundary value problems; partial differential equations. Prerequisite: knowledge of the FORTRAN programming language or permission of the instructor; courses MTH 233, 333, 355, and 432, or their equivalents.
- 717-4 *Numerical Analysis II* Continuation of MTH 716. Prerequisite: MTH 716.
- 718-4 *Numerical Analysis III* Continuation of MTH 717. Prerequisite: MTH 717.
- 731-4 *Real Analysis I* Set theory, the real number system and real line topology, Lebesgue measure, Lebesgue integral and convergence theorems, differentiation, bounded variation, absolute continuity. Prerequisite: MTH 432 or equivalent undergraduate analysis course.
- 732-4 *Real Analysis II* LP space, Riesz representation theorem, metric spaces, topological spaces, compact spaces, Hahn-Banach theorem, closed-graph theorem, Hilbert space. Prerequisite: MTH 731 or equivalent.
- 733-4 *Real Analysis III* Outer measure, measure, integration, general convergence theorems, Radon-Nikodym theorem, product measure, Fubini's theorem. Prerequisite: MTH 732 or equivalent.
- 737-4 *Complex Analysis I* Complex numbers, analytic functions, series, topology of the plane, conformal mappings. Prerequisite: MTH 635 or the equivalent.
- 738-4 *Complex Analysis II* Complex integration, Cauchy's integral formula, calculus of residues, harmonic functions, series, products, entire functions. Prerequisite: MTH 737.
- 739-4 *Complex Analysis III* Topics include normal families, Riemann mapping theorem, Schwarz-Christoffel formula, Dirichlet problem, conformal mappings of multiply connected regions, elliptic functions, analytic continuation, Picard's little theorem. Prerequisite: MTH 738.
- 751-4 *Algebra I* Group theory-isomorphism theorems, Jordan-Holder theorem, permutation groups, Sylow theorems, finitely generated Abelian groups, free groups. Prerequisite: MTH 452 and 455 or the equivalent.

- 752-4 *Algebra II* Ring theory-polynomial rings, unique factorization, radicals, Wedderburn-Artin structure theory. Prerequisite: MTH 751.
- 753-4 *Algebra III* Field theory-simple extensions, Galois theory, solvability by radicals, cyclotomy, finite fields and Wedderburn's theorem. Prerequisite: MTH 752.
- 761-4 *Introduction to Multivariate Analysis* An introduction to the multivariate normal distribution theory and applications. Prerequisite: MTH 463 and 355 or equivalent.
- 762-4 *Introduction to the Linear Model* An introduction to the statistical theory of linear models including the Gauss-Markoff theorem, the general linear hypothesis of full rank, estimation and testing, and regression. Prerequisite: MTH 761.
- 763-4 *The Linear Model and Analysis of Variance* A survey of specific linear models in the analysis of variance. These include factorial models, incomplete block, and interaction models. The fixed, mixed, and random models will be considered. Prerequisite: MTH 762.
- 771-4 *Topology I* Topological spaces, elements of point set theory. Prerequisite: MTH 432 or equivalent undergraduate analysis course.
- 772-4 *Topology II* A continuation of general topology and an introduction to algebraic topology. Prerequisite: MTH 771.
- 786-1 to 5 *Independent Reading in Statistics and Probability*
- 789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.
- 792-1 to 5 *Special Problems (Graduate)* Permission of instructor required.
- 796-1 to 5 *Topics in Statistics and Probability* Permission of instructor required.
- 800-1 *Graduate Seminar* Consent of instructor required.
- 830-1 to 4 *Topics in Analysis* Consent of instructor required.
- 850-1 to 4 *Topics in Algebra* Consent of instructor required.
- 870-1 to 4 *Topics in Geometry* Consent of instructor required.
- 899-1 to 18 *Graduate Research* Consent of instructor required.

Music

The Master of Music degree in music education is a professionally oriented program, designed to serve teachers in the public schools, and to serve as well those who wish to teach in junior and community colleges or in four-year colleges. Though all courses are pertinent to terminal degree programs, they would be equally valuable for students who plan study at the doctoral level. A variety of program options allows students to design programs which suit their professional goals and which take into account their backgrounds and experience.

The Graduate Faculty

Professors William C. Fenton (chairman), music education, choral music, conducting, music for brass instruments, fine arts administration; Martha Harris Wurtz, music education, choral music, conducting, musicology
Associate Professors Leland D. Bland, theory, literature of music; Barbara R. Foster, piano, music literature and history, chamber music; David G. Poff, music education, theory, organ; William J. Steinhort, theory, composition.
Assistant Professor Myron Welch, instrumental music, music education, conducting, acoustics, woodwind instruments.

The Graduate Program

Admission Requirements

In addition to meeting the admission requirements of the School of Graduate Studies, an applicant for admission to the Master of Music program in music education must present an undergraduate major in music from an accredited college or university with a minimum grade point average of 3.0 (on a 4.0 scale) in undergraduate course work in music. The applicant must take qualifying examinations in music history, music theory, and music education, the results of which will be used in planning the student's program. Students who wish to study performance for graduate credit must audition for faculty in their areas of performance. (Qualifying examinations will help determine strengths as well as weaknesses in the student's background; they will help to insure that the student does not take course work which would be unnecessary.) Students with deficiencies may be required to take additional courses.

A student not holding standard certification will be required to earn Ohio certification before graduation, in addition to the normal program.

Exceptions may be made for reasonable cause; such exceptions will require action by the Department of Music Graduate Committee and approval by the dean of the School of Graduate Studies.

Advising

No student will take graduate work in music without departmental advising. Full- and part-time students enrolled in the program must consult with their advisers each quarter. Students who are not candidates for the degree must have permission of the departmental director of graduate studies to register for any graduate course in music.

Each regularly enrolled student will be assigned a committee of at least two faculty who will, together with the student and the director of graduate studies, design a suitable program for the student, to be filed with the School of Graduate Studies no later than midterm of the second quarter of registration. The committee will design and evaluate the oral comprehensive examination and evaluate the thesis, recital or master's projects. (See degree program options.)

Degree Requirements

The Department of Music offers three major options in program planning. All of the program options include these basic requirements:

- 1 All students are required to take MUS 701, Introduction to Graduate Study in Music Education and MUS 704, Foundations and Principles of Music Education.
- 2 During the last quarter in the program, a candidate for a degree must pass an oral comprehensive examination covering the areas of music education, music history and literature, and music theory. The examination will particularly undertake to assess the candidate's comprehension of the general area of music education, and to assess skills and knowledge in the area of concentration within that field. The student who elects the thesis option will be prepared to defend the thesis as well. The examination will be designed and evaluated by the candidate's committee.

Thesis Option

Course work will be distributed in the areas of music education (twenty-four to thirty quarter hours) and music history and literature, music theory, and

performance (fifteen to twenty-one quarter hours) for a minimum total of forty-five quarter hours. A student who elects the thesis option will enroll for credit under MUS 799 (Thesis). (A maximum of six hours of MUS 799 credit will be counted in the minimum total required hours for the degree.) The student will prepare a thesis under the supervision of an adviser, approved by the departmental director of graduate studies. The thesis will be read and approved by the candidate's committee, chaired by the candidate's thesis adviser.

Recital Option

Course work will be distributed in the areas of music education (twenty-four to thirty quarter hours) and music history and literature, music theory, and performance (fifteen to twenty-one quarter hours) for a minimum total of forty-five quarter hours. With the approval of the major performance teacher the student may present a full-length recital in lieu of a thesis. The performance will be heard and approved by a committee made up of two faculty in the particular area involved and the candidate's appointed committee.

In addition, the student will present to the committee one research paper in the area of music education. The student may revise, refine, and extend a paper written for a previous course, or may elect to present a new paper. The paper will be read and approved by the candidate's committee, chaired by the candidate's adviser.

Master's Projects Option

Course work will be distributed in the areas of music education (twenty-seven to thirty-three quarter hours) and music history and literature, music theory, and performance (fifteen to twenty-one quarter hours) for a minimum total of forty-eight quarter hours. The student who elects "Master's Projects" will take an additional three hours of course work over that required in the other options. MUS 702, Introduction to Research in Music Education, and MUS 703, Research in Music Education, are required. Two research papers will be presented. The student may revise, extend, and refine two papers previously written during course work; revise one previously written paper and do one new project; or do two new projects. The papers will be read and approved by the candidate's committee, chaired by the candidate's adviser.

In any of the options the student may, with the approval of the departmental director of graduate studies and the adviser, elect a maximum of two courses outside the Department of Music. The courses may be substituted for music electives if the student can show that the courses are in cognate areas which contribute substantially to preparation as a teacher in the arts.

Graduate Courses

Music/MUS

Music Education

Registration for graduate credit in music education requires graduate standing in music.

680-1 to 4 *Workshops in Music* Study of selected special topics or problems in music, or special areas of music teaching. Titles to be announced for each workshop.

681-1 to 6 *Independent Studies*

691-3 *The Music of Black Americans* Music of black Americans 1619-present.

701-3 *Introduction to Graduate Study in Music Education* Methods of investigation in music; use of music bibliography; problems of collecting and evaluating information; reporting of findings.

702-3 *Introduction to Research in Music Education* Class studies and individual projects. Reading, research, discussion, reports; interpretation of contemporary research. Prerequisite: MUS 701.

703-3 *Research in Music Education* Continuation of MUS 702. Prerequisite: MUS 702.

704-3 *Foundations and Principles of Music Education* Survey of historical, philosophical, and psychological foundations of music education. Principles applied to theoretical and practical problems of music education.

706-3 *Supervision and Administration of School Music* Function of the supervisor of music in public schools. Curricula; testing programs; in-service training; teaching aids; school-community relationships; budget.

707-3 *Contemporary Trends in Music Education* Problems, objectives and current practices in music education. Contemporary theories of learning applied to music education. The arts in public education.

708-3 *Experimental Studies* Experimental methods applied to the problems of music. Individual projects.

711-3 *Advanced Conducting (Choral)* Technique and practice of choral conducting; score preparation. Choral music literature suitable for high school and college groups.

712-3 *Advanced Conducting (Instrumental)* Technique and practice of instrumental conducting; score preparation. Instrumental literature suitable for high school and college groups.

713-3 *Choral Literature and Techniques* Critical study of choral and ensemble literature from 1500 to present. Rehearsal techniques; performance practices.

714-3 *Instrumental Literature and Techniques* Critical study of large group and ensemble literature. Rehearsal techniques; performance practices. Selection of literature; programming.

716-3 *Problems in Elementary Music* Contemporary practices in elementary school music. Creative approaches and techniques; use of new materials.

717-3 *General Music in the Middle School and Junior High School* Philosophies, objectives, techniques, materials. The listening program; the changing voice; creative activities in music for the adolescent and preadolescent years.

718-3 *Teaching Music and the Humanities* Exploration of relationships between music and other arts. Consideration of works of art in terms of social, political, religious, economic and philosophical implications; teaching the arts as a humanistic discipline.

719-3 *Music in the Inner City School* The nature of the urban school and community; creating a climate conducive to learning in the arts. Techniques and materials.

721-3 *Twentieth Century Music in the General Music Program* Critical study of music of the Twentieth Century, with techniques of teaching this music for grades K-12.

722-3 *Marching Band Techniques* Techniques for preparation of high school and college marching band performance.

789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.

799-1 to 6 *Thesis* To be arranged with the departmental director of graduate studies. Students will be allowed a maximum of six hours thesis credit toward the degree.

Music History and Literature

The courses MUS 746-749 provide advanced studies in music history and literature of the eras named. Course work includes critical analysis of representative works from major composers, with attention toward stylistically correct performance. The block of courses provides detailed study of the history of musical styles. All courses in music history and literature require graduate standing in music.

746-3 *Medieval and Renaissance Music* (c. 600-c. 1600)

747-3 *Baroque Music* (c. 1600-c. 1750)

748-3 *Classic and Romantic Music* (c. 1750-c. 1900)

749-3 *Twentieth Century Music* (c. 1900-present)

751-3 *The Literature of Chamber Music* Critical study of music literature for small instrumental ensemble.

Theory of Music

All theory courses require graduate standing in music.

- 731-3 *Theory of Music* Written and analytical skills relating to music of period of common practice through the twentieth century, with emphasis on four-part homophonic writing.
- 732-1 *Ear Training* Sight singing and aural recognition of melodic, harmonic, and rhythmic components in music from the common practice to the present.
- 733-3 *Analytical Techniques I* Analysis of melodic, harmonic, and formal styles of major composers from Josquin to the present.
- 734-3 *Analytical Techniques II* In depth historical study of musical structures related to the styles of significant composition from chant to the present. Prerequisite: MUS 733.
- 736-3 *Sixteenth Century Counterpoint* Study of sixteenth-century contrapuntal techniques with practical application in writing and analysis.
- 737-3 *Eighteenth Century Counterpoint* Study of eighteenth-century contrapuntal techniques with practical application in writing and analysis.
- 738-3 *Twentieth Century Counterpoint* Study of twentieth-century contrapuntal techniques with practical application in writing and analysis.
- 741-3 *Band and Orchestral Arranging* Study of concert band and orchestral instrumentation; scoring of transcriptions and original compositions.
- 742-3 *Choral Arranging* Arranging for choral ensembles common to schools, elementary through college.

Performance

Registration for graduate credit in any area of performance requires graduate standing in music and permission of the instructor.

650-3 *Opera Production and Coaching* Production of opera; public performance; individual coaching. For advanced singers.

700-1 to 4 *Piano*

705-1 *Chamber Music*

710-1 to 4 *Voice*

715-1 *Ensemble*

720-1 to 4 *Organ*

730-1 to 4 *Woodwinds*

740-1 to 4 *Brass*

750-1 to 4 *Percussion*

760-1 to 4 *Strings*

780-1 to 4 *Pedagogy*

Personnel Counseling

See Education.

Physics

The Department of Physics offers two programs of graduate study leading to the Master of Science and to the Master of Science in Teaching degrees. The program leading to the Master of Science degree is a research master's program with a required thesis and prepares graduates for employment in industrial or government laboratories or for further graduate work in physics. The Master of Science in Teaching program is designed to enable high school physics teachers to upgrade their knowledge of physics by providing a thorough treatment of those areas of physics which form the basis of our modern knowledge. The majority of the course work is taken in physics, with additional courses elected in the field of education. The courses are carefully selected by students in consultation with departmental advisers to fit their backgrounds.

The Graduate Faculty

Professors Harvey M. Hanson, solid state and materials; John S. Martin, chairman, plasma physics

Associate Professors Merrill L. Andrews, plasma physics; Joseph W. Hemsley, solid state and materials, nuclear physics; Samuel C. Ling, nuclear physics; Thomas W. Listerman, solid state and materials; H. Mitchell Simpson, solid state and materials; Joseph F. Thomas, Jr., solid state and materials; Paul J. Wolfe, geophysics, nuclear physics; David R. Wood, atomic spectroscopy

Research and Facilities

The Department of Physics is involved in three major areas of research: solid state physics and materials, plasma physics, and atomic spectroscopy. There are also smaller programs in nuclear physics, geophysics, and radiology.

Research interests in the solid state physics-materials science area center around the properties of metals and metal alloys. Typical physical properties of interest are Young's modulus, creep, effects of radiation damage on mechanical properties, and positron annihilation. The facilities for experimental work include a 2 MeV electron Van de Graaff accelerator, a positron annihilation spectrometer, cryostats, potentiometers, and electronics for monitoring and controlling the electrical and thermal parameters of the samples. Metallographic and tensile testing equipment is also available.

The emphasis of the Wright State high temperature plasma physics program is on the development and refinement of plasma diagnostic systems and on plasma containment by the suppression of instabilities. The research experience gained in this program is applicable to the broad field of plasma studies essential to the development of controlled thermonuclear reactors, magnetohydrodynamic and thermoelectric energy conversion, space plasmas, ion propulsion engines, and gas laser discharges. A mirror machine with loffe bars and a long high-field solenoid are provided for these studies. Plasma heating methods include electron and ion cyclotron resonance systems and a high-voltage Penning-type source. Some experimental work is aimed at the suppression of plasma instabilities by the application of feedback, dynamic, or parametric suppression. Among the diagnostic systems available is a PDP11 data processor with magnetic tape cassette storage unit. This is used for rapid on-line data acquisition, processing, and storage, and for the cybernetic control of experiments. An ion beam diagnostic system is being constructed and a crossed atom and laser beam system is under investigation.

The atomic spectroscopy laboratory includes the equipment necessary to study a range of experimental research topics including the analysis of atomic spectra, hyperfine structure, and the Zeeman effect. At the present time, spectra of singly ionized lead are being analyzed by means of a two-meter Czerny-Turny vacuum spectrometer, while higher resolution is obtained from a Fabry-Perot etalon. Photographic and photomultiplier recording of data are used, and computer facilities are available for data reduction. An infrared spectrometer is also available for the analysis of molecular spectra and for atmospheric studies.

Research in nuclear reactions and nuclear structure is being conducted by the nuclear physics group using the Ohio State 6 MeV Van de Graaff accelerator. The major equipment available includes a seventeen-inch scattering chamber, particle identification electronics, and a two-parameter pulse height analyzer. The particular nuclear research interest at present is the study of isobaric analog states in medium A nuclides.

Geophysics research is conducted in cooperation with the Department of Geology. The emphasis is using seismic reflection, seismic refraction, and gravity to study the earth's structure in southern Ohio and neighboring regions. Equipment for field work includes a 24-trace digital seismic system, a 12-trace analog seismic system, and a Lacoste-Romberg gravimeter.

In addition to the research facilities available within the Department of Physics, there are other supporting facilities in the College of Science and Engineering. Among these are a Norelco X-ray diffraction system, a C.E.C. mass spectrometer, a Varian nuclear magnetic resonance apparatus, and a Zeiss electron microscope. Computer service is provided through the Research and Instruction Computation Center.

The Master of Science Program

Admission Requirements

For admission to graduate study in physics, candidates must meet the requirements for admission as established by the School of Graduate Studies. In addition, the candidate must have a bachelor's degree in physics or a comparable undergraduate preparation from an accredited institution and be recommended for admission by the departmental committee on graduate admissions. Students who do not hold a B.S. degree in physics should apply to the departmental committee on graduate admissions for evaluation of their training and experience.

Requirements for a Master of Science Degree in Physics

In addition to the requirements of the School of Graduate Studies the student must meet the requirements of the Department of Physics, which are that the student:

- 1 May be asked to take a qualifying examination before or during the first quarter of study. This examination is designed to evaluate the candidate's understanding of undergraduate physics. The results of this examination will be used by the advisory committee to establish the program of study.

- 2 Complete a minimum of thirty-six quarter hours in physics courses numbered 680 and above.
- 3 Complete the "core" courses, quantum mechanics and theoretical physics, which are to be part of the thirty-six quarter hours of part 2 above.
- 4 Pass a departmental final examination by the end of the last quarter of the degree program.
- 5 Present an approved thesis. (Note: no more than fifteen quarter hours of research credit may be counted toward the degree requirements.) Details concerning program selection, student evaluation, thesis requirements, and final examination may be obtained from the Department of Physics.

Performance Standards

Graduate students in good standing in physics must maintain a cumulative average of 3.0. A grade of C is considered a minimum passing grade. Candidates whose average is below 3.0 after twelve hours of graduate work will be placed on probationary status; they will be removed from this status when the average of 3.0 is earned. A student whose average is below a 3.0 after eighteen hours of graduate work may be asked to withdraw from the program.

The Master of Science in Teaching Program

This program allows secondary teachers to increase their physics background so that they may capitalize on a diversified exposure to physics in their own teaching of students at the secondary school level. Further, it provides an opportunity for optional courses in the area of professional education so that proficiency in the presentation of scientific materials can be augmented.

Admission Requirements

For admission to graduate study in the M.S.T. program, candidates must meet the requirements for admission as established by the School of Graduate Studies. In addition, for admission on a nonconditional status, candidates must have completed at least two years of college physics and have received certification to teach. Prior teaching experience is not required but is strongly recommended.

Requirements for a Master of Science in Teaching Degree in Physics

In addition to the requirements of the School of Graduate Studies, the following requirements of the Department of Physics must be met:

- 1 Successful completion of a minimum of thirty-six quarter hours of physics courses numbered 600 and above.
- 2 Successful completion of a final examination by the end of the last quarter of the degree program.
- 3 Presentation of a report on a satisfactory research project.

Research Project

Each student, under the direction of the advisory committee and an adviser approved by this committee, is responsible for planning and satisfactorily completing a research project in the areas of physics or the teaching of physics. This project may consist of *one* of the following:

- 1 Original experimental or theoretical research in an area of physics.
- 2 Research into more effective means for the presentation of classroom material.
- 3 Development of groups of classroom experiments or demonstrations.
- 4 Writing texts or other classroom materials.

Graduate Courses

Physics/PHY

- 500-3, 501-3 *Introduction to the Physics of Solids*
 (1) Selected concepts in quantum physics. (2) Crystal structure, X-ray diffraction, imperfections, metallic solutions and compounds, mechanical properties. (3) Electronic structure of solids: metals, semiconductors, and insulators. (4) Applications: semiconductor devices, metal alloys, dielectrics, magnetics, and superconductivity. Prerequisite: PHY 242, CHM 121, and MTH 233 or permission of instructor. PHY 260 recommended but not required.
- 522-4 *Applied Optics* A study of optical instruments by means of both geometric and physical optics. The theory and applications of interferometry and light detection devices. A brief introduction to lasers and holography. A four-hour laboratory session will be scheduled for five weeks. Prerequisite: MTH 255, PHY 242 or equivalents. PHY 260 or equivalent recommended.
- 571-3, 572-3 *Analytical Mechanics* Intermediate problems in statics, kinematics, and dynamics; the study of equilibrium of forces, rectilinear motion, curvilinear motion, central forces, constrained motion, energy and moments of inertia, and the Lagrange method. Prerequisite: PHY 242. Corequisite: MTH 233.
- 620-3* *Thermal Physics I* First and second laws of thermodynamics: general thermodynamic formulas with applications to matter. Prerequisite: PHY 372 or 572.

- 621-3* *Thermal Physics II* Kinetic theory of gases. Maxwell-Boltzmann statistics, introduction to quantum statistics. Prerequisite: PHY 620.
- 642-4 *Physical Optics* A study of the interaction of light and matter and the interpretation of these phenomena using the electromagnetic wave theory of radiation. Topics include emission, coherence, and holography, interference, diffraction, absorption, scattering and polarization. Prerequisite: PHY 452, MTH 333.
- 650-3*, 651-3*, 652-3 to 4* *Electricity and Magnetism* The fundamental laws of electricity and magnetism presented from the viewpoint of field theory. Maxwell's equations, transient and steady state currents, electric and magnetic properties of matter, electromagnetic radiation. Prerequisite: PHY 242, MTH 233.
- 660-3, 661-3, 662-3 *Modern Physics* A detailed study of many aspects of modern physics including relativity, quantum mechanics, atomic structure and spectra, X-rays, nuclear structure and reactions, fundamental particles, and cosmic radiation. Prerequisite: PHY 372, 452, MTH 333.
- 680-3, 681-3, 682-3 *Introduction to Theoretical Physics* An introduction to classical theoretical physics. Emphasis on mechanics, electromagnetic field theory, and mathematical techniques. Prerequisite: PHY 372, 452, MTH 333, and consent of the department.
- 694-3 *Advanced Physics Laboratory* Designed around selected laboratory problems and experiences in experimental physics at the advanced level. The student is expected to maintain a high level of independence in the investigations. Consent of the department required.
- 700-3 *Principles of Instruction in Physics* A survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. Limited to physics majors or by consent of the department.
- 704-2*, 705-2*, 706-2* *Philosophy of Physics* The various areas of physics are studied with regard to their historical and philosophical basis in modern physical theory. Consent of the department required.
- 710-3, 711-3, 712-3 *Quantum Mechanics* An introduction to nonrelativistic quantum mechanics. Schroedinger's equation. Matrix mechanics. Applications to simple atomic and nuclear systems. Consent of the department required.
- 720-4 *Statistical Physics* Laws of thermodynamics and the development of statistical mechanics. Macroscopic and microscopic applications to physical systems. Classical and quantum statistics. Fluctuation phenomena. Consent of department required.
- 730-3, 731-3, 732-3 *Solid State Physics* An introduction to the physics of solids. Lattice dynamics; thermal, electrical and mechanical properties. Free electron and band theories of solids. Consent of department required.
- 751-4 *Atomic Spectra and Structure* Modern theory of the atom and quantum mechanical treatment of the origin of atomic and X-ray spectra. Consent of department required.
- 770-3 *Selected Topics* A course on a selected topic in physics. Consent of the department required.
- 780-3, 781-3, 782-3 *Plasma Physics* An introduction to plasma physics. Motion of charged particles in electric and magnetic fields. Magneto-ionic theory, continuum equations, the Vlasov equation, the Boltzmann equation, the BBGKY equations. Consent of department required.
- 789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.
- 799-1 to 5 *Minor Problems* A course to enable the student to pursue a topic on a tutorial basis. Not to be used for thesis credit. Repeatable. Consent of department required.
- 800-1 *Seminar* Weekly discussions of current problems in physics. Centered about regular student presentations. Consent of department required.
- 899-1 to 5 *Research* A course designed to give a properly qualified student an opportunity for study or laboratory work in a specialized field of interest. This course will normally be used for thesis preparation. Repeatable. Consent of department required.

*Not available for graduate credit toward the M.S. degree in physics.

Political Science

See Applied Behavioral Science.

Principalship—Elementary, Middle School, and Secondary

See Education.

Psychology

See Applied Behavioral Science.

Reading Specialist

See Education.

Rehabilitation Counseling

See Education.

School Psychology

See Education.

Secondary Education

See Education.

Sociology/Social Work

See Applied Behavioral Science.

Special Education

See Education.

Systems Engineering

The Department of Engineering offers a graduate program in systems engineering leading to the Master of Science degree. The program emphasizes the techniques of modeling, simulation, and optimization as general portable concepts in the design and analysis of complex physical systems. The program is flexible in order to allow for students' various interests and backgrounds. It is expected, however, that each student will acquire an understanding of the methods and theory of systems engineering in foundation courses in linear systems theory, control systems, mathematics, digital systems, and communication systems. Laboratories and research programs have developed in support

of the graduate program, whose interdisciplinary character results in joint programs with other university departments and with off-campus organizations.

The Graduate Faculty

Professors Russell Hannen, classical, optimal, and stochastic control theory, bioengineering, estimation theory, digital filtering; Francis J. Jankowski, nuclear engineering, nuclear safety; Malcolm L. Ritchie, human factors engineering, engineering psychology; Robert F. Rolsten, specifying and fabricating materials for harsh environments, materials under impact and shock loading; William R. Wells (chairman), control theory, fluid mechanics, dynamics

Associate Professors Richard R. Bethke, biomedical engineering, signal analysis, stochastic processes; George T. Hankins, solid state electronics, communications theory signal detection, educational methods research; William S. McCormick, communication theory, process control, bio-instrumentation, electro-optics; Hermann Viets, fluid mechanics, vortex dynamics, energy conversion

Assistant Professors Billy W. Friar, thermodynamics, heat transfer, fluid mechanics; Chandler A. Phillips, biomedical engineering, cardiovascular physiology; George R. Spalding, distributed systems, system identification, control theory

Research and Facilities

The Department of Engineering is engaged in a wide variety of active research programs in which graduate students may become involved. Research is currently underway in avionics, man-machine systems, digital systems, biomedical engineering, environmental pollution, materials, system identification, distributed systems, and other areas.

Current master's level thesis studies in the general avionics area include coherent radar, Fourier optics, laser identification, and bionic human thought modeling.

Human factors research includes investigation of operator performance in tasks such as manual tracking. Work is also being done toward development of computer-generated displays and scenes for operator training and testing.

Research and design efforts in digital systems involve small computing systems and applications of microprocessors and minicomputers.

Research involving system identification and modeling includes time series analysis of urban pollution levels and atmospheric data and biomedical signal characterization for automated diagnosis.

Thesis research, normally six to nine quarter hours of work, could cover a phase of one of the ongoing research projects or a problem, possibly job-related, of interest to the student.

In addition to the teaching laboratories, separate laboratories are available for graduate research and for undergraduate projects. They are well equipped with electrical measuring equipment including a wide range of oscilloscopes, signal generators, sweep generators, signal analyzers, and recorders. Analog computation facilities include five EAI TR-20 machines and one AD-5. Digital computation facilities include a computer center with an IBM 360/65 and several PDP 11 computers.

Research at Wright State is not limited to the laboratory facilities on campus. Several industrial companies, laboratories, and the Wright-Patterson Air Force Base are involved in joint research efforts with the university and have unique facilities which are available for faculty and graduate research.

The Program of Study

Admission

A student may be admitted to the Master of Science program in systems engineering with a bachelor's degree in engineering or related areas and satisfaction of the admission requirements as set forth by the School of Graduate Studies.

The student should come to the program with a knowledge of vector analysis, matrix algebra, and differential equations; a capability for using FORTRAN IV programming; a knowledge of solving dynamic problems, a knowledge which could have been attained from upper division undergraduate courses in circuit analysis, mechanical vibrations, or linear systems. A student lacking any of the above may attain the necessary proficiency by taking undergraduate courses or by independent study. There are no qualifying or admission tests other than the Graduate Record Examination in some cases, as required by the School of Graduate Studies.

Degree Requirements

The student must plan a program of study which satisfies educational needs and career objectives as well as meeting degree requirements. Generally, the student makes early course selections and develops a tentative program of study by consulting with members of the department's graduate committee and/or faculty. A faculty adviser will be formally appointed by the department chairman after a student has completed twelve to fifteen hours of course work in the program. A thesis adviser will be appointed by the department chairman during the first quarter the student enrolls for thesis credit. A thesis committee consisting of at least two faculty members in addition to the thesis adviser will be formed by the adviser to guide the thesis research.

In addition to satisfying the requirements for the Master of Science degree established by the School of Graduate Studies, the student must satisfy the Department of Engineering requirements set forth

below. The candidate must complete a minimum of forty-five quarter hours which have prior approval of the Department of Systems Engineering. Departmental approval is normally given through the student's faculty adviser.

The candidate may choose a thesis or nonthesis option, and must satisfy the first five requirements below, which apply to both options, and either 6a or 6b.

- 1 Minimum of eighteen quarter hours (excluding thesis credit) in the Department of Systems Engineering.
- 2 Maximum of two courses or six quarter hours may be taken outside the College of Science and Engineering.
- 3 Minimum of fifteen quarter hours in courses numbered 700 and above. Twelve or more of these quarter hours must be in systems engineering. Thesis credit does not apply to this requirement.
- 4 Minimum of six quarter hours from the Department of Mathematics.
- 5 Pass a written comprehensive examination after the completion of at least twenty quarter hours toward the degree requirement.
- 6a Thesis option: complete a thesis project for six to nine quarter hours of credit and pass an oral examination on the thesis subject.
- 6b Nonthesis option: complete at least six quarter hours in courses numbered 700 and above in systems engineering. This requirement is in addition to the requirement in number 3. Pass an oral examination covering the course work taken for the degree in the last quarter of course work toward the degree.

Graduate Courses

Engineering/EGR

500-3 *Technology and Society* Team taught with Departments of Sociology and Religion. A study of important developments in engineering and technology and their interrelations with society and human values. Analysis of significant historical events in technology and their social consequences. A study of contemporary technological developments and an assessment of their possible impacts upon society.

513-5.5 *Strength of Materials* Axial and shear stresses and strains; biaxial loading; torsion of circular shafts; shear and bending moment diagrams; deflection of beams; combined stresses; theories of failure; column theory. 4 hrs. lect., 3 hrs. lab. Prerequisite: EGR 212 or permission of instructor.

- 515-4 *Thermodynamics* A study of classical thermodynamics with primary emphasis on the application of the first and second laws to thermal systems. Introduction to physical and chemical equilibria. The object of this course is to provide the student with a background in the fundamental concepts of thermodynamics. Thus, the student will be introduced to the laws of thermodynamics and their application in defining and solving engineering problems. Prerequisite: undergraduate physics sequence.
- 517-4 *Fluid Dynamics* Study of fluid properties, fluid statics, one-dimensional compressible and incompressible flow, flow of real fluids, and flow measurements. 3 hrs. lect., 2 hrs. lab. Prerequisite: EGR 515 or equivalent.
- 518-4 *Heat Transfer* Principles that govern heat transfer in solids, fluids, vacuum, and at interfaces of solids and fluids are examined. Laboratory experiments to illustrate these phenomena. 3 hrs. lect., 2 hrs. lab. Prerequisite: EGR 517 or equivalent.
- 521-5 *Linear Systems I* Linear systems, in general, deals with the mathematical description of linear systems via the writing and solution of equations. Linear Systems I emphasizes electrical systems while using concepts and techniques common to all systems analysis. Included are the writing and solution of circuit equations, work and power, equivalent circuits and analogies, transfer functions, resonance, superposition, Laplace transforms, and Fourier series. 4 hrs. lect., 1 hr. rec. Prerequisite: differential equations and undergraduate physics sequence.
- 522-5.5 *Linear Systems II* Linear Systems II diversifies and extends the concepts and techniques of systems analysis used in Linear Systems I. It deals with the mathematical description of a wide variety of system types including mechanical, electrical, thermal, and hydraulic, with emphasis on mechanical systems. Material covered includes the writing of equations describing the system and the solution of these equations by various means including analytical methods, electronic methods using analog and digital computers, and graphical phase plane. 4 hrs. lect., 3 hrs. lab. Prerequisite: EGR 521 or permission of the instructor.
- 523-4.5 *Linear Systems III* This course generalizes, ties together, and extends the techniques of analysis developed in 521 and 522. Systems are studied using matrix techniques, Laplace transforms, Fourier series, transfer functions, block diagrams, and signal flow graphs. 3 hrs. lect., 3 hrs. lab. Prerequisite: EGR 522 or permission of the instructor.
- 527-3.5 *Introduction to Analog Computers* Electrical and mechanical analog computing components, time and amplitude scaling, simulation techniques. 2 hrs. lect., 3 hrs. lab. Prerequisite: EGR 521 or permission of instructor.
- 541-4.5 *Electronic Devices* Introductory study of basic solid-state and electron devices. Includes fundamentals necessary for comprehension and further study of modern engineering electronics. Major topics are: carrier flow in semiconductors, p-n junction theory, semi-conductor diodes, bipolar junction transistors, field effect transistors, biasing, introduction to amplifiers. 3 hrs. lect., 3 hrs. lab. Prerequisite: EGR 521.
- 545-4 *Electromagnetics* Developments of the basic concepts of vector calculus and their application to electromagnetics, electrostatics, and magnetics; induced electromotive force; Maxwell's equations and their physical interpretation and application. Prerequisite: EGR 521 or equivalent.
- 546-3 to 4 *Transmission Lines, Waveguides, and Radiating Systems* Plane waves in free space and matter, development of the transmission line equations, application of Smith charts. Application of Maxwell's equations to the rectangular and circular waveguides. Introduction to radiating systems including the dipole and loop antennae; actual design of typical systems containing transmission lines, waveguides and antennae. Prerequisite: EGR 545.
- 550-4 *Introduction to Mechanical Design* A study of the application of the general principles and empirical relationships of mechanics of solids to the creative design of mechanical equipment. Prerequisite: EGR 513 or permission of the instructor.
- 556-4 *Principles of Nuclear Engineering* Radioactivity and neutron physics; nuclear and thermal analysis of fission power systems; nuclear safety; Nuclear Regulatory and Environmental Impact requirements. Prerequisite: MTH 233 and PHY 242 or equivalent.

- 560-4 *Mechanical Vibrations* The modeling and analysis of single and multi-degree of freedom systems under free and forced vibration and impact; Lagrangian and matrix formulations; energy methods; introduction to random vibrations. Prerequisite: EGR 522.
- 570-3 *Materials Engineering Science: Introduction* This course will include atomic theory, theory of ideal crystalline solids, behavior of real solid materials, phase equilibrium, phase transformations, response of materials to static mechanical forces, thermal properties of materials, electromagnetic properties, response of materials to chemical environments, and high molecular weight polymers. Prerequisite: undergraduate physics and chemistry sequences.
- 571-3 *Manufacturing Materials and Processes* This course will present the properties and nature of materials, solid state changes in metals, ferrous metals, nonferrous metals, nature of manufacturing, casting process, foundry technology, theory of plastic flow, millwork and forging, press working of sheet metal, powder metallurgy, plastics, welding processes and design, welding equipment and procedures, machining fundamentals, machined shapes, cutting tools, surface finishing and inspection. Prerequisite: undergraduate physics and chemistry sequences.
- 603-4.5 *Measurement Systems* Study of general concepts of measurement instrumentation of physical quantities and the study of specific measuring devices for motion, force, torque, pressure, sound, flow, and temperature measurement. 3 hrs. lect., 3 hrs. lab. Prerequisite: EGR 522.
- 605-5 *Applied Electronics* Study of application of modern electronic fundamentals for use in instrumentation and data handling, principally utilizing integrated circuits. Sequence of topics: useful circuit laws, transistor switches, flip-flops, ideal linear voltage amplifiers, operational amplifiers, feedback amplifiers and measuring instruments. May not be taken for credit by students who have credit for EGR 541. 3 hrs. lect. or independent study, 4 hrs. lab. Prerequisite: PHY 113 or equivalent or permission of instructor.
- 611-4 *Advanced Dynamics* Kinematics of a particle in three dimensions for various coordinate systems, fixed and moving. Dynamics of a particle and system of particles including work-energy and impulse-momentum. Kinematics of general rigid body motion. Principal axes of inertia. Eulerian angles. Dynamics of general rigid body motion. Lagrange's equations. Prerequisite: EGR 213.
- 615-3 *Advanced Thermodynamics* Power and refrigeration cycles, thermodynamic relations, mixtures and solutions, chemical reactions, phase and chemical equilibrium. Prerequisite: EGR 515.
- 621-5 *Communication Theory* The analysis of linear systems by the Fourier transform and the time convolution integral methods. Introduction to information theory. Comparative evaluation of various analog and pulse modulation techniques. Selected topics from radar theory and electro-optics as well as an introduction to random process theory. Prerequisite: EGR 522.
- 623-4 *Energy Conversion* Study of important new developments in the field of energy conversion. Thermoelectric, photoelectric, thermionic, electromechanical, and electrochemical systems will be studied. Prerequisite: EGR 515, EGR 522.
- 625-4.5 *Control Systems I* An introduction to control systems using state variables and classical analysis. Closed loop system representation, block diagrams, time response, and frequency response are treated. 3 hrs. lect., 3 hrs. lab. Prerequisite: EGR 522.
- 626-4.5 *Control Systems II* System stability and closed loop response are analyzed using Routh-Hurwitz, Nyquist and root locus techniques. System specifications and compensation are realized using state variables and classical analysis. 3 hrs. lect., 3 hrs. lab. Prerequisite: EGR 625.
- 630-4 *Distributed Systems* Distributed constants and traveling waves in various types of physical systems. A-C steady-state in distributed systems. Phase and group velocities. Reflections, standing wave ratios, and impedance matching techniques. Prerequisite: EGR 522 or equivalent.
- 632-3 *Optimization Techniques* Concepts of minima and maxima. Linear programming: simplex method, sensitivity and duality. Transportation and assignment problems. Dynamic programming. Prerequisite: matrix algebra, differential equations, or permission of instructor.

- 633-4 *Reliability Analysis* Elements of probability theory: events, probability axioms, random variables, discrete and continuous distributions, moments, and characteristic functions. Applications of mathematical tools: component and system failure models. Marginal failures: initial tolerances, environmental drifts, transfer functions and sensitivities. Passive and active redundancy techniques. Repairable systems: maintainability, availability, and reliability acceptance. Prerequisite: EGR 522.
- 635-3 *Synthesis of Linear Systems* Positive real functions and their relation to physical realizability. Zero-pole structure of network impedance functions; properties and applications of frequency selective network; filter design by approximating functions. Prerequisite: EGR 522, 621, and consent of instructor.
- 641-4.5 *Electronic Circuits* Theory and application of basic engineering electronics developed for discrete and integrated circuits. Topics include bipolar and field effect transistor amplifier analysis and design, frequency response, multi-stage and feedback amplifiers. 3 hrs. lect., 3 hrs. lab. Prerequisite: EGR 541.
- 642-3 *Digital Computer Design* Functional design of a digital computer, including arithmetic and control units. Counters, adders, accumulators, multipliers, dividers, and memory devices and their logic. Prerequisite: EGR 650.
- 644-3 *Linear Integrated Circuits* Modular circuit concepts fundamental to analysis and application of linear integrated circuits. Topics include feedback and stability, operational and integrated amplifiers, active filters, waveform generators, and Schmitt triggers. Prerequisite: EGR 641.
- 649-4.5 *Pulse and Digital Circuits* Design and analysis of pulse and switching circuits including: linear wave shaping; diode wave shaping; logic types, DTL, DCTL, RTL, TTL, and ECL; bistable, astable, and monostable multivibrators; voltage comparators; Schmitt triggers; blocking oscillators; and magnetic core switching. 3 hrs. lect., 3 hrs. lab. Prerequisite: EGR 641.
- 650-3 *Switching Theory and Circuits* Logical design and simplification of combinational and sequential switching circuits with emphasis on the practical rather than abstract. Prerequisite: EGR 541 or equivalent, MTH 510, CS 210.
- 660-3 *Design and Analysis of Engineering Experiments* This course is an introduction to the planning and analysis of engineering experiments. It covers basic topics required for experimental work and their applications to engineering problems. Included is a brief coverage of basic statistics, probability distributions, tests of hypotheses, linear regression and analysis of variance, and the application of these tools using randomized block, factorial, and fractional factorial experimental designs in the investigation of engineering problems. Consent of instructor required.
- 670-4 *Communications Systems Design* Introduction to communication systems design. Topics include source characterization and encoding, choice of modems and the tradeoffs involved, choice of received configuration, etc. The techniques developed will be applied in the design of a deep space communication system. Prerequisite: EGR 522 and 621 and consent of instructor.
- 675-3 *Introduction to Radar Systems* Introductory study of the radar equation, antenna patterns, target cross sections and system losses, radar measurements, pulse doppler and coherent techniques, detection probability and signal-to-noise ratio, sidelobe clutter, synthetic arrays, and pulse compression techniques. Prerequisite: EGR 522 and 621 or equivalent.
- 699-1 to 5 *Special Problems in Engineering* Special problems in advanced engineering topics. Consent of instructor required.
- 700-3 *Principles of Instruction in Engineering* A survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. Required of and limited to those who hold first-year graduate teaching assistantships in the Department of Engineering.
- 701-3 *Linear Systems I* Signal representation. Orthonormal families of signals and generalized Fourier series. Generalized functions, the impulse function. Calculus of generalized functions. Superposition and convolution of signals. The Fourier transform. Sampled and periodic signals and their associated spectra. Fast Fourier transform. Time limited and band limited signals—sampling theorems, uncertainty principle. Prerequisite: EGR 521, 522.

- 702-3 *Linear Systems II* Differential equation description of a linear system. Degenerate and nondegenerate systems. Decomposition of an n th order linear system. State equations. Transition matrix. Input/output relations.
- 710-3 *Digital Signal Processing* Theory and applications of digital signal processing including the following: Discrete equivalence of continuous signals and systems. Digital simulation and block diagram representation of computer programs. Choice of state variables for efficient realization. Quantization, roundoff, word length, and stability. Choice of sampling rates. Discrete Fourier transforms, high-speed convolution and correlation. Digital filtering and modeling. Prerequisite: EGR 702.
- 715-4 *Imaging Systems* Introduction to optical imaging systems using techniques of linear system theory. Classical topics of scalar diffraction, incoherent-coherent imaging, and lens theory developed in terms of convolution integral and two-dimensional Fourier transform. Optical system synthesis also introduced using linear system formulation. Spatial filtering, optical information processing, and holographic imaging considered. Prerequisite: EGR 702 or permission of instructor. Enrollment limited to graduate students.
- 724-3 *Foundations of Optimization Theory* Theory of minima and maxima, calculus of variables, optimum-seeking search techniques, dynamic programming, and maximum principle. Prerequisite: EGR 702.
- 725-3 *Principles of Modern Control Theory* State variable description of continuous and discrete multivariate systems. Concepts of controllability, observability, stability, and sensitivity. Stability via second method of Liapunov. Introduction to dynamic programming with applications to linear systems. Prerequisite: EGR 626 and 702; EGR 702 may be taken concurrently.
- 733-4 *Modern Radar Theory: Introduction* Application of probability and random process to the performance characterization of range/doppler radar. Development of the concepts of resolution, S/N, ambiguity function, and pulse compression, and their application to radar systems design. Consideration is also given to coherent, imaging radar. Prerequisite: Probability Theory, Linear Systems, or consent of instructor.
- 740-4 *Information and Coding Theory* Development of communication channel model and use of information theory as means of quantifying that model. Investigation of various error correcting and detecting codes. The popular Viterbi coding algorithm will also be considered. Prerequisite: basic linear systems and probability theory or consent of instructor.
- 750-3 *Switching and Finite Automata Theory I* The analysis and synthesis of finite state systems including the following: Definition and representation of finite automata and sequential machines. State transition diagrams and state table. Machine realization using flip flops and delay lines. Races and hazards in sequential circuits. Equivalence of states and machines. Incompletely specified machines. Reduced machines. Asynchronous machines. Prerequisite: EGR 650.
- 751-3 *Switching and Finite Automata Theory II* Further development of the theory of finite state systems: State assignment problems. Partitions with SP and partition pairs. Machine decomposition problem. Regular expressions. Linear machines. Memory and information-losslessness. Diagnosing and homing experiments. Control and identification problems. Prerequisite: EGR 750.
- 761-3 *Probability and Stochastic Processes I* Algebra of sets. Set functions. Events. Axiomatic foundations of probability theory. Classical models: binomial, multinomial, Poisson, and exponential distributions. Random variables. Distribution and density functions. Characteristic functions. Transformation of random variables. Chebyshev's inequality. Orthonogality principle. Meansquare estimation. Convergence concepts. Laws of large numbers. The central limit theorem. Introduction to stochastic processes. Weiner Hoft equation. (This course is equivalent to MTH 661.) Prerequisite: MTH 233, 555.
- 762-3 *Probability and Stochastic Processes II* Stochastic processes: complete and partial characterization. Correlation functions. Power spectrum, stationarity, and ergodicity. Input-output relations for random processes in linear systems. Discrete and continuous Markov processes: Brownian motion, white noise, Poisson's processes. Shot noise. Meansquare estimation. Weiner theory. Kalman filtering. Nonstationary signals. Gaussian processes. Zero crossings. Modulation. Detection. Prerequisite: EGR 761 (or MTH 661), EGR 701 and 702. Can be taken concurrently with EGR 702.

763-3 *Dynamic Stochastic Systems Modeling*

Modeling by Markov processes: studies the application of fundamental principles of probability and linear system theory to modeling of processes exhibiting both dynamic and uncertainty behavior. Modeling is done by discrete time, finite and infinite state, stationary and nonstationary Markov processes. Applications are drawn from a variety of fields: consumer purchasing, taxicab operation, inventory control, rabbit reproduction, family-name extinction, car rentals, machine repair, system reliability, network transversal, project scheduling, and space exploration, etc. Prerequisite: EGR 761 (or MTH 661) and EGR 702. Can be taken concurrently with EGR 702.

789-1 *Continuing Registration* A student must be registered at the graduate level in the quarter in which the degree is granted, or in any quarter in which the department is affording some service, such as giving an examination, reading a thesis, or giving advice on the thesis after completion of all other requirements of course work and research.

830-3 *Nonlinear Systems* Nonlinear elements and their effects in physical systems, phase plane, linearization techniques, describing functions, Liapunov stability, absolute stability, and Popov's theorem.

880-3 *Selected Topics in Systems Engineering* Lectures and study on selected topics in current research and recent developments in systems theory and engineering. Consent of instructor required.

890-1 to 5 *Special Problems* Special problems in advanced engineering topics. Graduate standing and consent of instructor required.

899-1 to 9 *Thesis* Consent of adviser required.



Additional Courses

Courses are offered for graduate credit in the following disciplines which do not have graduate degree programs at this time. An explanation of the course numbering system may be found in the preceding chapter, Graduate Programs.

Art/ART

The Graduate Faculty

Associate Professors Ernest Koerlin, painting; Edward Levine (chairman), contemporary art; Raymond Must, printmaking

Assistant Professors Martha Dunkelman, art history; Kimmerly H. Kiser, painting; Thomas Macaulay, sculpture; Robert B. Sibbison, sculpture

Graduate Courses

- 611-4, 612-4, 613-4 *Printmaking* The development of personalized concepts and individual aesthetic expression in printmaking. Prerequisite: twelve hours of 400 level printmaking or permission of instructor.
- 621-4, 622-4, 623-4 *Painting* Emphasis on pictorial organization with increased attention to the individual student's personal imagery. Prerequisite: twelve hours of 400 level painting or permission of instructor.
- 640-3 *Studies in the Art of the Twentieth Century* Courses offered under this number provide both general surveys and intensive studies of the period, major movements, and artists of the time. May be repeated under different titles to a maximum of twelve hours. Permission of instructor required.
- 642-3 to 4 *Special Problems in Art and Art History* Courses offered under this number provide opportunities to explore special problems and approaches to art history and include cross-period and interdisciplinary studies. May be repeated with different titles. Graduate standing and permission of instructor required.
- 651-4, 652-4, 653-4 *Drawing* Exploration of the structure and interrelationships of visual form in drawing, painting, and sculpture. Principal historical modes of drawing will be examined. Prerequisite: twelve hours of 400 level drawing or permission of instructor.
- 663-4, 664-4, 665-4 *Sculpture* Further development of personal concepts and aesthetic expression in sculpture. Emphasis on individualized approach to sculptural problems using media selected by the students. Prerequisite: twelve hours of 400 level sculpture or permission of instructor.

Communication/COM

The Graduate Faculty

Associate Professors Barbara B. Dreher, R. Gene Eakins, Robert E. Pruett (chairman)

Assistant Professors William E. Rickert, James E. Sayer

Graduate Courses

- 621-3 *Speech and Language Development* The development of speech and language in the preschool years.
- 622-3 *Language Disorders* Diagnosis and treatment of language disorders in children. Emphasis on the research in the language problems of the mentally retarded, emotionally disturbed, and language-delayed child.
- 629-4 *Urban Communications Theory* Processes and institutions by which individuals and groups communicate in an urban environment. Model of an urban communication system developed by interdisciplinary systems approach.
- 630-3 *Directing the Forensic Program* Intensive study of the administration, coaching, and teaching of high school and college forensics.
- 639-3 *Freedom of Speech* Study of the growth and development of free speech in the United States. Special attention is given to the development of definitions of free speech and various communication strategies in different settings.
- 641-3 *Forms of Interpersonal Communication* A consideration of interpersonal communication with special emphasis on the psychology of the speaker and the listener.
- 643-3 *Interviewing* Theory and practice in interviewing procedure including the use of sample interviews and role-playing situations.
- 645-3 *Group Communication and Conference Leadership* Intensive study of group communication regarding leadership development and member participation. Examination of the characteristics of the group and the various aspects of decision making.
- 647-3 *Organizational Communication* Study of communication within an organization including an examination of the variables that affect communication productivity.
- 649-3 *Survey of Communication Research* Provides students with a basic knowledge of the behavioral approach and of the current theories and experiments being conducted in communication research.

- 653-3 *Communication and Conflict* In-depth study of the function of communication in conflict/crisis situations. Special attention to the role that communication performs in conflict resolution in intrapersonal, interpersonal, group, and international situations.
- 655-3 *Nonverbal Communication* Theory, survey of research, and experimental learning in nonverbal communication. Exploration of types and forms and of methods of sending and receiving nonverbal communication.
- 671-3 *Topics in Speech Communication* Examination of special topics in the various areas of speech communication. Specific title announced each time course is offered. May be repeated for credit.
- 691-1 *Communication Techniques and Evaluation* The philosophy and techniques of conducting communication events. Includes the planning, initiating, and summarizing of communication activities, and evaluating written and oral performance. Repeatable for a maximum of three credits. Permission of instructor required.
- 741-3 *Principles and Application of Communication Theory* An examination of communication theory relevant to the role of the communication utilization specialist. Special consideration given to the changing pattern of communication roles and the application of communication theory to the problems of the utilization specialist. The course also focuses upon the possible consequences of the diffusion of communication innovations within the business, educational, and governmental institutions of American society.
- 781-3 *Independent Research* Supervised independent research on a specific subject. Permission of instructor required.

Geography/GEO

The Graduate Faculty

Associate Professors Harold G. Dusko (adjunct), cartography, digital image processing, photogrammetry, and photo interpretation; Kenji K. Oshiro, agriculture of Japan, population migration, agricultural and economic development policy, agricultural labor, customs and traditions in Japanese agriculture; John R. Ray (chairman), human attitudes toward environmental insults, remote sensing of environmental problems

Graduate Courses

- 503-3 *Space and Faith: Topics in Religion and Geography* (Team taught with the Department of Religion; see REL 503). The interrelation of religious and geographical factors in selected cultures of East and South Asia. May be repeated under different subtitles.
- 531-4 *Introduction to Meteorology* Development and application of first principles governing the atmosphere at rest and in motion. Examination of the general circulation. Applied meteorology. Prerequisite: MTH 131.
- 534-3 *Climatology for Earth Science Teachers* Interaction of weather and climate with the various earth systems. Includes observation, measurement, and analysis of meteorological elements and controls.
- 560-3 *Systematic Geography* Analysis of various geographic factors. Specific topic or field of concentration announced each time course is offered. Repeatable to a maximum of fifteen credits.
- 562-4 *Remote Sensing of the Environment* An application of remote sensing techniques to environmental and resource problems. Emphasis on optimizing sensor selection to enhance image information content.
- 570-3 *Regional Geography* Physical and cultural analysis of major and minor world regions. Specific region for study announced each time course is offered. Repeatable to a maximum of fifteen credits.
- 576-3 *Principles of Planning* Includes the role of planning in urban structures, and duties and responsibilities of planning commissions; process of preparing comprehensive plans; population change, the economic base, and employment change; determinants of future urban structure.
- 599-1 to 4 *Studies in Selected Subjects* Course of variable content dealing with problems, approaches, and topics in the field of geography.
- 632-4 *Intermediate Climatology* Principles of physical and dynamical climatology. Evaluation of local and regional transports and conversions of energy in the earth-atmosphere system. Prerequisite: GEO 531.
- 645-5 *Intermediate Cartography and Map Interpretation* Study and practice of compilation processes for the development of maps and models utilizing primary data sources.

- 646-3 *Map and Photo Interpretation* Uses of map and photographic data in close and long range photogrammetry. Emphasis is given to the full spectrum of photo interpretation as applied to the controlled mapping of terrestrial and marine surfaces. Prerequisite: GEO 645 or permission of instructor.
- 655-3 *Geography of Transportation* Analysis of spatial aspects and structural characteristics of transport networks, the movement of goods, and their relationship to regional structures.
- 658-3 *Human Perception in Resource Management* Spatial factors influencing human response and decision-making in resource use schema. How man perceives environmental elements and apprehends resources and natural hazards such as floods and droughts.
- 666-3 *Seminar in Urban Geography* Geographic perspective in the study of cities. Recent developments in theory, method, and techniques in urban geographic research, with emphasis on the behavioral approach.
- 677-3 *The Land Use Plan* The process of preparing comprehensive urban plans. Methods for assessing land-use conditions, housing patterns, and urban deterioration. Students are expected to participate in the development of a land-use plan for a selected area. Prerequisite: GEO 576.
- 678-3 *Urban Planning Seminar* Examination of urban plans and planning proposals. Includes future land use plans, community facilities and public utility plans, and traffic and circulation plans. Considers modern theories of planning and the planning and design of new communities.
- 681-1 to 4, 682-1 to 4 *Special Problems in Geography* Research and problems designed for specific needs and talents of the student.

Modern Languages/ML

The Graduate Faculty

Associate Professors James E. Larkins, Spanish, modern Spanish literature; Karlis Racevskis, French, the French Enlightenment, Voltaire
Assistant Professor Pierre Horn, nineteenth- and twentieth-century literature

Graduate Courses

Linguistics

- 671-3, 672-3 *Introduction to Historical and Comparative Linguistics* Principles of the historical and comparative study of languages; introduction to Indo-European, Germanic, and Romance philology; linguistics and cultural history; dialect geography in Europe and the United States. Consent of instructor required. The courses must be taken in numerical sequence.

French

- 622-3 *Villon to Chénier* Three centuries of French poetry: Villon, Marot, DuBellay, Ronsard, d'Aubigné, La Fontaine, Boileau, Chénier. Graduate standing and consent of instructor required.
- 642-3 *Seventeenth- and Eighteenth-Century Theatre* Works of Corneille, Moliere, Racine, Marivaux, Voltaire, Beaumarchais. Graduate standing and consent of instructor required.
- 643-3 *The Enlightenment* History of political and social ideas in eighteenth-century France, based principally on works of Montesquieu, Voltaire, and Rousseau. Graduate standing and consent of instructor required.
- 651-3 *French Romanticism* From Rousseau to Hugo. Includes Bernardin de Saint-Pierre, Chateaubriand, Mme. de Staël, Nodier, Lamartine, Vigny, Musset, Nerval. Graduate standing and consent of instructor required.
- 652-3 *The Nineteenth-Century Novel* Stendhal, Balzac, Flaubert, Zola, and France. Graduate standing and consent of instructor required.
- 653-3 *Poetry from Baudelaire to Breton* Symbolists, Decadents, and Surrealists. Graduate standing and consent of instructor required.
- 662-3 *Twentieth-Century Literature* The novel. Graduate standing and consent of instructor required.
- 665-3 *Problems in French Literature* Examination of selected topics in French literature to investigate various themes, myths, genres, literary movements, or characters. May be taken more than once under different subtitles. Graduate standing and consent of instructor required.

Spanish

- 602-3 *The Spanish Novel of the Nineteenth Century* Nineteenth-century prose works by Galdós and others. Graduate standing and consent of instructor required.
- 603-3 *Advanced Studies: Language/Civilization* Course content will vary. Topic chosen by instructor. Conducted in Spanish. Graduate standing and consent of instructor required.

- 611-3 *Golden Age Drama* Intensive readings of dramas by playwrights of the sixteenth and seventeenth centuries. Graduate standing and consent of instructor required.
- 612-3 *Modern Drama* Intensive readings of dramas by playwrights of the nineteenth and twentieth centuries. Graduate standing and consent of instructor required.
- 621-3 *Cervantes* Intensive study of *Don Quixote* Part I. Graduate standing and consent of instructor required.
- 631-3 *Seminar in Spanish Literature* Intensive study of selected topics in peninsular literature. Background lectures, oral reports, and discussions. Graduate standing and consent of instructor required.
- 641-3 *Contemporary Spanish Literature* Readings in the novel, poetry, and drama of major Spanish writers in the post-Civil War period. Graduate standing and consent of instructor required.
- 642-3 *Contemporary Latin-American Literature* Readings in the novel, poetry, and drama of various Latin-American writers from the late 1930s to the present day. Graduate standing and consent of instructor required.
- 662-3 *The Generation of 1898* Novel, poetry, and theatre of Unamuno, Baroja, and others. Graduate standing and consent of instructor required.
- 582-3 *Philosophy of Religion: Process* (Listed jointly with Department of Religion; see REL 582.) Realism and the revolt against idealism. Cross-disciplinary analysis of a major contemporary process philosopher and the implications of his thought for religion. Focus on Alfred North Whitehead.
- 583-3 *Philosophy of Religion: Secular* (Listed jointly with Department of Religion; see REL 583.) Cross-disciplinary analysis of modes of human awareness through which religious meaning is expressed. Examination of presuppositions of contemporary secular religious movements in existentialism. The problem of the ultimate from the secular perspective.
- 623-3 to 4 *Advanced Logic* Offered jointly with Department of Mathematics; see MTH 623. Treats logic as an object rather than as a subject. Emphasis on use of logic and on limitations of logical systems. Prerequisites: PHL 123 and 323, or one of these together with one mathematics course beyond calculus, or consent of instructor.
- 624-3 to 4 *Mathematical Philosophy* Investigation of philosophical theories concerning the nature of mathematics, the ground of mathematical knowledge, the necessity of mathematical truth, the empirical relevance of mathematics, and the relationships between mathematical philosophy and general philosophy. Prerequisite: PHL 123 or consent of instructor.
- 667-3 to 4 *Philosophy of Mind* Classical and contemporary approaches to such issues as the nature of mind, relationships of mind to body, knowledge of other minds, intentionality, perception, and agency. Prerequisite: PHL 111 or 112 or consent of instructor.
- 694-3 to 4 *Existentialism* Offered jointly with the Department of Religion; see REL 694. Representative writers of the Existentialist movement.
- 695-3 to 4 *Metaphysics* Investigation of classical and contemporary attempts to develop a theory of the nature of being and reality. Prerequisite: PHL 111 or 112 or consent of instructor.
- 696-3 to 4 *Epistemology* Origin, certainty, and extent of human knowledge. Prerequisite: PHL 111 or 112 or consent of instructor.

Philosophy/PHL

The Graduate Faculty

Associate Professors Ronald F. Hough (chairman), Robert J. Power

Graduate Courses

- 578-3 *Ethics and Medicine* Taught jointly with Department of Religion; see REL 578. An examination of the ethical issues confronting society in the area of medicine and health care, considered from the perspective of philosophical and theological ethics. Examples: ethics of abortion, euthanasia, experimental medicine, and behavior control.
- 581-3 *Philosophy of Religion: Contemporary Western Survey* (Listed jointly with Department of Religion; see REL 581.) Cross-disciplinary perspective on philosophical and religious schools of thought in the early twentieth century. Absolute and personal idealism, spirit, value, positivism and naturalism, history and culture, modernism and pragmatism, religious consciousness and phenomenology.

Political Science/PLS

The Department of Political Science participates in the applied behavioral science degree program. Please see the description of that program in the previous chapter.

A concentrated program in either American politics or international relations is available to students in the Master of Arts in education or Master of Education graduate programs. See the chairman of the Department of Political Science for details.

The Graduate Faculty

Professors Reed M. Smith, Byron S.J. Weng
Associate Professors Robert W. Adams (chairman), Willard J. Hutzler, Kanti C. Kotecha, Robert G. Thobaben
Assistant Professors Samuel C. Funderburk, Perry D. Moore, Ronald M. Sirkin, Paul C. Shaw, James L. Walker

Graduate Courses

- 505-4 *Comparative Marxist Theory* Critical examination of the chief theories developed by Marx, Engels, Lenin, Stalin, Mao Tse-tung, Castro, and various revisionists. Emphasis on Soviet and Chinese ideologies.
- 506-4 *The Marxist-Christian Dialogue* Offered jointly with the Department of Religion; see REL 506. Examination and evaluation of the developing intellectual exchange between Christian and Marxist points of view.
- 510-4 *Empirical Political Analysis* Scope and methods of empirical political research; concepts and hypotheses; explanation and prediction; methodological approaches to the study of politics and political behavior. Prerequisite: familiarity with bivariate statistics equivalent to one course.
- 526-4 *Government of Ohio* Organization and functions of the government of Ohio, with special attention to development, social structure, legal status, electoral processes, and fiscal problems.
- 528-4 *Political Aspects of Urban Development* Institutional and political context of planning; laws, governmental structures, and procedures; urban politics.
- 540-4 *Constitutional Law* Cases in which provisions of the Constitution have been judicially interpreted; federal systems; separation of powers; limits on government.
- 541-4 *Civil Liberties* Cases and related materials on the Bill of Rights and the Fourteenth Amendment; emphasis on the First Amendment freedoms.
- 542-4 *The American Criminal Justice System* Survey of the American criminal justice system, concentrating on political aspects. Topics include police, judges, attorneys, Supreme Court decisions, crime, and public opinion.
- 546-4 *Public Personnel Administration* Methods of employment, training, compensation, and employee relations in various levels of civil service; organizations of public employees.
- 547-4 *American Public Policy Analysis* The nature and classification of public policy. Emphasis on fragmentation, incrementalism, bargaining as means of policy development. Impact of citizens on public policy evaluation. Examination of illustrative public policy areas.
- 554-4 *Governments of Eastern Europe* Introduction to the governments and politics of Eastern Europe, particularly since World War II. Includes current developments in Poland, Czechoslovakia, East Germany, Hungary, Rumania, Bulgaria and Yugoslavia.
- 562-4 *Political System of Japan* Analysis of the political structures and processes of Japan with special attention to the dynamic factors of socioeconomic development.
- 564-4 *Contemporary African Politics* Political processes and governmental institutions of Sub-Saharan Africa, with special attention to dynamics of political development and social and economic change. Comparative analysis of selected African political systems.
- 566-4 *Politics of the Middle East* Introduction to governments and politics of the Middle East with special attention to cultural and historical background and the Arab-Israeli conflict.
- 567-4 *Political System of China: the People's Republic* Analysis of political structures and processes of Communist China; focus on dynamic factors of socioeconomic and political development.
- 572-4 *International Organization* Analysis of developing structures and functions of the United Nations and other international organizations, and concepts relating to world government.
- 580-4 *American Foreign Policy* Study of the role of the United States in contemporary international politics and the relationship of the domestic political system to that role. Discussion of current problems.
- 601-4 *Classical and Medieval Political Thought* Critical examination of political ideas from 500 B.C. to 1500 A.D. with special attention to Plato, Aristotle, Cicero, St. Augustine, St. Thomas Aquinas, Luther, Calvin, and Machiavelli.

- 602-4 *Political Thought: Hobbes to Mill* Critical examination of political ideas from 1600 to 1900, with special attention to Hobbes, Locke, Rousseau, Montesquieu, Hume, Burke, Hegel, Bentham, Marx, and Mill.
- 603-4 *Twentieth Century Political Thought* Critical examination of the ideas of twentieth-century political theorists. Emphasis on the nature, methodology, evaluation, existing condition and future of political thought.
- 607-4 *Seminar in Political Theory* Readings, research, reports, and discussion on selected theorists, topics, and problems.
- 611-4 *Seminar in Methodology* Techniques and methods of research in political science; application to individual projects and research designs. Prerequisite: PLS 510 or an equivalent level of familiarity with statistical techniques.
- 612-4 *Topics in Empirical Political Analysis* Selected topics of methodological or analytical concern in contemporary political research. Prerequisite: PLS 510 or permission of instructor. May be repeated once.
- 625-4 *Seminar in Metropolitan Studies* Intensive interdisciplinary treatment of metropolitan studies. Reading and discussion on pertinent theory, methodology, and case studies. Practical research by students. Permission of instructor required. May be repeated once.
- 627-4 *Urban Policy Analysis* Study of selected urban problems and their relationship to the political environment; explores program design and evaluation, and the use of social indicators. Students are urged to have some background in introductory statistics.
- 629-4 *Urban Communications Theory* (Listed jointly with the Department of Communication; see COM 629.) Processes and institutions by which individuals and groups communicate in an urban environment. Model of an urban communication system developed by interdisciplinary systems approach.
- 630-4 *Seminar in American Politics and Government* Selected topics related to American political institutions and processes. Emphasis on readings, discussion, research. Prerequisite: twelve hours in American government or permission of instructor. May be repeated once.
- 633-4 *Public Opinion* Opinion formation in American politics; relationship of opinion to public policy; voting behavior in American elections; role of mass media and political interest groups in the policy process; development of political attitudes and values.
- 634-4 *Political Socialization* Political attitude development; acquisition of basic political orientations and values from childhood through adolescence and adulthood; investigation of role of various socializing agents.
- 645-4 *Comparative Public Administration* Comparative study of public administration, emphasizing characteristics and roles of public bureaucracies in Western, non-Western, developing, and developed nations.
- 646-4 *Public Budgeting* Examination of the major phases of the governmental budget cycle; types of budget; budgetary reform; economic and public policy impact of government budgeting; decision-making; legislative-executive relations in budget formation and implementation.
- 647-4 *Seminar in Public Administration* Selected national, state, and local problems; emphasis on legal scope of administrative power and on research methods used by staff agencies. Prerequisite: PLS 345 or permission of instructor.
- 649-4 *Public Organization Theory* Theory of administration and decision making of public organizations, principal schools of thought, and impact of structure, behavior, and public policy. Prerequisite: PLS 345.
- 651-4 *Comparative Government Policy* An examination of the differences in policy outcomes in relation to variations in governmental structure and political processes in West European political systems and the U.S.; policy areas examined include social welfare, taxation, civil rights, foreign policy.
- 653-4 *Political System of the Soviet Union* Analysis of the Soviet system with emphasis on development of the Communist Party.
- 660-4 *Seminar on Comparative Political Systems* Readings, research, reports, and discussion on selected topics and problems. Permission of instructor required.
- 670-4 *Seminar in International Relations* Readings, research, reports, and discussion on selected topics and problems. Permission of instructor required.
- 671-4 *International Law* Study of rules governing the conduct of international politics with emphasis on their relevance to current world problems.

- 686-4 *Chinese Foreign Policy* Policy dynamics and structure as well as external policies and international relations of the People's Republic of China.
- 690-1 to 4 *Independent Reading* Supervised individual readings on selected topics. Arranged between student and faculty member directing the study. Permission of instructor required. May be taken twice.
- 691-1 to 4 *Independent Research* Supervised individual research on selected topics. Arranged between student and faculty member directing the study. Permission of instructor required. May be taken twice.
- 692-1 to 4 *Independent Field Experience* Supervised individual projects. May involve intern programs in local government or other special programs. Arranged between student and faculty member directing the study. Permission of instructor required. May be taken twice.
- 693-1 to 4 *Contemporary Problems* Advanced study in selected topics which frequently include new developments in the methodology or subject matter of the various subfields of the discipline. May be repeated for credit.
- 694-1 to 4 *Special Topics* Study of particular political problems of contemporary significance. May not follow time patterns scheduled for regular courses. May be repeated for credit.
- 551-4 *Experimental Social Psychology* Current theories and experimental findings regarding the determinants of social behavior.
- 561-4 *Learning and Motivation* Introduction to experimental findings and contemporary theories of conditioning, learning, and motivation.
- 571-4 *Perception* Physiology and psychology of the phenomena of sensation and perception.
- 591-4 *Physiological Psychology* Physiological mechanisms of behavior; special emphasis on motivational systems and learning.
- 632-4 *Practicum in Applied Psychology* Provides an opportunity to work in an applied psychological setting under supervision. The setting will be consistent with the individual student's interests (mental health agency, industrial or organizational setting, etc.). Permission of instructor required.
- 633-4 *Exceptional Child* Problems of retarded, gifted, physically handicapped, and emotionally disturbed children.
- 635-4 *Abnormal Psychology* Causes, symptoms, influence, and prevention of abnormal behavior and their relation to normal behavior. Field trips to appropriate local institutions. Prerequisite: four quarter hours of advanced psychology.
- 636-4 *Behavior Modification Method and Theory* A basic survey of the principles of conditioning as they relate to problems in human adjustment. The general principles of the psychology of learning are emphasized but they are illustrated with cases of interest to a wide variety of helping professionals; e.g., psychologists, educators, social workers, nurses, and speech therapists. Prerequisite: PSY 435 or 305 or 361 or consent of instructor.
- 637-4 *Behavior Modification* Applications of psychological principles to a wide variety of behaviors. Prerequisite: PSY 311, 312, 313, 331, 332 or 435/635 or permission of instructor.
- 639-4 *Theory and Research in Clinical Psychology* Overview of contemporary clinical approaches, research techniques, and empirical data. Prerequisite: PSY 331, 435, or advanced standing and permission of instructor.
- 643-4 *Tests and Measurements* A survey of the basic principles, problems and techniques of psychological testing with special emphasis on test construction, interpretation, and usage. Prerequisite: PSY 313 or consent of instructor.
- 644-4 *Advanced Industrial Psychology* Theories and research findings in selected topics in industrial psychology. Advanced standing and permission of instructor required.

Psychology/PSY

The Department of Psychology participates in the applied behavioral science degree program. Please see the description of that program in the previous chapter.

The Graduate Faculty

Professors George H. Crampton, Sherwin J. Klein, Kevin M. Mitchell (chairman), Warner Wilson
Associate Professors Patrick E. Campbell, Herbert A. Colle, Helen G. A. Klein, Brian M. Kruger, Martin K. Moss, Richard A. Page
Assistant Professor Harry N. Davis

Graduate Courses

- 531-4 *Theory and Research in Personality* Review of contemporary theories of personality and associated research methodology.
- 541-4 *Developmental Psychology* Theory, research, and issues in the study of development of children and the young of other species.

- 655-4 *Psycholinguistics* A survey of experimental findings in the areas of animal communication and human language with special emphasis on their implications for current theories of language. Includes production and reception of speech, acoustic signal, speech mechanism, personality and speech behavior, development and deficiencies, and communication.
- 657-4 *Psychology of Administrative Principles for Social Agencies* A survey of the basic social psychological principles involved in administrative mental health and mental retardation programs. Focus is on factors governing application of those principles to communication, organization development, and supervision within the mental health/mental retardation field. Senior standing and consent of instructor required.
- 665-4 *Information Processing* A survey of experimental findings in animal and human memory with emphasis on their implications for current theories of memory. Prerequisite: PSY 313.
- 678-4 *Animal Behavior* Also listed as BIO 678. The physiology, phylogeny, and ontogeny of behavior. Prerequisite: either BIO 111, 112, 113 and 302, or PSY 111, 112, 311, and 312; and consent of instructors. Field trips are planned.
- 681-4 *History of Psychology* Major trends in the development of psychology from its beginning to the present. Prerequisite: PSY 313 or consent of instructor.
- 682-4 *Theories and Systems in Psychology* Comprehensive treatment of the historical antecedents for selected theories and systems in psychology. Graduate standing required.
- 688-1 to 4 *Seminar in Special Topics* Variable content. Specific topics of the course will be announced in the schedule when course is offered. Advanced standing in psychology or related field and consent of instructor required.
- 698-1 to 3 *Independent Research* Original problems for investigation. Permission of instructor required.
- 699-1 to 3 *Independent Research* Original problems for investigation. Consent of instructor selected by the student required.
- 721-4 *Engineering Psychology* The application of psychology to equipment design and man-machine relationships. Open to engineering and business students of advanced standing without introductory psychology.
- 725-4 *Experimental Methods in Social Psychology* A survey of experimental method as it is applied to social psychological problems. Provides experiences in both laboratory and field techniques. Prerequisite: PSY 313, 351, or consent of instructor.
- 726-4 *Attitude Structure and Change* Study of attitude as a social psychological concept, including problems of measurement, empirical findings, and theoretical models. Prerequisite: PSY 351 or consent of instructor.
- 727-4 *Small Groups* Current theory and research in selected areas of small groups, including communications, group norms and conformity, group structure, leadership. Prerequisite: PSY 351 or consent of instructor.
- 729-4 *Interpersonal Relations* A laboratory group for the study of interpersonal relations, in which the group determines the goals and the means of goal achievement and then proceeds toward the goal. Advanced standing and consent of instructor required.
- 731-4 *Theories of Personality* Contemporary theories of the development, organization, and dynamics of personality. Prerequisite: PSY 331; advanced standing or consent of instructor required.
- 761-4 *Human Learning Psychology* Phenomena, principles, and problems of learning and retention. Prerequisite: PSY 362 or consent of instructor.
- 762-4 *Advanced Learning* A survey of experimental findings in animal and human learning with emphasis on their implications for current theories in learning. Prerequisite: PSY 313 and 361, 362 or consent of instructor.
- 763-4 *Advanced Motivation* A survey of experimental findings in animal and human motivation with emphasis on their implications for current theories of motivation. Prerequisite: PSY 313 or 361, 362 or consent of instructor.
- 771-4 *Perception* Selected problems in perception with emphasis on theoretical interpretations. Prerequisite: PSY 372 or consent of instructor.
- 773-4 *Sensory Processes* A survey of the basic physiology of the senses and the peripheral nervous system. Emphasis is on receptor mechanisms and neural coding processes. Prerequisite: PSY 371 or 391 or consent of instructor.

- 775-4 *Neuropsychology* Intensive laboratory involvement with the instrumentation and surgical techniques used in physiological psychology including: GSR, EMG, EKG, and EEG recordings; animal behavioral changes produced by electrical stimulation of the brain and/or lesions of brain structures. Prerequisite: PSY 391 and 392 or consent of instructor.
- 785-4 *Intermediate Statistics* Statistical methods and interpretations encountered in experimental studies and presentations of behavioral data. Prerequisite: PSY 312.

Religion/REL

The Graduate Faculty

Professor Nicholas Piediscalzi (chairman)
 Associate Professors Catherine L. Albanese, Eric L. Friedland, Herbert T. Neve, Robert D. Reece, Willis M. Stoesz
 Assistant Professor David L. Barr

Graduate Courses

- 500-3 *Technology and Society* (Taught jointly with Department of Engineering; see EGR 500). Important developments in engineering and technology; their interrelations with society and human values as viewed in historical and in contemporary perspective. Open to juniors and seniors in all colleges.
- 503-3 *Space and Faith: Topics in Religion and Geography* (Team taught with Department of Geography; see GEO 503.) The interrelation of religious and geographical factors in selected cultures of East and South Asia. May be repeated under different subtitles.
- 506-4 *The Marxist-Christian Dialogue* (Team taught with the Department of Political Science; see PLS 506.) Examination and evaluation of the Marxist-Christian dialogue. Emphasis on such categories as hope, liberation, alienation, man, love, class struggle, transcendence, power, and change. Consent of instructor required.
- 509-3 *Christianity* An examination of the structures of religious experience which have shaped the development of Christianity in history. Institutional and ritual forms will be investigated as systems of meaning against the backdrop of the general history of religions.
- 510-3 *Western Religious Thought: Ancient* Historical survey of intellectual development in Western religion. Selected readings in important thinkers and in comprehensive secondary works.
- 511-3 *Western Religious Thought: Medieval* Historical survey of intellectual development in Western religion. Selected readings in important thinkers and in comprehensive secondary works.
- 512-3 *Western Religious Thought: Modern* Historical survey of intellectual development in Western religion. Selected readings in important thinkers and in comprehensive secondary works.
- 516-3 *Judaism: Faith and People* Judaism as a religious culture of a particular people is examined critically, historically, and phenomenologically.
- 517-3 *Development of Jewish Thought* An examination of the development of Jewish thought since the emancipation from the Ghetto in western Europe in the eighteenth century.
- 518-3 *Contemporary Jewish Thought* Examination of the major themes and issues in the works of contemporary Jewish thinkers, e.g., Borowitz, Herberg, Fackenheim, Kaplan, Rothschild, Heschel, Rubenstein, and Wiesel.
- 530-3 *Topics in American Religion* Examination of selected topics in American religion to investigate its basic religious structures and to explore the relationship of religious phenomena to their cultural context. May be taken more than once under different subtitles.
- 560-3 *Primitive Religions* Offered jointly with Department of Anthropology; see ATH 546. Anthropological approach to the meaning and function of religion in social life and the nature of the thought or belief systems that gave rise to different forms of religious life. Emphasis on primitive and peasant societies.
- 561-3 *Sociology of Religion* Offered jointly with the Department of Sociology; see SOC 561. General treatment of religion, the influence of religious ideas and institutions on other social institutions, and the influence of society upon religion. Consent of instructor required.
- 570-3 *Studies in Ethics* A special topics course for intensified study of the ethical dimensions of a particular religious tradition or for concentrated study in theoretical or practical ethical problems. Topics to be announced with each offering.

- 578-3 *Ethics and Medicine* Taught jointly with the Department of Philosophy; see PHL 578. An examination of the ethical issues confronting society in the area of medicine and health care, considered from the perspective of philosophical and theological ethics. Examples: ethics of abortion, euthanasia, experimental medicine, and behavior control.
- 581-3 *Philosophy of Religion: Contemporary Western Survey* (Listed jointly with Department of Philosophy; see PHL 581.) Cross-disciplinary perspective on philosophical and religious schools of thought in the early twentieth century. Absolute and personal idealism, spirit, value, positivism and naturalism, history and culture, modernism and pragmatism, religious consciousness and phenomenology.
- 582-3 *Philosophy of Religion: Process* (Listed jointly with Department of Philosophy; see PHL 582.) Realism and the revolt against idealism. Cross-disciplinary analysis of a major contemporary process philosopher and the implications of his thought for religion. Focus on Alfred North Whitehead.
- 583-3 *Philosophy of Religion: Secular* (Listed jointly with Department of Philosophy; see PHL 583.) Cross-disciplinary analysis of modes of human awareness through which religious meaning is expressed (sensation, morality, beauty, reason, human relations). Examination of presuppositions of contemporary secular religion in existentialism.
- 600-3 *Seminar in Religion* Topics chosen by the department. Consent of instructor required. May be taken more than once.
- 610-4 *Religious Themes in Literature* Taught jointly with the Department of English; see ENG 660. Courses offered under this number provide intensive study of literary works in terms of significant and recurring religious themes and images as they can be traced in various cultures, and literary traditions.
- 617-3 *Evolution* Taught jointly with the Department of Biology; see BIO 617. Introduction to the biological, philosophical, theological, and ethical aspects of evolution. Consent of instructor required.
- 619-3 *Ethics in an Industrial Society: the Responsibility of Business in Society* Taught jointly with the College of Business and Administration; see ADM 695. Ethical responsibilities of business in light of political, moral, social, and religious considerations. Emphasis on analysis and evaluation of the changing framework of responsibilities facing both business organizations and their leaders.
- 629-3 *Foundations for Religion Studies* Introduction to various methods utilized in religion studies and an application of these methods to concrete data in order to establish a foundation for teaching about religion.
- 630-3 *Teaching About Religion in the Public Schools* Taught jointly with the College of Education; see ED 630. Introduction to the historical background and court decisions pertaining to teaching about religion in the public schools; current ways in which religion is taught in the public schools; and new experimental approaches to teaching about religion.
- 631-3 *Religion in American Life* Offered jointly with the Department of History; see HST 671. Development of religious thought and institutional life in the United States viewed in relation to American social change. Offered alternate years.
- 641-3 *Islam* Study of the origin and development of Islam, including contemporary issues and problems. Offered on an irregular schedule.
- 642-3 *Hinduism* Study of the origin and development of Hinduism and its impact upon various aspects of Indian society and culture from ancient times to the present. Offered alternate years.
- 643-3 *Buddhism and Asian Culture* Study of Theravada Buddhism and Mahayana Buddhism in various Asian countries as expressed in art, philosophy, social thought and folk tradition. Offered alternate years.
- 648-3 *Contemporary Eastern Religious Thought* Study of major schools and selected figures in contemporary eastern religious thought. Consent of instructor required. Offered alternate years.
- 653-3, 654-3 *Age of Renaissance and Reformation* Offered jointly with Department of History; see 652 653, 654. Decline of European feudalism and rise of the nation-state; revival of culture and arts; decline of universal Church and growth of religious diversity. 653: 1350-1500; 654: 1500-1648; offered alternate years.

- 670-1 to 4 *Workshop* Intensive study of selected problems (e.g. the teaching of religion in secondary schools, medical ethics) to meet particular needs of participating students. Specific subtitles to be announced for each workshop. May be repeated subject to maximum limits established by student's department. Consent of instructor required.
- 694-3 to 4 *Existentialism* Offered jointly with the Department of Philosophy; see PHL 694. Representative writers of the existentialist movement. Permission of instructor required.
- 701-2 to 4, 702-2 to 4, 703-2 to 4 *Reading and Research in Religion* Intensive research in specialized areas. Student must submit a written proposal, with faculty approval, for acceptance in course. Prerequisite: a minimum of thirty quarter hours of advanced work in religion or approved related courses; related courses must be approved by the chairman of the department.

Sociology, Anthropology, and Social Work

The Department of Sociology, Anthropology, and Social Work participates (in the disciplines of sociology and social work) in the applied behavioral science degree program. Please see the description of that program in the previous chapter.

The Graduate Faculty

Professors Lawrence J. Cross, A.K.M. Aminul Islam, Matthew Melko (chairman)

Associate Professors Jeanne Ballantine, Leonard Cargan, Myrtle Korenbaum, Jerald Savells

Assistant Professors Bela Bogнар, Gordon Welty

Graduate Courses

Sociology/SOC

512-1 to 6 *Workshop in Current Problems* Specific subtitles to be added with individual workshops. Intensive study of a particular problem area, utilizing professionally qualified personnel from the academic and community environments. Consent of instructor required. May be repeated for a maximum of nine quarter hours.

- 520-3 *Sociology of Deviant Behavior* Extensive exploration of the various sociological approaches to the study of deviance and social disorganization with an emphasis upon contemporary sociological theory and research. Consent of instructor required.
- 532-3 *Juvenile Delinquency* Problems of definition and treatment of delinquency; preparation for further study or work with the delinquent. Graduate standing and consent of instructor required.
- 540-3 *Social Organization* Theories and analysis of social organization from micro to macro levels with emphasis on theories of equilibrium and disequilibrium. Graduate standing and consent of instructor required.
- 541-3 *Social Stratification* Structures, theories, and consequences of social inequality with special emphasis on the United States. Graduate standing and consent of instructor required.
- 550-3 *Sociology of Occupations and Professions* Investigation, analysis, and discussion of contemporary theories focusing upon the relationship of the individual to his/her work.
- 560-3 *Sociology of the Family* Sociological analysis of development of the family, its relationship to society, and its contribution to personality. Graduate standing and consent of instructor required.
- 561-3 *Sociology of Religion* Listed jointly with Department of Religion; see REL 561. General treatment of religion, the influence of religious ideas and institutions on other social institutions, and the influence of society upon religion. Graduate standing and consent of instructor required.
- 562-3 *Political Sociology* Analysis of the political institution and the important theories about it: political decision making, power, and the instrumentalities of power. Graduate standing and consent of instructor required.
- 563-3 *Sociology of Education* The school as a social institution. Internal and external influences, structure of the school social system, and sociological issues affecting the school such as social class factors and equality of educational opportunity. Graduate standing and consent of instructor required.
- 599-1 to 4 *Studies in Selected Subjects* Course of variable content dealing with problems, approaches, and topics in the field of sociology. May be repeated up to nine hours under different topics. Graduate standing and consent of instructor required.

- 601-3 *Selected Topics in Theory-Methods* Variable content. Specific topics will be announced in the class schedule when course is offered. Graduate standing and consent of instructor required. May be repeated up to nine hours under different topics.
- 632-3 *Penology* Historical development and critical assessment of penal institutions. Consent of instructor required.
- 633-3 *Internship in Corrections* Supervised field experience in some area of corrections (probation, parole, jail, etc.) Instructor permission required. Student must be enrolled for two consecutive quarters, may be enrolled for three consecutive quarters. Graduate standing and consent of instructor required.
- 634-3 *Social Life and Organization in Extreme Conditions* Examines the forms social interaction takes in extreme situations such as mental hospitals, concentration camps, prisons, and skid rows.
- 639-3 *Selected Topics in Problems/Deviance* Variable content. Specific topics will be announced in the schedule when course is offered. Graduate standing and consent of instructor required. May be repeated up to nine hours under different topics.
- 641-3 *Industrial Sociology* Extensive exploration of the relationship between organization structure and interaction patterns; sociological analysis of the division of labor in contemporary society and the role of the individual in the work group. Graduate standing and consent of instructor required.
- 642-3 *Minority Relations* A study of intergroup, racial, and ethnic group relations, including the processes and consequences of conflict, prejudice, and discrimination. Graduate standing and consent of instructor required.
- 643-3 *Urban Demography* Techniques and methods for analyzing urban populations; emphasis upon working with local population data. Graduate standing and consent of instructor required.
- 644-3 *Urban Sociology* An approach to understanding the causes and consequences of urbanization and the varieties of urban life. Graduate standing and consent of instructor required.
- 645-3 *Rural Sociology* The structure and functioning of rural society, rural-urban relationships, and the impact of social change. Graduate standing and consent of instructor required.
- 646-3 *Community Studies* Examination of various types of communities in America and the major sociological theories concerning the community. Graduate standing and consent of instructor required.
- 660-3 *Sociology of Law* The law and legal institutions as revealed in selected classical and contemporary sociological literature. Consent of instructor required.
- 662-3 *Social Gerontology* Listed jointly with the Department of Social Work; see SW 662. Study of social aspects of aging, the needs of the aging population, and society's response to the needs.
- 663-3 *Social Gerontology II* Listed jointly with the Department of Social Work; see SW 663. Second course in a two-quarter sequence of social gerontology. Explores in depth concepts and issues related to aging. Prerequisite: SOC 662 or consent of instructor.
- 679-3 *Selected Topics in Social Institutions* Variable content. Specific topics will be announced in the schedule when course is offered. Graduate standing and consent of instructor required. May be repeated up to nine hours under different topics.
- 680-3 *Collective Behavior* The nature of crowds, mobs, fads, social movements, and revolutions and the role of public opinion and propaganda in society.
- 681-3 *Sociology of Small Groups* Study of face-to-face interaction with emphasis on both intergroup and intragroup structure and processes. Graduate standing and consent of instructor required.
- 689-3 *Selected Topics in Microsociology* Variable content. Specific topics will be announced in the class schedule when course is offered. Graduate standing and consent of instructor required.
- 690-2 to 4 *Directed Studies in Sociology* Graduate standing and consent of instructor required.

Anthropology/ATH

- 546-3 *Primitive Religions* Listed jointly with Department of Religion; see REL 560. Anthropological approach to the meaning and function of religion in social life, and the nature of the thought or belief systems that gave rise to different forms of religious life; emphasis on primitive and peasant societies.
- 569-6 to 9 *Archaeological Field Study* Excavation training on prehistoric sites. Summer only. Prerequisite: ATH 368 or equivalent, graduate standing, and permission of instructor.

- 600-3 *Special Topics in Archaeology* Courses under this number provide advanced study in various specialized aspects of archaeology. Prerequisite: twelve quarter hours of anthropology.
- 610-3 *Special Topics in Cultural Anthropology* Selected topics concerning the method and theory of anthropological thought and their relationship to the allied disciplines of art, economics, history, linguistics, and politics. Special emphasis will be placed on current trends influencing research in cultural anthropology. Prerequisite: twelve quarter hours of anthropology or undergraduate degree in other social science, graduate standing and consent of instructor required.
- 646-3 *Cultures of South Asia* Survey and analysis of cultural diversity and unity in Southern Asia, particularly India, Pakistan, Bangladesh, and Ceylon. Graduate standing and consent of instructor required.
- 648-3 *Development of Ethnological Thought* Surveys historical development of ethnological thought; emphasizes theories of social and cultural change. Graduate standing and consent of instructor required.
- 650-3 *Political Institutions in Primitive Societies* A study of that part of the culture of primitive societies which we recognize as political organization. An attempt is made to show how in less complex (primitive) societies new local communities come into being through fission. Prerequisite: twelve quarter hours of anthropology or undergraduate degree in another social science; graduate standing and consent of instructor required.
- 692-2 to 4 *Directed Studies in Anthropology* Graduate standing and consent of instructor required.

Social Work/SW

- 570-3 *Social Welfare and the Community* Analysis of the community's agencies which are intended to meet the social welfare needs of its people. Field placement of four clock hours per week in a social agency to study one unit of the community's welfare system. Graduate standing and consent of instructor required.
- 580-3 *Social Work Practice I* First of two-quarter foundation sequence of generic social work practice theory. Problem assessment, data collection, data analysis, interventive methods and evaluation procedures are studied and simulated. Graduate standing and consent of instructor required.
- 581-3 *Social Work Practice II* Second of two-quarter foundation sequence of generic social work practice theory. Problem assessment, data collection, data analysis, interventive methods and evaluation procedures studied and simulated. Graduate standing and consent of instructor required.
- 599-1 to 4 *Studies in Selected Subjects* Course of variable content dealing with problems, approaches, and topics in the field of social work.
- 662-3 *Social Gerontology* Listed jointly with the Department of Sociology; see SOC 662. The study of social aspects of aging. The needs of the population and society's response to those needs.
- 663-3 *Social Gerontology II* Listed jointly with the Department of Sociology; see SOC 663. Second course in a two-quarter sequence of social gerontology. Explores in depth concepts and issues related to aging. Prerequisite: SW 662 or consent of instructor.
- 677-1 to 4 *Seminar on Special Problems in Social Welfare Policy and Services* Selected topics related to the operation of the social welfare system in America; issues, trends, and problems. Variable content. Specific topics are announced in the class schedule. Consent of instructor required.

- 681-3 *Interventive Methods with Individuals* In-depth study of social work practice theory for the enhancement of social functioning of individuals. Graduate standing and consent of instructor required.
- 682-3 *Interventive Methods with Groups* In-depth study of social group work practice theory including practice simulations using the class as an illustrative group. Graduate standing and consent of instructor required.
- 683-3 *Interventive Methods with Families* Strategies for the analysis and intervention into family functioning. Techniques in conjoint interviewing including simulations of family functioning and family therapy sessions. Graduate standing and consent of instructor required.
- 690-4 *Research Methods in Social Work I* First course in a two-quarter sequence study of evaluation research methodology. Criteria for intelligent consumption of research reports. Evaluation of selected research reports for relevance to social work practice. Graduate standing and consent of instructor required.
- 691-4 *Research Methods in Social Work II* Second course in a two-quarter sequence study of evaluative research methodology. Criteria for intelligent consumption of research reports. Evaluation of selected research reports for relevance to social work practice. Graduate standing and permission of instructor required.
- 694-2 to 4 *Directed Studies in Social Work* Graduate standing and consent of instructor required.

Theatre Arts/TH

The Graduate Faculty

Professor Abe J. Bassett (chairman)
Assistant Professor Richard H. Andrew

Graduate Courses

695-3 to 9 *Workshop in Theatre* Intensive study of selected special topics or problems or intensive experience in theatrical presentations designed to meet the needs of participating students. Specific title to be announced for each workshop. May be repeated for credit subject to departmental, divisional, and university limits.

Urban Studies/URS

Graduate Courses

690-1 to 4 *Special Topics* Advanced study in selected topics in urban studies. Topics may include new developments in methodology or the various subfields of the discipline. May be repeated for a total of twelve quarter hours.





Graduate Faculty and Administrative Officers

The Graduate Faculty

The following faculty members have been appointed Category Two members of the graduate faculty. They are qualified to teach at the graduate level on a continuing basis and to serve on graduate student advisory committees.

Adams, Robert W. *Associate Professor of Political Science and Department Chairman* A.B., 1955, Utica; M.A., 1961, Syracuse; Ph.D., 1969, Ohio State

Ahmad, Khurshid *Associate Professor of Finance* B.A., 1953, Karachi; M.A., 1955, Punjab; Ph.D., 1970, Pennsylvania

Albanese, Catherine L. *Associate Professor of Religion* A.B., 1962, Chestnut Hill; M.A., 1968, Duquesne; M.A., 1970, Ph.D., 1972, Chicago

Allen, Arnold *Professor of Psychiatry* B.S., 1940, Cincinnati; M.D., 1943, Cincinnati Medical College; certified in psychoanalyses, 1962, Chicago Institute for Psychoanalyses

Amon, James P., *Assistant Professor of Biological Sciences* B.S., 1965, Cincinnati; M.A., 1968, Ph.D., 1974, William and Mary

Amos, Oris Elizabeth Carter *Associate Professor of Education* A.B., 1951, Virginia State College; M.A., 1963, Ph.D., 1971, Ohio State

Amsden, Robert T. *Assistant Professor of Quantitative Business Analysis* B.A., 1960, New Hampshire; M.S., 1964, Ph.D., 1969, Rutgers

Anderson, Beverlee B. *Assistant Professor of Marketing* B.S., 1960, B.S., 1966, M.B.A., 1972, Ph.D., 1972, Ohio State

Andrew, Richard H. *Assistant Professor of Theatre Arts* B.A., 1964, Emporia State; M.A., 1965, Bowling Green; Ph.D., 1971, Illinois

Andrews, Henry B., Jr. *Adjunct Associate Professor of Education* B.S., 1966, Ed.D., 1970, Tennessee

Andrews, Merrill L. *Associate Professor of Physics* B.A., 1960, Cornell; Ph.D., 1967, Massachusetts Institute of Technology

Anon, Norman *Professor of Economics* A.B., 1948, Miami; M.S. 1951, Ph.D., 1954, Wisconsin

Apt, Madeline H. *Associate Professor of Education* B.S., 1960, M.Ed., 1962, Ph.D., 1966, Pittsburgh

Arbabi, Martin *Assistant Professor of History* A.B., 1961, Georgetown; M.A., 1963, Ph.D., 1969, Rutgers

Arlan, Larry G. *Associate Professor of Biological Sciences* B.S., 1966, M.S., 1968, Colorado State; Ph.D., 1972, Ohio State

Ashare, Alan B. *Associate Professor and Chairman of Radiological Sciences* A.B., 1960, Columbia; M.D., 1965, Albany Medical College

Back, Kenneth C. *Adjunct Professor of Medical Sciences* B.S., 1951, Muhlenberg; M.S., 1954, Ph.D., 1957, Oklahoma

Bacon, Peter W. *Associate Professor of Finance* B.A., 1962, Albion; M.B.A., 1964, D.B.A., 1967, Indiana

Badaczewski, Dennis *Associate Professor of Education* B.A., 1966, Northern Michigan; M.A., 1969, Eastern Michigan; Ed.D., 1971, Kansas

Bajpai, Praphulla K. *Adjunct Associate Professor of Physiology* B.V.Sc. and A.H., 1958; M.V.Sc., 1960, Agra; M.S., 1963, Ph.D., 1965, Ohio State

Baker, William D. *Professor of English* B.A., 1946, Hobart; M.A., 1948, Chicago; Ph.D., 1950, Northwestern

Ballantine, Jeanne H. *Associate Professor of Sociology* B.S., 1963, Ohio State; M.A., 1966, Columbia; Ph.D., 1971, Indiana

Barbour, Clyde D. *Associate Professor of Biological Sciences* B.A., 1958, Stanford; Ph.D., 1966, Tulane

Barlow, Gary C. *Professor of Art Education* B.S., 1957, M.Ed., 1958, Miami; Ed.D., 1967, Pennsylvania State

Barone, Sam *Professor of Management* B.S., 1958, M.S., 1959, Ph.D., 1962, Illinois

Barr, David L. *Assistant Professor of Religion* B.A., 1965, Fort Wayne Bible College; M.A., 1969, Ph.D., 1974, Florida State

Bassett, Abe J. *Professor of Theatre Arts and Department Chairman* B.A., 1952, Bowling Green; M.A., 1957, Ph.D., 1962, Ohio State

Batra, Prem P. *Professor of Biological Chemistry* B.S., 1955, M.S., 1958, Punjab; Ph.D., 1961, Arizona

Battino, Rubin *Professor of Chemistry* B.S., 1953, City College of New York; M.A., 1954, Ph.D., 1957, Duke

Becker, Carl *Professor of History* B.A., 1949, Otterbein; M.A., 1950, Wisconsin; Ph.D., 1971, Cincinnati

Beljan, John R. *Professor of Surgery and Biomedical Engineering; Dean of the School of Medicine; Vice-Provost* B.S., 1951, M.D., 1954, Michigan

Benner, Carl V. *Professor of Education* B.S., 1957, Rio Grande; M.A., 1960, Northern Iowa; M.S., 1960, Purdue; Ed.S., 1965, Bowling Green; Ph.D., 1970, Ohio State

Berry, Charles R. *Associate Professor of History* B.A., 1954, George Washington; M.A., 1963, Ph.D., 1967, Texas

Bethke, Richard J. *Associate Professor of Engineering* B.S.M.E., 1965, Ph.D., 1970, Wisconsin

Bigley, Nancy J. *Professor and Chairman of Microbiology and Immunology* B.S., 1953, Pennsylvania State; M.S., 1955, Ph.D., 1957, Ohio State

Bireley, Marlene *Professor of Education* B.S., 1957, Bowling Green; M.A., 1961, Ph.D., 1966, Ohio State

Blackwell, Barry *Professor and Chairman of Psychiatry* M.A., 1957, Queen's College, Cambridge; M.B., B. Chir., 1960, Guy's Hospital, London; M.D., 1966, Cambridge; diploma, psychiatric medicine, 1967, London

- Blake, Charles H., Jr.** *Associate Professor of Economics* B.S., 1949, Linfield; M.S., 1953, Ph.D., 1966, Wisconsin
- Bognar, Bela J.** *Assistant Professor of Social Work* B.S., 1962, Ecole Sociale de Louvain; M.S.W., 1966, Ph.D., 1974, Wisconsin
- Bracher, Peter S.** *Professor of English* A.B., 1954, Wittenberg; M.A., 1956, University of Washington; Ph.D., 1966, Pennsylvania
- Brandeberry, James E.** *Associate Professor of Computer Science and Engineering and Department Chairman of Computer Science* B.S.E.E., 1961, M.S.E.E., 1963, Toledo; Ph.D., 1969, Marquette
- Brewer, William S.** *Assistant Professor of Biological Sciences* B.S., 1968, M.S., 1970, Clemson; Ph.D., 1975, North Carolina
- Brown, Herbert E.** *Professor of Marketing* B.S., 1961, M.S., 1962, Southern Illinois; Ph. D., 1969, Ohio State
- Brown, William E.** *Assistant Professor of Education* B.S., 1962, M.A., 1964, Ball State; Ph.D., 1969, Indiana
- Bullock, John D.** *Assistant Clinical Professor of Ophthalmology* A.B., 1965, Dartmouth; B.M.Sc., 1966, Dartmouth Medical School; M.D., 1968, Harvard Medical School
- Calcott, Peter H.** *Assistant Professor of Biological Sciences* B.S., 1969, East Anglia; Ph.D., 1972, Sussex
- Campbell, Patrick E.** *Associate Professor of Psychology* B.S., 1965, M.S., 1966, Kansas State College; Ph.D., 1968, Kansas
- Cantelupe, Eugene B.** *Professor of English and Art; Dean of the College of Liberal Arts* B.A., 1942, Buffalo; M.F.A., 1950, Iowa; Ph.D., 1959, Washington University
- Cargan, Leonard** *Associate Professor of Sociology* B.A., 1958, M.A., 1963, Ph.D., 1968, Wayne State
- Carlock, Charlene J.** *Assistant Professor of Education* A.B., 1970, Queens; M.S., 1971, Ph.D., 1975, Florida State
- Carmichael, Wayne W.** *Assistant Professor of Biological Sciences* B.S., 1969, Oregon State; M.S., 1972, Ph.D., 1974, Alberta
- Carraher, Charles E.** *Professor of Chemistry and Department Chairman* B.S., 1963, Sterling College; Ph.D., 1967, Missouri (Kansas City)
- Carusone, Peter S.** *Professor of Marketing and Department Chairman* B.F.A., 1962, Cincinnati; M.B.A., 1965, Xavier; Ph.D., 1969, Ohio State
- Cary, Cecile W.** *Associate Professor of English* B.A., 1959, Macalester; M.A., 1963, Ph.D., 1969, Washington University
- Cary, Norman R.** *Associate Professor of English* B.A., 1958, Asbury; M.A., 1960, Arkansas; Ph.D., 1968, Wayne State
- Castellano, Joseph F.** *Associate Professor of Accountancy and Department Chairman* B.S., 1964, M.S., 1965, Ph.D., 1971, St. Louis
- Cathro, David M.** *Associate Professor of Pediatrics* M.B., Ch.B., 1948-1954, M.D., 1964, Univ. of Edinburgh
- Chait, Beatrice** *Professor of Education; Associate Dean and Director, Division of Teacher Education* A.B., 1936, Hunter; M.A., 1951, Michigan
- Chance, Larry L.** *Assistant Professor of Education* B.S., 1966, M.A., 1967, Ball State; Ph.D., 1973, Kansas
- Chao, Joseph T.** *Associate Professor of Economics* B.A., 1947, Catholic University of Peiping; M.S., 1958, Southern Illinois; Ph.D., 1968, New York University
- Chiodo, John J.** *Assistant Professor of Education* B.A., 1968, M.A., 1970, San Jose State; Ph.D., 1974, Iowa
- Clark, Robert L.** *Associate Professor of Education* B.S., 1949, Murray State; M.A., 1954, Kentucky; Ph.D., 1965, Southern Illinois
- Cleary, Michael J.** *Associate Professor of Quantitative Business Analysis* B.S., 1961, Norwich; M.A., 1969, Ph.D., 1971, Nebraska
- Cobb, Joseph J.** *Assistant Professor of Education* B.S., 1958, Central State; M.Ed., 1969, Wright State; Ph.D., 1973, Miami
- Colbert, Charles** *Adjunct Associate Professor of Engineering* B.E.E., 1940, Michigan; M.S., 1944, Princeton; Ph.D., 1974, Union Graduate School
- Colle, Herbert A.** *Associate Professor of Psychology* B.S., 1965, Wisconsin; Ph.D., 1969, University of Washington
- Collie, William** *Associate Professor of Education; Codirector of Public Education Religion Studies Center* B.A., 1965, Murray State; M.A., 1969, Ed.D., 1972, Kentucky
- Constable, Gordon K.** *Associate Professor of Management* B.S., 1966, M.S., 1968, Ph.D., 1972, Purdue.
- Conway, John B.** *Assistant Professor of Biological Sciences* B.S., 1964, M.S., 1967, San Diego State; M.P.H., 1970, Ph.D., 1973, Minnesota
- Coppage, William E.** *Associate Professor of Mathematics* B.A., 1955, M.S., 1956, Texas Agricultural and Mechanical; Ph.D., 1963, Ohio State
- Correale, Robert M.** *Associate Professor of English and Department Chairman* B.A., 1955, St. Bonaventure; M.A., 1960, Siena; Ph.D., 1971, Cincinnati
- Courtney, K. Diane** *Adjunct Assistant Professor of Pharmacology* B.S., 1955, Massachusetts; M.S., 1961, California Medical School; Ph.D., 1964, Upstate Medical Center, Syracuse
- Cox, Edward F.** *Professor of History* A.B., 1949, A.M., 1950, Ph.D., 1957, Indiana

- Cox, Myron K.** *Associate Professor of Quantitative Business Analysis* B.S., 1949, Virginia Polytechnic Institute; B.S., 1952, Pennsylvania State; M.S., 1957, Massachusetts Institute of Technology; E.E., 1963, North Carolina State; D.Sc., 1964, College of Applied Science (London)
- Crampton, George H.** *Professor of Psychology* B.S., 1949, Washington State; M.S., 1950, Ph.D., 1954, Rochester
- Cross, Lawrence J.** *Professor of Sociology* B.A., 1943, M.A., 1951, Loyola; Ph.D., 1962, Pennsylvania
- Crum, Larry A.** *Associate Professor of Computer Science* B.S., 1964, Ohio State; Ph.D., 1971, Marquette
- Cudkowicz, Leon** *Professor of Internal Medicine* M.B.B.S., 1946, M.D., 1951, Univ. of London; M.R.C.P., 1955, F.R.C.P., 1973, Royal College of Physicians, London
- Cummings, Sue C.** *Professor of Chemistry* B.A., 1963, Northwestern; M.S., 1965, Ph.D., 1968, Ohio State
- Dailey, Kenneth I.** *Professor of History* A.B., 1938, St. Lawrence; Ph.D., 1957, Syracuse
- Daily, James M.** *Associate Professor of Management* B.S., 1954, M.B.A., 1958, Indiana; D.B.A., 1964, Colorado
- Davis, Harry N.** *Assistant Professor of Physiology* B.A., 1964, Eckerd College; M.S., 1971, Ph.D., 1974, Florida
- Davis, Henry W.** *Associate Professor of Computer Science* B.A., 1959, Rice; M.A., 1961, Ph.D., 1965, Univ. of Colorado
- Dillehay, James A.** *Professor of Education, Associate Dean and Director, Division of Educational Leadership and Human Services* B.S., 1957, Dayton; M.Ed., 1960, Miami; Ed.S., 1968, Ph.D., 1969, Bowling Green
- Dimopoulos, George T.** *Professor and Chairman, Department of Biological Sciences* B.S., 1949, M.S., 1950, Pennsylvania State; Ph.D., 1952, Michigan State
- Dittmar, Doris E.** *Associate Professor of Education* B.S., 1954, Oklahoma Baptist; M.Ed., 1965, Wichita State; Ed.D., 1969, Northern Illinois
- Dixon, Robert D.** *Professor of Computer Science* B.S., 1958, M.S., 1960, Ph.D., 1962, Ohio State
- Dolphin, Robert, Jr.** *Professor of Finance; Dean of the School of Graduate Studies* B.S., 1960, M.B.A., 1961, Indiana; D.B.A., 1964, Michigan State
- Dombrowski, Joanne M.** *Assistant Professor of Mathematics* B.S., 1968, Marygrove; M.S., 1970, Ph.D., 1973, Purdue
- Dom, Jacob H.** *Professor of History* B.A., 1960, Wheaton; M.A., 1962, Ph.D., 1965, Oregon
- Dovel, Thomas D.** *Associate Professor of Marketing; Assistant Dean of the College of Business and Administration* B.S., 1959, M.B.A., 1961, Miami
- Dreher, Barbara B.** *Associate Professor of Speech Communication* B.A., 1955, Connecticut; M.A., 1956, Illinois; Ph.D., 1966, Ohio State
- Dusko, Harold G.** *Adjunct Associate Professor of Geography* B.S., 1964, Southern Illinois; M.B.A., 1970, Dayton
- Eakins, R. Gene** *Associate Professor of Speech Communication* B.A., 1951, B.S., 1953, Wittenberg; M.Ed., 1959, Kent State; Ph.D., 1966, Ohio State
- Earl, Robert D.** *Professor of Education* B.S., 1954, Bluffton; M.A., 1958; Miami; Ed.D., 1967, Oklahoma
- Eiteman, Dean S.** *Professor of Accountancy* B.B.A., 1957, M.B.A., 1958, Michigan; Ph.D., 1967, Michigan State
- Elliott, Dan W.** *Professor of Surgery* M.D., 1949, Yale University School of Medicine; Master of Medical Science, 1956, Ohio State
- Emanuel, S. Joseph, Jr.** *Associate Professor of Education* B.A., 1953, St. Meinrad; M.A., 1963, St. Francis; Ed.D., 1969, Indiana
- Engebretson, Darold** *Adjunct Associate Professor of Education; Director of Counseling Services* B.D., 1963, Luther Theological Seminary; B.A., 1966, M.Ed., 1967, Ph.D., 1969, Hawaii
- Ertel, Harry C.** *Associate Professor of Education* B.S., 1939, Wilmington; M.Ed., 1961, Ed.D., 1974, Cincinnati
- Fabrycy, Mark Z.** *Professor of Economics* B.Com., 1950, London; M.A., 1963, Ph.D., 1967, City University of New York
- Fenton, William C.** *Professor of Music and Department Chairman* B.Mus., 1950, B.S., 1951, Cincinnati Conservatory; M.Ed., 1956, Miami; Ed.D., 1967, Cincinnati
- Fernandez, Eileen Gloria** *Assistant Professor of Education* B.S., 1971, Tampa; M.Ed., 1972, Ph.D., 1976, Mississippi
- Fortman, John J.** *Associate Professor of Chemistry* B.S., 1961, Dayton; Ph.D., 1965, Notre Dame
- Foster, Barbara R.** *Associate Professor of Music* B.F.A., 1958, M.F.A., 1960, Georgia; M.Mus., 1963, D.M.A., 1970, Illinois
- Frey, Diane E.** *Associate Professor of Education* B.S., 1966, Shippensburg; M.Ed., 1967, Ph.D., 1970, Illinois
- Frey, Mary Anne** *Assistant Professor of Physiology* A.A., 1967, Montgomery College; B.A., 1970, Ph.D., 1975, George Washington
- Friar, Billy W.** *Assistant Professor of Engineering* A.B., 1953, Berea; B.S., 1958, Virginia Polytechnic; M.S., 1959, Ph.D., 1970, Ohio State
- Fricke, Gerd** *Associate Professor of Mathematics* B.S., 1968, Bonn; M.S., 1969, Kansas; Ph.D., 1971, Kent State
- Friedland, Eric Lewis** *Associate Professor of Religion; Sanders Scholar* B.A., 1960, Boston; M.A., 1962, Ph.D., 1967, Brandeis

- Fries, Ian B.** *Adjunct Associate Professor of Anatomy* B.A., 1964, Columbia; M.D., 1968, Columbia College of Physicians and Surgeons
- Fritz, H. Ira** *Associate Professor of Biological Chemistry* B.A., 1958, Ph.D., 1964, California
- Funderburk, Samuel C.** *Assistant Professor of Political Science* B.A., 1965, M.A., 1967, Florida; Ph.D., 1973, Iowa
- Gaddis, Hal D.** *Professor of Education; Assistant Dean of the College of Continuing and Community Education; Assistant Dean of the College of Education* B.S., 1949, M.A., 1953, Ph.D., 1968, Ohio State
- Gardier, Robert W.** *Professor of Pharmacology and Director of Basic Pharmacology and Toxicology, School of Medicine; Acting Associate Dean, School of Graduate Studies* B.S., 1949, Scranton; M.S., 1952, Ph.D., 1954, Tennessee
- Gaw, Beverly A.** *Assistant Professor of Speech Communication* B.A., 1964, M.A., 1967, Miami; Ph.D., 1974, Ohio State
- Glaser, Roger M.** *Associate Professor of Physiology* B.A., 1968, M.S., 1969, City University of New York; Ph.D., 1971, Ohio State
- Gleason, James J.** *Associate Professor of English* B.S., 1953, Dayton; M.A., 1957, Ph.D., 1969, Ohio State
- Gordon, David C.** *Professor of History and Department Chairman* B.A., 1947, Princeton; M.A., 1952, American Univ. of Beirut; Ph.D., 1957, Princeton
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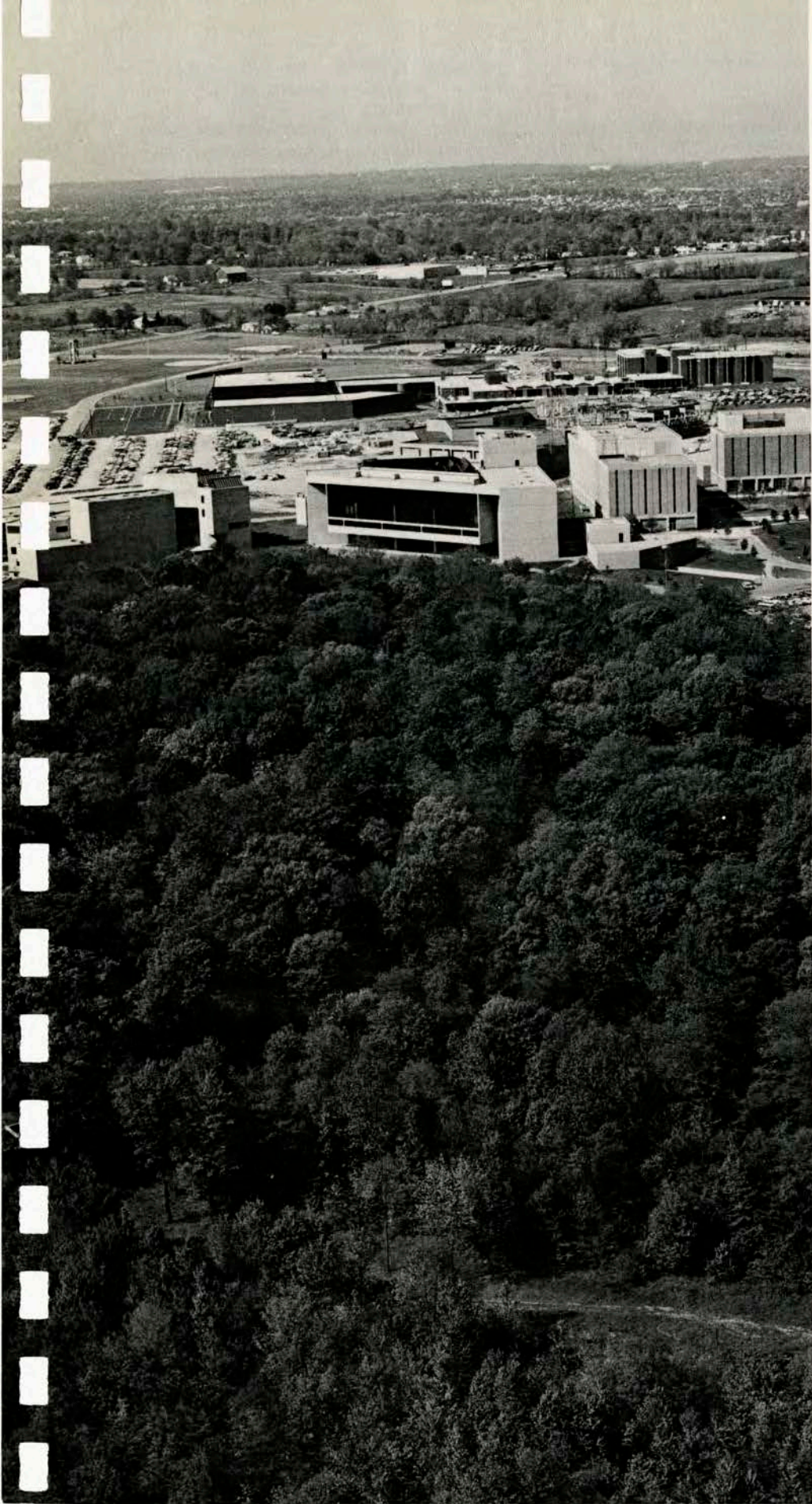
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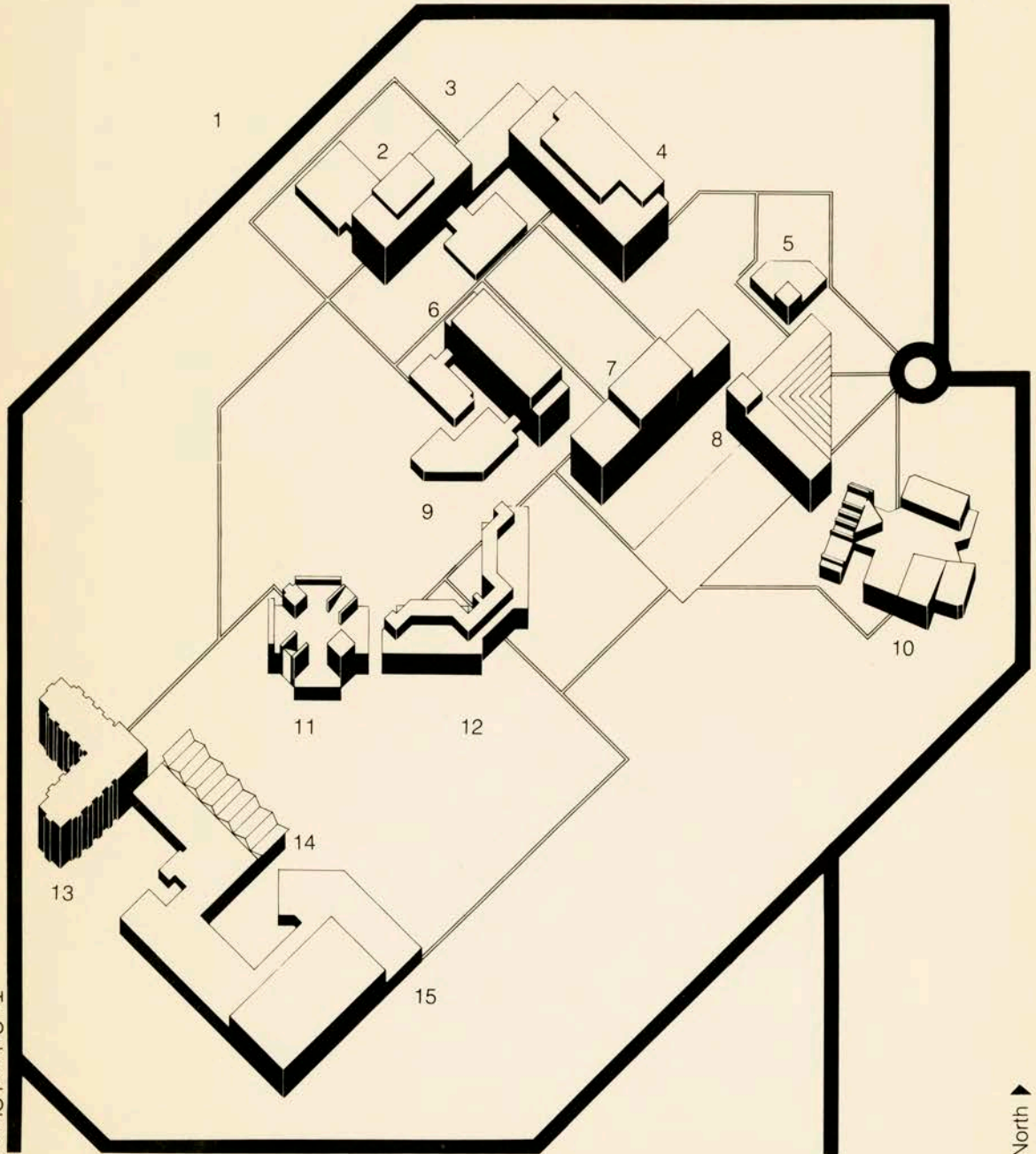
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To Kauffman-Huffman



To Colonel Glenn

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