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1986-1988 Wright State University Graduate Course Catalog

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Wright State University

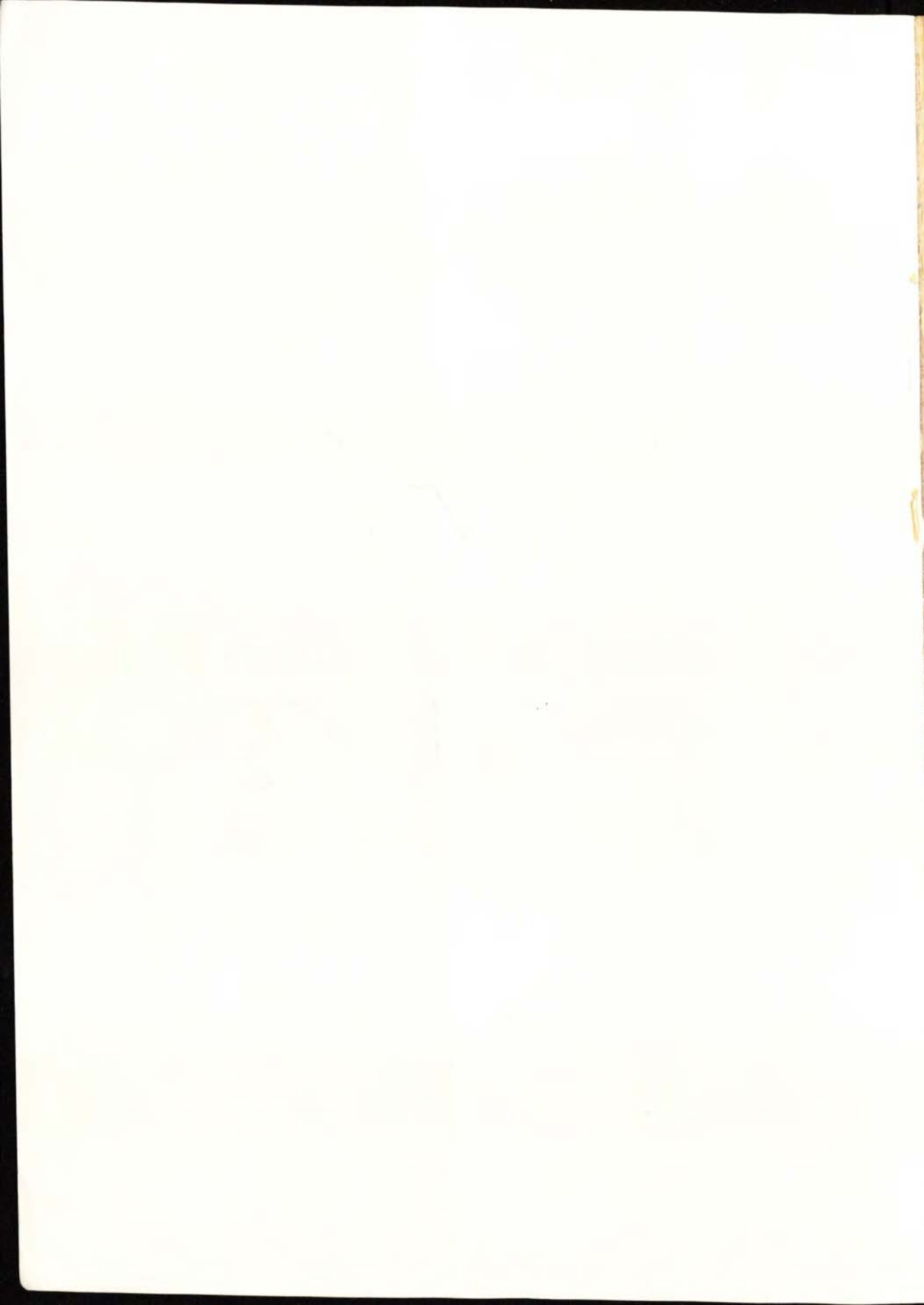
B U L L E T I N



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GRADUATE
CATALOG

D A Y T O N • O H I O



Wright State University
B U L L E T I N



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GRADUATE
CATALOG

D A Y T O N • O H I O

June 1986 Volume 17/Issue 4

The Wright State University Bulletin (USPS 564-130) is published by Wright State University five times a year: February, April, May, June, and November

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Academic Calendar 1986/88

The material in this catalog has been prepared for information purposes and does not constitute a contract between the student and the university. The university reserves the right to make changes in policy, regulations, fees, and programs without notice.

In order to make current academic information available to students, new course descriptions and changes in academic policies and programs that have been made since the publication of this bulletin will be printed in the quarterly class schedules.

The course descriptions included in this catalog represent the range of graduate courses offered at Wright State by the Colleges of Business and Administration, Education and Human Services, Engineering and Computer Science, Liberal Arts, and Science and Mathematics, the School of Professional Psychology, the Wright State University-Miami Valley School of Nursing, and

Fall Quarter September 17-December 6, 1986

September 17, Wednesday/classes begin
November 11, Tuesday/Veterans Day holiday
November 26, Wednesday/classes end
November 27-30, Thursday-Sunday/Thanksgiving holiday
December 1-6, Monday-Saturday/final examinations
December 6, Saturday/Fall Commencement

Winter Quarter January 5-March 21, 1987

January 5, Monday/classes begin
January 19, Monday/Martin Luther King Day holiday
March 14, Saturday/classes end
March 16-21, Monday-Saturday/final examinations

Spring Quarter March 30-June 13, 1987

March 30, Monday/classes begin
May 25, Monday/Memorial Day holiday
June 6, Saturday/classes end
June 8-13, Monday-Saturday/final examinations
June 13, Saturday/Spring Commencement

Summer Quarter June 15-August 20, 1987

June 15, Monday/Terms A and C classes begin
July 3, Friday/Independence Day holiday observed
July 16, Thursday/Term A classes end
July 20, Monday/Term B classes begin
August 20, Thursday/Terms B and C classes end

other graduate programs. For medical school courses see the *School of Medicine Catalog*, available in the medical school Office of Student Affairs/Admissions, 210 Medical Sciences Building. For undergraduate course descriptions see the *Undergraduate Catalog*, available in the Office of Undergraduate Admissions, 127 Student Services. Not all courses are available every quarter of every year. For a listing of the specific courses offered in a particular quarter, students should consult the quarterly class schedule.

Questions concerning admission to the university or questions about academic programs should be directed to the School of Graduate Studies, Wright State University, Dayton, Ohio 45435, telephone 513/873-2975.

This catalog was prepared by the Office of University Communications, Wright State University, Dayton, Ohio.

Fall Quarter September 16-December 5, 1987

September 16, Wednesday/classes begin
November 11, Wednesday/Veterans Day holiday
November 25, Wednesday/classes end
November 26-29, Thursday-Sunday/Thanksgiving holiday
November 30-December 5, Monday-Saturday/final examinations
December 5, Saturday/Fall Commencement

Winter Quarter January 4-March 19, 1988

January 4, Monday/classes begin
January 18, Monday/Martin Luther King Day holiday
March 12, Saturday/classes end
March 14-19, Monday-Saturday/final examinations

Spring Quarter March 28-June 11, 1988

March 28, Monday/classes begin
May 30, Monday/Memorial Day holiday
June 4, Saturday/classes end
June 6-11, Monday-Saturday/final examinations
June 11, Saturday/Spring Commencement

Summer Quarter June 13-August 18, 1988

June 13, Monday/Terms A and C classes begin
July 4, Monday/Independence Day holiday
July 14, Thursday/Term A classes end
July 18, Monday/Term B classes begin
August 18, Thursday/Terms B and C classes end

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Graduate Program Officers

School of Graduate Studies

Donald C. Thomas, Dean and Assistant Vice-President for Research, Office of Academic Affairs
R. Mark Sirkin, Associate Dean and Director of University Research Services
Gerald C. Malicki, Assistant Dean and Director of Graduate Admissions and Records
John M. Kimble, Associate Director of Graduate Admissions and Records and Program Evaluation Coordinator

College of Business and Administration

Waldemar M. Goulet, Dean
Rishi Kumar, Associate Dean for Academic Programs
James C. Crawford, Director of Graduate Programs in Business and Economics
G. Scott King, Director of Master of Science in Logistics Management Program

Accountancy

Jacob P. Paperman, Chair
Harper A. Roehm, Coordinator

Economics

John P. Blair, Chair

Finance, Insurance, and Real Estate

Peter W. Bacon, Chair

Management

James M. Daily, Chair

Marketing

Gordon L. Wise, Acting Chair

College of Education and Human Services

Roger G. Iddings, Dean
James A. Dillehay, Associate Dean and Director of Allied Health Programs

Division of Educational Leadership

Gerald P. Sturm

Advanced Programs in Educational Leadership

Lilburn Hoehn

Curriculum and Supervision

Gerald P. Sturm

Principalship

Gerald P. Sturm

Teacher Leader

R. A. Pendergrass

Division of Human Services

Gregory R. Bernhardt

Art Therapy

Gary C. Barlow

Business and Industry

Eileen F. Self

Chemical Dependency

S. Joseph Emanuel

Community Mental Health

Mary Ann Jones

Gerontology

Gregory R. Bernhardt

School Counseling

Ruth B. Schumacher

School Psychology

Marlene K. Bireley

Rehabilitation Counseling

Jan La Forge

Division of Teacher Education

Ruth H. King

Art Education

Ruth H. King

Classroom Teacher

Ruth H. King

Early Childhood

Doris E. Dittmar

Educational Media

Bonnie K. Mathies

Reading Specialist

Larry L. Chance

Special Education

Oris E. Amos

Division of Health, Physical Education, and Recreation

Stephen D. Frederick

College of Engineering and Computer Science

James E. Brandeberry, Dean

Computer Engineering

Larry A. Crum, Chair

Computer Science

Larry A. Crum, Chair

Systems Engineering

James E. Brandeberry, Dean

College of Liberal Arts

Perry D. Moore, Dean

Lillie P. Howard, Associate Dean

English

James M. Hughes

History

Allan B. Spetter, Chair

Humanities

Nicholas Piediscalzi

Music

David G. Poff

School of Medicine

William D. Sawyer, Dean

John O. Lindower, Associate Dean for Academic Affairs

Aerospace Medicine

Stanley R. Mohler

Wright State University-Miami Valley School of Nursing

Jeanette Lancaster, Dean

Donna M. Deane, Associate Dean for
Research and Development

School of Professional Psychology

Ronald E. Fox, Dean

Allan G. Barclay, Associate Dean for
Academic Affairs

College of Science and Mathematics

Richard S. Millman, Dean

Marc E. Low, Associate Dean

Lois A. Cook, Assistant Dean

Biological Sciences

Anatomy

Joseph Zambarnard, Chair

Biological Chemistry

Robert A. Weisman, Chair

Biological Sciences

John D. Rossmiller, Chair

Microbiology and Immunology

Nancy J. Bigley, Chair

Physiology and Biophysics

Peter K. Lauf, Chair

Chemistry

George G. Hess, Chair

Geological Sciences

Raphael Unrug, Chair

Mathematics and Statistics

Edgar A. Rutter, Chair

Physics

Merrill Andrews, Chair

Other Graduate Programs

Applied Behavioral Science

Helen A. Klein

Biomedical Sciences

Robert A. Weisman

Selected Graduate Studies

Donald C. Thomas

Graduate Council Members

School of Graduate Studies

Donald C. Thomas, Dean and Chair

R. Mark Sirkin, Dean's Alternate

College of Business and Administration

Waldemar M. Goulet, Dean

Rishi Kumar, Dean's Alternate

Harper A. Roehm, Faculty Member, 1984-86

Khurshid Ahmad, Faculty Member, 1985-87

Nabil Hassan, Faculty Alternate, 1985-86

College of Education and Human Services

Roger G. Iddings, Dean

James A. Dillehay, Dean's Alternate

Larry L. Chance, Faculty Member, 1984-86

Gregory R. Bernhardt, Faculty Member, 1985-87

William E. Brown, Faculty Alternate, 1985-86

College of Engineering and Computer Science

James E. Brandeberry, Dean

Larry Crum, Faculty Member, 1985-87

Isaac Weiss, Faculty Alternate, 1985-86

College of Liberal Arts

Perry D. Moore, Dean

Lillie P. Howard, Dean's Alternate

A.K.M. Aminul Islam, Faculty Member, 1985-87

David L. Garrison, Faculty Member, 1985-87

James E. Sayer, Faculty Alternate, 1985-86

School of Medicine

William D. Sawyer, Dean

John O. Lindower, Dean's Alternate

Jane N. Scott, Faculty Member, 1984-86

Richard L. Warren, Faculty Member, 1985-87

Peter Lauf, Faculty Alternate, 1985-86

Wright State University-Miami Valley

School of Nursing

Jeanette Lancaster, Dean

Eda L. Mikolaj, Dean's Alternate

Betsy Frank, Faculty Member, 1985-87

Donna M. Deane, Faculty Member, 1985-87

College of Science and Mathematics

Richard S. Millman, Dean

Marc E. Low, Dean's Alternate

Terry A. McKee, Faculty Member, 1984-86

College of Continuing and Community Education

John C. Barton, Dean

David B. Buzzard, Dean's Alternate

School of Professional Psychology

Ronald E. Fox, Dean

Allan G. Barclay, Dean's Alternate

James E. Dobbins, Faculty Member, 1985-86

Donna G. Mills, Faculty Member, 1984-86

Kathleen D. Glaus, Faculty Alternate, 1985-86

Biomedical Sciences Ph.D. Program

Robert A. Weisman, Director

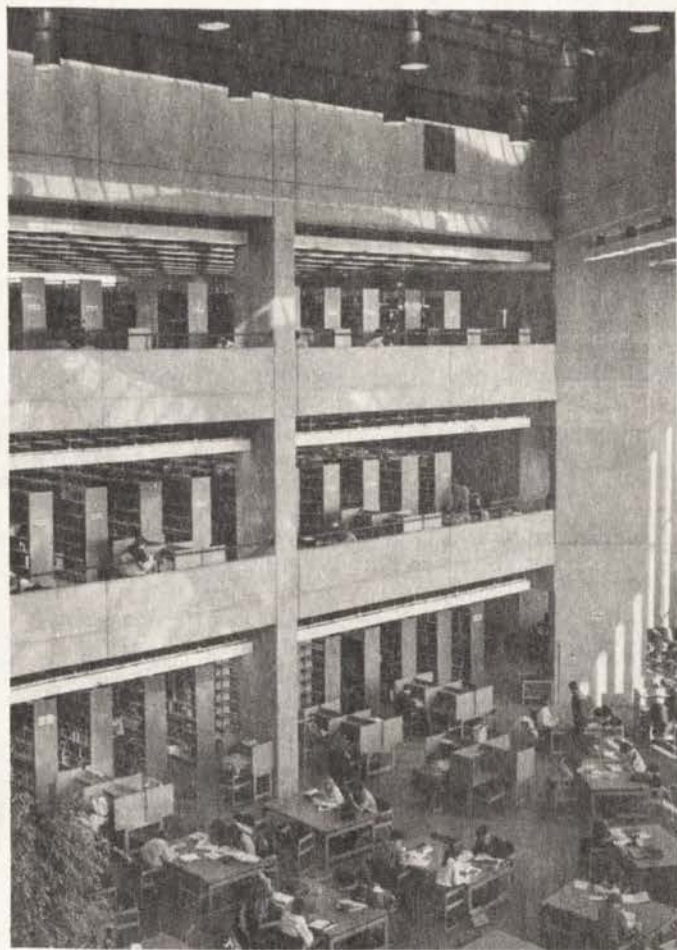
Student Government Representative

Vacant

Ex Officio

Paul G. Merriam

Wright State University



Past and Present

Wright State University is a fully accredited state-assisted university, offering to a student population of over 16,000 more than one hundred undergraduate majors, twenty-seven master's degree programs, a post-master's degree program, and programs of study for the Ed.D., M.D., Psy.D., and Ph.D. degrees. (Two of Wright State's doctoral-level programs are offered in cooperation with other universities: the Ph.D. in education is offered in cooperation with Bowling Green State University, and the Ed.D. is offered in cooperation with Indiana University.)

Wright State has reached this stage in its growth just twenty-two years after opening its doors in 1964 as the Dayton Campus of Miami University and The Ohio State University. These schools had been offering classes in borrowed facilities in the area for many years, giving rise in the 1950s to the idea of a joint branch campus. A community fund-raising effort in 1961 generated three million dollars, which financed the purchase of a 618-acre campus site near Dayton, Ohio, and the construction of Allyn Hall, the first building on campus.

In 1965, the Wright State Campus became Ohio's twelfth state-assisted university. A major turning point was reached in October 1967, when Wright State became an independent state institution. Wright State University was then recognized as fully accredited and autonomous. Since its inception, Wright State had grown from a faculty of fifty-five and a student population of 3,200 to a university with 5,000 students registered in ninety-six different programs and concentrations, master's degree programs in five disciplines, and 206 faculty members. Three new buildings had been constructed, completing Founders Quadrangle in the center of the campus.

Since that time, Wright State's history has continued to be characterized by growth and change. The residence hall opened in 1970, followed by the completion of the University Center and the president's house in 1971. In 1973, Wright State celebrated the openings of the Creative Arts Center, the University Library, the Physical Education Building, and the Brehm Laboratory. Facilities for the biological sciences were completed in 1975 and 1976, and the Medical Sciences Building was dedicated in 1976. New offices, bringing together student services in one central location, were completed in 1977.

The creation of the Wright State University School of Medicine in 1974 marked Wright State's first professional doctorate and indicated its commitment to providing resources for primary health care. The first class of medical doctors graduated in 1980. Wright State received authorization in 1977 to establish the School of Professional Psychology, and the school graduated its first class in 1982. Planning approval was also

granted in 1977 for a Ph.D. program in biomedical sciences. The first class of biomedical sciences graduate students was admitted in 1979.

In 1981, construction was completed on Rike Hall, housing the College of Business and Administration, and the Frederick A. White Center, which is both a teaching facility and a center for health care services. Two new buildings opened in 1984: the Health Sciences facility, which houses the administrative offices of the School of Professional Psychology and the Health Sciences animal laboratories; and the Engineering and Mathematical Sciences Building.

Program development approval for a Ph.D. in computer science and engineering was granted in 1985. In 1986, the College of Science and Engineering was reorganized into two separate colleges, the College of Engineering and Computer Science and the College of Science and Mathematics.

Since its beginning in 1964, Wright State has continually expanded and responded to community needs. Wright State has grown from a branch campus to a fully independent, comprehensive university with a 645-acre campus. Through the Colleges of Business and Administration, Continuing and Community Education, Education and Human Services, Engineering and Computer Science, Liberal Arts, and Science and Mathematics; the Schools of Graduate Studies, Medicine, Nursing, and Professional Psychology; and our branch campus, Wright State offers a fully balanced university program, committed to excellence and community service.

Purpose

The university's chief purposes are to achieve excellence in teaching, substantial contributions to human knowledge, and major service to humanity, and to maintain a free and cosmopolitan environment in which people may work toward such achievements.

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 learning, it is important for both the professor and the student to exchange ideas freely and for faculty to experiment with innovative teaching techniques.

The university encourages 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 scientific and technical fields.

As a public institution of higher education, the university makes every effort to serve the community

by being particularly responsive to the needs of the Miami Valley region and the state of Ohio.

The university seeks to create an environment in which each person has academic freedom—the opportunity to learn the truth about any subject as long as it does not interfere with the rights of others. Wright State values diversity of viewpoints and actively seeks faculty and students of different backgrounds.

The people at Wright State are constantly working to eliminate discrimination. The university has, since its beginning, been a leader in providing services and opportunities for the handicapped and disabled. Moreover, there is an established program of affirmative action on campus with special program counselors to ensure equal opportunity for all qualified people and to seek to prevent any person from experiencing discrimination at Wright State.

Statement of Policy

Wright State University is committed to achieving full equal opportunity in all aspects of university life. Wright State is proud of the diversity of the university community and strives to make all members feel welcome.

The policy of Wright State University is not to discriminate against any person on the basis of race, religion, color, sex, sexual preference, disability, veteran status, national origin, age, or ancestry. In addition, the university takes affirmative action to recruit and assist members of various racial or ethnic groups, women, Vietnam-era veterans, and persons with disabilities whose ability to achieve academic success might otherwise be unrecognized because of cultural barriers. The university policy is fully consistent with the various federal and Ohio statutes that prohibit discrimination.

Any questions or comments about the university's policy and any complaint about perceived discrimination may be directed to Juanita Wehrle-Einhorn, director of Affirmative Action Programs, 224 Millett Hall, telephone 513/873-3207.

The university's Affirmative Action Plan is maintained in the Office of Affirmative Action Programs. Wright State is a public institution, and any member of the public may request a copy of the plan.

In addition, Wright State University is a national leader in accommodating the needs of students with disabilities. Any questions or comments concerning a needed accommodation may be directed to Stephen Simon, director of Handicapped Student Services, 133 Student Services, telephone 513/873-2141.

Profile

Now a university with 16,097 students (3,463 graduate and professional students) as of fall

quarter 1985, the university has more than one hundred programs of study leading to nine different baccalaureate degrees and more than thirty programs of graduate and professional study.

Most students at Wright State are commuters. About ninety-six percent regularly travel to campus for classes. Ninety-eight percent of the students are from Ohio with eighty percent from the nearest three counties—Montgomery, Greene, and Clark.

Accreditation and Memberships

Wright State is accredited by the North Central Association of Colleges and Schools at the doctoral degree-granting level. Also, programs in the College of Education and Human Services are accredited by the State of Ohio Department of Education and the National Council for Accreditation of Teacher Education; music programs are accredited by the National Association of Schools of Music; art therapy by the American Art Therapy Association; undergraduate and graduate business programs by the American Assembly of Collegiate Schools of Business; social work by the Council on Social Work Education; geological sciences by the American Institute of Professional Geologists; environmental health by the Accrediting Council for Environmental Health Curricula of the National Environmental Health Association; medical technology by the Committee on Allied Health Education and Accreditation of the National Accrediting Agency for Clinical Laboratory Scientists; medicine by the Liaison Committee on Medical Education; the School of Professional Psychology and its internship programs by the Committee on Accreditation of the American Psychological Association; the College of Engineering and Computer Science's systems engineering, materials science and engineering, and computer engineering programs by the Accrediting Board for Engineering and Technology, Inc.; and the School of Nursing by the National League for Nursing and the State of Ohio Board of Nursing Education and Nurse Registration. In addition, the Bachelor of Science program in chemistry is certified by the American Chemical Society, and the Western Ohio Branch Campus is accredited by the North Central Association of Colleges and Schools at the associate degree-granting level.

Wright State holds memberships in numerous organizations, including the American Assembly of Collegiate Schools of Business, the Midwestern 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, the American Association of Colleges, the American Association of Colleges of Nursing, the Council of Baccalaureate and Higher Degree Programs of the National League for Nursing, the Association of Graduate Liberal

Studies Programs, and the Association of American Medical Colleges.

Wright State participates in many kinds of cooperative ventures with local colleges, universities, and other institutions. Through the Southwestern Ohio Council for Higher Education, an association of twenty-one colleges, universities, and corporations, Wright State students may take courses at member institutions and also take advantage of their library facilities. The School of Medicine has cooperative arrangements with Central State and Miami Universities, and the School of Nursing has implemented a collaborative agreement with Miami Valley Hospital. Both of these schools work closely with many area hospitals. The College of Engineering and Computer Science has developed a cooperative arrangement with Central State University, so that students may take the first two years of the baccalaureate systems engineering program at Central State and the final two years at Wright State, and be awarded the baccalaureate degree from Wright State University. Two doctoral-level programs are offered through agreements with two universities outside of the area: the Ph.D. degree in educational administration and supervision is offered in cooperation with Bowling Green State University and the Ed.D. in counselor education and in school administration in cooperation with Indiana University. The Western Ohio Branch Campus offers programs and courses in conjunction with Lima Technical College and the Lima Branch Campus of The Ohio State University. Wright State's telecommunications department works with the University Regional Broadcasting Corporation, a joint program of Wright State, Central State, and Miami Universities. In addition, the Sanders Judaic Studies Program, providing scholarship and teaching in the field of Judaic studies, is made possible through the cooperative effort of Wright State, Antioch College, United Theological Seminary, and the University of Dayton.



Academic Organization and Programs

Academically, the university is organized into eleven units. Undergraduate degrees are awarded through the Colleges of Business and Administration, Education and Human Services, Engineering and Computer Science, Liberal Arts, Science and Mathematics, and the School of Nursing. Master's degrees are awarded through the School of Graduate Studies and the departments offering graduate programs. The University Division serves underclass students, especially first-year students, 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 students. In addition, the university offers a doctoral-level academic degree through the College of Engineering and Computer Science, the College of Science and Mathematics, and the School of Medicine, and doctoral-level professional degrees through the School of Medicine and the School of Professional Psychology.

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 level of professional competence.

The following are the graduate degree programs and their concentrations.

Master's Degrees

Aerospace Medicine/M.S.

Applied Behavioral Science/M.A.

Art Therapy/M.A.T.

Biology/M.S.

Anatomy, Biological Chemistry, Biological Sciences, Microbiology and Immunology, Physiology and Biophysics

Business Administration/M.B.A.

Accountancy, Finance, Financial Administration, Health Care Management, Logistics Management, Management, Management Science, Marketing

Chemistry/M.S.

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

Art, Business, Computer Education, Early Childhood, Elementary Certification, General, International Literature for Children, Math, Media, Physical Education, Reading, Retraining, Secondary Certification, Science, Special Education (Children and Youth with Multiple Impairments, Developmentally Handicapped, Gifted, and Learning Disabilities/Behavior Disorders)

Computer Engineering/M.S.C.E.

Computer Science/M.S.

Counseling/M.A., M.S., M.R.C.

Business and Industrial Counseling Management, Chemical Dependency Counseling, Counseling Exceptional Children, Gerontology, Marriage and Family, Mental Health, Rehabilitation Counseling, Severely Disabled, Student Personnel Services in Higher Education

Earth Science/M.S.T.

Educational Leadership/M.A., M.Ed.

Educational Leadership General: Administrative Specialist Certification Options: Business Management, Instruction, Pupil Personnel, Research, Special Education, School and Community Relations, Staff Personnel Administration; Curriculum and Supervision: Computer Coordinator, General, Media, Special Education, Teacher Leader, Assistant Superintendent, Principalship, Principalship and Curriculum and Supervision

English/M.A.

Geological Sciences/M.S.

History/M.A.

Humanities/M.Hum.

Logistics Management/M.S.

Mathematics/M.S.

Applied Mathematics, Mathematics, Statistics

Music Education/M.Mus.

Nursing/M.S.

Administration, Education, Advanced Clinical Practice

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

Selected Graduate Studies/M.A., M.S.

Social and Applied Economics/M.S.

Student Personnel Services/M.A., M.Ed.

School Counseling, School Psychology, Visiting Teacher

Systems Engineering/M.S.

Educational Specialist Degree/Ed.S.

Educational Leadership

Curriculum and Supervision

Superintendency

Doctor of Philosophy Degrees/Ph.D.

Biomedical Sciences Program

The university's first academic doctoral program, leading to a Ph.D. in biomedical sciences, began in the fall of 1979. Cooperatively offered by the College of Engineering and Computer Science, the College of Science and Mathematics, and the School of Medicine, this program is interdisciplinary, innovative, and staffed by the largest program faculty on campus. The first year of study consists of a basic biological core, followed by a series of advanced interdisciplinary courses and laboratory practica. Upon successful completion of candidacy examinations, students pursue dissertation research. Undergraduate students majoring in biology, chemistry, psychology, physics, engineering, and mathematics may be accommodated in the program.

Computer Science and Engineering

The university's second academic doctoral program, the Ph.D. in computer science and engineering, received program development approval from the Ohio Board of Regents in June 1985, and will be implemented when program faculty development goals are met. A graduate catalog supplement for this program will be issued when the program is implemented (projected for 1986/87).



Educational Administration and Supervision

Beginning fall quarter 1985, Wright State, in cooperation with Bowling Green State University, began offering the Ph.D. degree in education.

Professional Doctoral Degrees

Doctor of Medicine/M.D.

The School of Medicine educates physicians, placing emphasis on primary care, and awards the Doctor of Medicine (M.D.) degree. Within the context of preparing physicians to meet the needs of patients and society, the school conducts research, encourages the generation of new knowledge, and maintains continuing and graduate medical education programs.

Affiliated with twenty-nine hospitals and health care facilities in the Dayton-Miami Valley region, the school features a four-year curriculum with instruction in twenty-four departments and programs. Integrated or affiliated graduate medical education (residency) programs are conducted in the following disciplines: aerospace medicine, anesthesiology, dermatology, emergency medicine, family practice, general surgery, internal medicine, internal medicine/pediatrics, obstetrics and gynecology, orthopedic surgery, pathology, pediatrics, plastic surgery, psychiatry.

The School of Medicine catalog may be obtained from the medical school admissions office.

Doctor of Education/Ed.D.

Beginning fall quarter 1985, Wright State began offering the Ed.D. degree in school administration and in counselor education in cooperation with Indiana University.

Doctor of Psychology/Psy.D.

The School of Professional Psychology educates professional psychologists, offering a four-year postbaccalaureate program leading to the Doctor of Psychology degree (Psy.D.). Although the program primarily admits postbaccalaureate students, consideration will be given to advanced-standing students when circumstances so indicate. The program is centered around the education and training of professional psychologists. It is expected that these individuals will be primarily oriented to the application of the knowledge base of psychology to the resolution of human problems encountered in social and organizational contexts and other life situations. The emphasis is on preparing professionals who will be thoroughly grounded in the basic science and profession of the discipline of psychology.

Students are selected from a diverse range of backgrounds, attitudes, and experiences in order to ensure a broad representation of social, cultural, and ethnic origins that reflect the pluralistic nature of our society, and will be expected to master the fundamental knowledge of psychology and the factors that may determine or influence human behavior. In addition, there will be a particular emphasis on the attainment of those practical skills that will assist the student in functioning as a professional psychologist in diversified real life/real world settings. Of particular note is the fact that students will be expected to work in close conjunction with practicing professional psychologists in a variety of practicum and internship placements.

The School of Professional Psychology catalog may be obtained from the school's admissions office.

Resources

Libraries

The 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 360,000 bound volumes, 729,000 microforms, 186,000 U.S. and Ohio government documents, and 30,000 pieces of nonprint media. Since the collection is only twenty years old, the emphasis is on current materials, yet important older resources have also been acquired. Many of the 4,448 periodical subscriptions include significant back files.

Archives and Special Collections is an area of special interest to graduate students since the collections contain primary research materials such as manuscripts, archival records, and special book collections. The archives house one of the world's most complete depositories of information on the Wright brothers. The Wright State collection of about 6,000 historical items includes manuscripts and records, a library of books that influenced the Wright brothers, technical journals that covered their progress, family papers, awards, and over 3,600 prints made by Orville and Wilbur Wright from their own negatives.

The archives also contain many other important collections such as the papers of Dayton newspaper publisher and former Ohio governor James M. Cox, the records of the Miami Conservancy District, and the records of the Dayton and Springfield Urban Leagues.

Students and the general public who need access to maps can make use of the national map depository in the University Library. The map depository collection includes approximately 50,000 geological and topographical maps from all over the United States.

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

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

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 ensures that virtually anything required by a student can be obtained in a week's time. Wright State's membership in the Southwestern Ohio Council for

Higher Education and its arrangements with the other Ohio state-assisted 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 24,000 serial titles in ninety area libraries.

Health Sciences Library

The Health Sciences Library supports the health sciences educational and research needs of the students and faculty at Wright State University.

The Fordham Library, also called the Health Sciences Library, is located in the Medical Sciences Building on the Wright State University campus. A substantial gift to establish the facility and develop its collection was made by Mrs. Thelma Fordham Pruett as a memorial to her late husband and son, Thomas B. Fordham, Sr., and Thomas B. Fordham, Jr. The collections number 76,000 volumes and 1,200 current serial subscriptions.

Reference staff members assist users in finding information in the library's books and periodicals; in using the indexes, abstracting journals, and bibliographies; in interpreting the card catalog; and in guiding readers in the most efficient and effective use of the library's resources. The reference staff also searches on-line over two hundred computerized indexes, abstracts, and bibliographic information banks to produce tailor-made subject bibliographies in the biomedical and life sciences. Library materials that are unavailable from the Health Sciences Library may be requested through the library's interlibrary loan service.

Audiovisual software, including slide sets, slide/tapes, videotape programs, and microforms may be used in the Learning Resources Center's individual study carrels and group study rooms.

Special collections include the McFarland Collection in aerospace medicine and human factors engineering, the Aerospace Medical Association Archives, and the Wright State health sciences programs archives. The Thelma Fordham Pruett Rare Book Room houses rare American eighteenth- and nineteenth-century medical books.

A unique cooperative relationship among the area's hospital libraries and the Health Sciences Library promotes sharing and nonduplication of library materials as well as reciprocal library services for students and professionals in the health care fields. Over 100,000 volumes in these affiliated libraries complement the library's collections.

Other Resources

University Audio-Visual Services

University Audio-Visual Services provides equipment, materials, and services to support the academic curriculum, both on campus and at remote locations. Additional support services are provided for administration, recognized student groups, noncurricular activities, such as

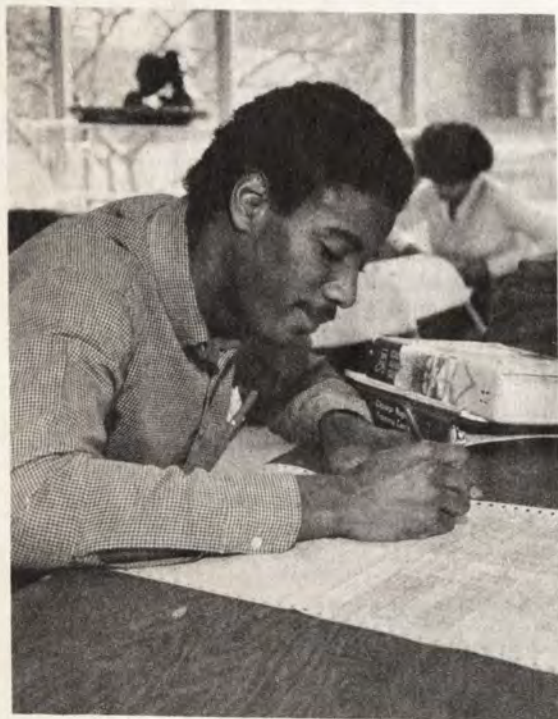
convocations, meetings, and nonuniversity groups or organizations that request equipment or services.

The department provides a pool of audio-visual equipment and is responsible for distribution, set up, and retrieval of the equipment. University Audio-Visual Services provides a projectionist, or operator, whenever a faculty member is unfamiliar with the operation of the requested equipment, or whenever complex equipment is being used.

Audio-visual materials available include slide/tapes, videotapes, 8mm films, 16mm films, filmstrips, and more. Preview rooms house permanent equipment and may be used for individual or group viewing.

Autotutorial Lab

The Autotutorial Lab is comprised of a viewing and listening area with video players, monitors, cassettes, record players, and audiotape recorders to facilitate individualized self-paced instruction. Students may use the Autotutorial Lab for studying with the materials that have been placed on course reserve by faculty members. The university's language audiotapes are also housed in the Autotutorial Lab for individual listening and may be checked out for a two-day period. Other educational in-house productions such as videotapes and audio tapes are maintained at this location for viewing or listening by the faculty members.



Computer Services

Computing services for the academic community are provided by the Research and Instruction Computation Center (RICC) and Administrative Computer Services (ACS). RICC provides the specialized and general purpose computing software and hardware needed to support the instructional and research activities of the university. ACS provides computing support to administrative offices throughout the university and provides services for the major mainframe computer on campus that provides a general computing resource to all areas of the university.

The main computing equipment consists of an IBM 3083B and a VAX 785. Other computing resources are located in various departments throughout campus, including several large laboratory facilities. Numerous software packages are available for general use. Information and guidance on hardware and software for faculty and students are available in the RICC. Information on the general hardware and software, along with services for administrative users, is available in ACS. Offices of the RICC and ACS as well as the major computing equipment on campus are located in the basement of the library.

Southwestern Ohio Council for Higher Education (SOCHE)

Wright State students have hundreds of additional classes available to them through the university's membership in the SOCHE, an association which includes seventeen area colleges and universities and four corporations with regional or home offices in the Dayton area. Full-time students at Wright State may cross-register for credit at member institutions under the following conditions:

- 1 The student must pay Wright State's tuition rates.
- 2 Class space must be available.
- 3 The student must obtain his or her adviser's consent.
- 4 The course must not be offered at Wright State during the current quarter.

Students must also meet course and host college prerequisites.

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

Resources for Special Interests

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

The Office of Professional School Advising and Information at Wright State provides assistance to students whose plans include further study in medical, or related health, law, graduate, or other professional schools. The office maintains a reference library of professional and graduate school catalogs and advises students about careers and professional school curricula, application procedures, entrance exams, and financial aid.

The Bolinga 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 features audiovisual facilities and the Paul Laurence Dunbar Library of special publications and books on black history.

The College of Continuing and Community Education, located in the Eugene W. Kettering Center in downtown Dayton, offers continuing education programs emphasizing areas beyond those covered by existing degree programs.

In 1977, the university was designated a National Center for Arts for the Handicapped. Because of Wright State's progressive programs in the area of art therapy, the National Committee of Arts for the Handicapped selected the university as one of only four national resource centers. Wright State was the only university to be so designated. The university continues to be associated with the NCAH in project development and special activities.

The Organizational Services Group (OSG) provides valuable information and services both to the university community and to the community at large. It is composed of six different centers: Consumer and Business Research, Economic Education, Industrial Studies, Professional Development, Research Development, and Small Business Assistance.

The Department of English offers a certificate program and a master's degree option in Teaching of English to Speakers of Other Languages (TESOL), which draw on the resources of the English Language and Multi-Cultural Institute (ELMI) of the Southwestern Ohio Council for Higher Education. Students may take course work and a practicum with ELMI staff members.

The university's Educational Resources Center houses educational kits and games, children's literature and textbooks, resource units, curriculum guides, and standardized tests. The Media

Production Lab provides facilities and services for producing materials for class requirements. The Microcomputer Lab provides classroom instruction and open lab time for faculty, staff, and students.

Assistantships, Fellowships, and Financial Aid

Financial aid available to graduate students includes graduate assistantships, graduate fellowships, National Direct Student Loans, Guaranteed 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 or the School of Graduate Studies. Other types of financial aid are handled through the Office of Financial Aid in Student Services.

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 School of Graduate Studies.

Assistantships/Fellowships

Assistantships and fellowships are awarded through individual departments of instruction; assistantships 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. Graduate assistants are required by the graduate school to register for a minimum of eight hours of graduate credit per quarter and some departments may require as many as fifteen credit hours per quarter. (A maximum of six credit hours for each five-week summer term is considered the normal load.) Fellows are required to register for a minimum of twelve credits per quarter.

Continuation of graduate appointment contracts depends upon satisfactory academic (minimum 3.0 grade point average) and assistantship performance. For information regarding assistantships or fellowships, contact directly the chair of the department involved or the School of Graduate Studies. Applicants for graduate assistantships must complete an Assistantship Application form. Financial need is not a criterion for selection of graduate assistants; the Financial Aid Form (FAF) discussed in the following section on Financial Aid applies to other forms of financial assistance.

Financial Aid

In addition to filing a Wright State University application for financial aid, students and/or their parents must fill out a Graduate and Professional School Financial Aid Service Financial Statement (GAPSFAS) and send it to the Graduate and Professional School Financial Aid Service. These forms may be obtained from the Office of Financial Aid. The GAPSFAS should be submitted to the Graduate and Professional School Service no later than March 31 for the succeeding academic year. The GAPSFAS is used to determine eligibility for National Direct Student Loans and College Work-Study employment.

Wright State University Graduate Scholarships

The Wright State University Foundation awards graduate scholarships based on academic performance, potential, and letters of recommendation. Financial need is not a consideration in these awards. The required application and detailed information can be obtained from the Office of Financial Aid.

Professional Nurse Traineeships

The Professional Nurse Traineeship Program was established in 1956 and extended in 1975 to provide financial support to currently licensed professional nurses to study full time, to teach, to serve in administrative or supervisory capacities, to serve as nurse practitioners, or to serve in other professional nursing specialties requiring advanced training. Financial need is not a consideration in these awards. The required application and information can be obtained in the School of Nursing Graduate Office.

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. A student may borrow no more than \$12,000 during the undergraduate and graduate years. The amount received each year is determined by the student's computed financial need through the FAF.

The repayment period and interest on these loans do not begin until six months after the student terminates at least half-time enrollment. The loan bears interest at the rate of five percent per year and repayment 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 canceled each year.

Guaranteed Student Loan Program

Through the cooperation of lending institutions that participate in the Guaranteed Student Loan Program, students may receive long-term

educational loans which are interest-free during periods of at least half-time enrollment. Graduate students may borrow a maximum of \$5,000 per year.

Repayment of the loan begins six months following graduation or termination of less than half-time enrollment. The minimum repayment is \$600 per year and the interest rate of nine percent begins at the time of repayment.

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 four-and-a-half 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.

Veterans' Benefits

G.I. Bill benefits can be used by veterans and active-duty personnel who served during the post-Korean and Vietnam periods. Veterans who served on active duty for more than 180 continuous days, any part of which occurred after January 31, 1955, but before January 1, 1977, and who were released under conditions other than dishonorable, are eligible. Veterans who were released from active duty after June 1, 1966, have eligibility for ten years after their last discharge or release, or until December 31, 1989, whichever is earlier.

The **Veterans' Educational Assistance Program (VEAP)** can be used by a veteran who entered active military service after December 31, 1976, served for a continuous period of 181 days or more, and contributed to VEAP while on active duty.

The **All-Volunteer Force Educational Assistance Program** (New G.I. Bill) can be used by a veteran who entered on active duty at any time during the three-year period beginning July 1, 1985, through June 30, 1988, and paid into the program.

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 declared missing in action or prisoners of war.

Fees

Quarterly Fees†

1986-87

Master's Students	Main Campus	Western Ohio Branch Campus	WSU Extension
Ohio Resident			
1 through 10.5 credit hours/per hour	\$ 69	\$ 66	\$ 63
11 through 18 credit hours*	735	696	
Nonresident			
1 through 10.5 credit hours/per hour	\$ 124	\$ 121	\$ 110
11 through 18 credit hours*	1,319	1,280	
Academic Doctoral and Educational Specialist Students			
	Main Campus		
Ohio Resident			
1 through 10.5 credit hours/per hour	\$ 74		
11 through 18 credit hours*	792		
Nonresident			
1 through 10.5 credit hours/per hour	\$ 129		
11 through 18 credit hours*	1,376		

†Fee assessment is based on student level (graduate or undergraduate), not on course level.

Note: Fees for School of Medicine and School of Professional Psychology students differ from those listed above. For these fee schedules, consult the Office of the Registrar.

*The hourly rate applies to all credit hours in excess of 18.

Additional Fees and Charges

Late registration fee/all students	\$25	\$25	\$25
Nondegree application fee	10	10	10
Audit fee/per credit hour (laboratory and special courses not open to audit)	same as for credit courses	same as for credit courses	same as for credit courses
Drop fee (one course/more than one course)	7/10	7/10	7/10
Charge for persons taking courses under Educational Benefits Policy/ per credit hour (see note below)	11	11	11
Transcript fee/first request each additional at same time—50 cents	2	2	2
Undergraduate and graduate degree student and certification student application fee	25	25	25
Returned check penalty/per check	15	15	15
Applied music fee			
one half-hour lesson per week	43		
one hour lesson per week	85		
Proficiency test/per credit hour	10	10	10
Graduation fee	15	15	
International student fee	40		
Student's Installment Payment Plan application fee/late payment fee	15/15		
Short-Term Loan processing fee/late payment fee	5/15		

The Educational Benefits Policy applies only to undergraduate and master's level course work.

Some courses may require additional fees to cover travel, individual instruction, or materials; check the course descriptions in this catalog and the departmental offices.

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 listed here for the main campus, Western Ohio Branch Campus, and Wright State University Extension are those in effect when this catalog went to press. For an up-to-date list, you should consult the Office of the Registrar.

Library fines are set by the university librarian with the approval of the president.

Paying Fees

The method for paying fees depends on which registration period is used. See the section on registration for a description of the different registration periods.

Students will find fee payment deadlines for each registration period in the university calendar published in the quarterly schedule of classes. If a student registers early and does not pay the fees by the required due date, the registration will be canceled in order to make classroom space available to other students. If a student registers during the open registration period, he or she must pay all fees and charges at the time of registration.

Students are encouraged to pay fees by check or money order, made payable to Wright State University and sent to the attention of the bursar. The check or money order should be written for the exact amount due. Incorrect checks will be returned to students, 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 the payment of fees.

Students also may use either MasterCard or VISA credit cards to charge most fees paid to the university. In order to use a credit card, the student must either be the cardholder or have the cardholder's authorization. All charge transactions are subject to approval by the financial institution that issued the credit card.

Students have the option of using the Student Installment Payment Plan (SIPP) to spread quarterly fees for tuition, insurance, and university housing (if applicable) over a three-month period. The plan is offered as an alternative to the single payment for fees that is normally due at the beginning of fall, winter, and spring quarters. SIPP is not offered during the summer quarter. For a \$15 nonrefundable fee, preregistered students pay one-third of their fees by the published fee payment deadline. The balance is divided into two installments which are payable at established dates about thirty days apart. If a student participates in open registration, he or she must pay the \$15 fee and the initial installment on the day of registration. The second and third payments are due on the same dates established for those who have preregistered. Further information about SIPP is available at the bursar's office.

Payment of fees can be mailed to the attention of the bursar or presented in person at the cashier windows in Allyn Hall. Mailed payments should be sent to ensure their receipt by the fee payment deadline. Mailed payments received after the deadline will be returned and the original registration will be canceled.

Any payment made with a check not honored by the bank will result in a student's registration being canceled unless satisfactory payment arrangements are made within seven days after appropriate notification is mailed to the student. A returned check charge is assessed for each check

not honored by the bank. All charges, including the returned check charge, must be paid by the date indicated in the notification.

Financial accounts may be audited at any time during your enrollment or academic career. If an error is identified, a bill or refund will be issued. The university will issue a refund within thirty days or apply the credit to your account. If you do not make acceptable arrangements to pay any amount due within thirty days after notification, your current registration will be canceled.

Refunds

A current schedule of refunds can be found in the quarterly schedule of classes. Refunds relating to withdrawal are initiated through the Office of the Registrar. Refunds will be calculated as of the date of official withdrawal, unless proof is submitted substantiating circumstances which were beyond the control of the student (e.g., hospital confinement) and which prevented the filing of the official withdrawal at an earlier date. In such a case, the refund will be determined as of the date of said circumstances. Nonattendance of classes or notification of the instructor or department does not constitute official withdrawal. Refunds or reduction of indebtedness for withdrawals after the official dates will not be made in cases of failure or inability to attend classes because of changes in business (e.g., work schedule) or personal affairs (e.g., illness).

If students officially withdraw from the university before the first day of classes, they will receive a 100 percent refund of instructional and general fees paid.

If students withdraw during the first two weeks, or equivalent portion, of the quarter, they will receive a credit based on eighty percent of the fees assessed. If students withdraw during the eighty percent period they will be charged twenty percent of the total instructional and general fees assessed, regardless of how much they have paid at the time of withdrawal. If students are on the installment payment program, the charge of twenty percent of the instructional and general fees will be subtracted from their payments to determine the amount of any refund.

No refunds will be granted after the first two weeks of classes. Those who withdraw while owing the university money will be considered to be indebted to the university for that amount. Therefore, all refunds will be applied to any indebtedness before being issued to the student. All refunds will be issued thirty days after the date of withdrawal from the university.

A student who drops courses during a partial-refund period will receive the refund according to the published refund schedule that will be in compliance with the policy for complete withdrawal.

Criteria for Ohio Residency

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 state of Ohio, determine who can be considered an Ohio resident, and cite specific exceptions.

Section 1

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 the purposes of this rule for at least twelve consecutive months immediately 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

Section 2

Additional criteria which may be considered in determining residency for these purposes may include, but are not limited to, the following:

- 1 Criteria evidencing residency:
 - if a person is subject to tax liability under section 5747.02 of the Ohio Revised Code
 - if a person qualifies to vote in Ohio
 - if a person is eligible to receive Ohio state welfare benefits
 - if a person has an Ohio driver's license and/or car registration
- 2 Criteria evidencing lack of residence:
 - if a person is a resident of or intends to be a resident of another state or nation for the purpose of tax liability, voting, receipt of welfare benefits, or student loan benefits (if the student qualified for that loan program by being a resident of that state or nation)
 - if a person is a resident or intends to be a resident of another state or nation for any purpose other than tax liability, voting, or receipt of welfare benefits (see Section 2, paragraph 1)

Section 3

Exceptions to the general rule of residency for subsidy and tuition surcharge purposes include the following:

- 1 A person who is living in Ohio and is gainfully employed on a full-time or part-time and self-sustaining basis in Ohio and who is pursuing a part-time program of instruction at an institution

of higher education shall be considered a resident of Ohio for these purposes.

- 2 A person who enters and currently remains upon active duty status in the United States military service while a resident of Ohio for all other legal purposes and his or her dependents shall be considered residents of Ohio for these purposes as long as Ohio remains the state of such person's domicile.
- 3 A person on active duty status in the United States military service who is stationed in Ohio and resides in Ohio and his or her dependents shall be considered residents of Ohio for these purposes.
- 4 A person who is transferred by his or her employer beyond the territorial limits of the fifty states of the United States and the District of Columbia while a resident of Ohio for all other legal purposes and his or her dependents shall be considered residents of Ohio for these purposes as long as Ohio remains the state of such person's domicile and as long as such person has fulfilled his or her tax liability to the state of Ohio for at least the tax year preceding enrollment.
- 5 A person who has been employed as a migrant worker in the state of Ohio and his or her dependents shall be considered a resident for these purposes provided such person has worked in Ohio at least four months during each of the three years preceding the proposed enrollment.

Section 4

Procedures:

- 1 A dependent person classified as a resident of Ohio for these purposes and 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 continue to be considered a resident during continuous full-time enrollment and until his or her completion of any one academic degree program.
- 2 In considering residency, removal of the student or the student's parents or legal guardian from Ohio shall not, during a period of twelve months following such removal, constitute relinquishment of Ohio residency status otherwise established under Section 1, paragraphs 1 and 2.
- 3 Any person once classified as a nonresident, upon the completion of twelve consecutive months of residency, must apply to the institution he or she attends for reclassification as a resident of Ohio for these purposes if such person in fact wants to be reclassified as a resident. Should such 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. such person shall be reclassified as a resident. Evidentiary determinations under this rule shall be made by the institution which may require, among other things, the submission of documentation regarding the sources of a student's actual financial support.

- 4 Any reclassification of a person who was once classified as a nonresident for these purposes shall have prospective application only from the date of such reclassification.
- 5 Any institution of higher education charged with reporting student enrollment to the Ohio Board of Regents for state subsidy purposes and assessing the tuition surcharge shall provide individual students with a fair and adequate opportunity to present proof of their Ohio residency for purposes of this rule. Such an institution may require the submission of affidavits and other documentary evidence which it may deem necessary for a full and complete determination under this rule.

Student Services

The Office of Student Development provides general information and growth opportunities to students and student organizations through a number of programs. New student orientation introduces the university and its programs and services through workshops on numerous topics, campus tours, and small group participation.

The *Student Handbook*, written by the Student Development staff, outlines helpful information and lists university policies and procedures which govern students. The University Information Center staff in Allyn Hall answers questions on the spot and can refer students to the appropriate university offices for detailed answers to involved questions.

The Student Development staff also advises student organizations, supervises expenditures from the student activities fund, and is involved in developing policies concerning students. A special Leadership Program provides opportunities to develop leadership and communication skills through weekend experiential workshops and one-day workshops offered several times during the year.

International students attending Wright State can find answers to their questions by consulting with the international student adviser, who is a member of the Student Development staff.

On-campus communication is aided by assigning to each student who attends classes on the main campus a mailbox in the Allyn Hall student lounge. Most official university correspondence is placed in these mailboxes. Students are assigned a

mailbox in the fall and keep the same mailbox throughout the year unless they fail to register early for winter or spring quarter.

University Placement Services concentrates on involving students and alumni in the process of career choice and assists them in finding both full-time and part-time positions. Through workshops, academic courses, career counseling, and occupational testing, the department helps students explore and evaluate factors important to their career planning, such as their potential abilities, skills, interests, values, needs, and priorities. University Placement Services helps students develop their career paths through summer and part-time work, and assists seniors, graduate students, and alumni in finding full-time positions.

The Psychological Services Center staff of the School of Professional Psychology helps students learn to integrate their academic and personal lives through a variety of experiences. Recognizing the need for life skills development, the center offers individual and group counseling in such areas as increasing self-esteem, assertiveness training, human sexuality, decision making, and adapting to change. Services are also available to assist students in coping with stress as it relates to school, work, family, and personal life situations. Test



anxiety, fear of failure, changing values, and uncertainty about future plans are some of the commonly presented concerns.

Students who are interested in these programs or who have other personal concerns may call the Psychological Services Center for an appointment or may visit the center Monday through Friday from 8:30 am to noon and from 1 to 5 pm. All counseling services are confidential and are available to students without charge. The offices are located on the second floor of the Frederick A. White Center.

Veterans who are seeking a degree and who attend school either full time or part time may be entitled to specific benefits. The Veterans Affairs office on campus can help veterans take full advantage of these educational benefits.

Medical care is available to students in the health clinic in Allyn Hall. (Students should schedule appointments.) Personnel are on duty to handle emergencies during normal working hours Monday through Friday. Students needing follow-up care will be referred to the Frederick A. White Center. There is a charge for service at the center; student insurance may cover some of this expense. Student Health Services also sponsors preventive health care programs for the university community, such as a wellness program, hearing and hypertension testing, and community services including visits from the Community Blood Center.

The Department of Public Safety is the official law enforcement agency for the university campus. Information or complaints concerning any emergency or criminal activity should be reported immediately to the security dispatch center at campus telephone extension 2111. The Department of Public Safety is also responsible for lost and found articles. Articles are held for ninety days and, if not claimed, are sold at an auction.

The Office of Parking Services establishes and regulates the procedures for parking on campus. Motor vehicle regulations and complete information about parking are available at the parking services office.

Services for Disabled Students

Extending the opportunities of higher education to people with disabilities is a high priority at Wright State. We rank as a leader in adapted physical facilities, and campus buildings have been designed to be free of architectural barriers. Ramps and ground-level entrances lead to each building and all buildings have adapted restrooms and elevator access to every floor. An underground tunnel system links most campus buildings. Handicapped Student Services promotes the realization of each student's potential by offering services in physical, academic, personal, and/or vocational areas. These services are provided on the basis of individual need, allowing learning-disabled and physically disabled students to pursue college educations.

Physical support services are designed to enable each student to be as independent as possible and include personal attendant care for dressing and hygiene needs; adapted transportation for disabled commuter students; adapted campus parking; assistance in locating adapted off-campus housing; training in activities of daily living to achieve a greater degree of independence; campus mobility orientation for visually impaired students; and adapted athletics and intramural sports.

The academic support services are designed to assist physically and learning-disabled students in meeting all academic requirements. These include tape library services and the provision of taped textbooks for students who have a visual impairment or a learning disability; test proctoring for students who need reading or writing assistance and/or extra time to complete a test; and academic aids that accommodate individuals with disabilities in meeting class requirements.

The vocational program assists the student in making realistic occupational choices. Opportunities exist in the planning and development of a career, and there are services designed to provide experience at various employment sites. These methods allow the student to make a realistic decision about a future career and ensure that the student is able to meet the demands of the occupation.

Applicants requiring services available for disabled students are strongly encouraged to contact Handicapped Student Services prior to admission to make arrangements for the necessary services.

Facilities

University Center

The University Center is a good place to meet and talk with students, staff, and faculty. It includes a cafeteria, private dining rooms, meeting rooms, lounges (including a TV room), game rooms, a box office, a computer room, a rathskeller, a faculty dining room and lounge, offices for staff and for student organizations, and the bookstore. The student-run University Center Board (UCB) schedules seminars, workshops, exhibits, guest speakers, artists, dances, tournaments, and recreation at the center. The facility can also be reserved for public activities by arrangement with the University Center director's office. The Office of University and Community Events, which facilitates the planning of official university activities, is available to provide consultation on planning and coordinating special functions.

The Student Activities Office, on the lower level of the center, serves as a resource to members of the university community in planning a wide range of functions. Use of Achilles Hill, the quad, and road signs can be arranged through this office. The office

also provides information about various types of entertainment and manages the Hollow Tree Box Office, where tickets for various events can be purchased.

The University Bookstore, owned and operated by the university, is located on the lower level of the center. It stocks textbooks and tradebooks used in Wright State classes as well as a variety of other books, supplies, and gift items. The bookstore also buys and sells used books each quarter.

Housing

For a limited number of students who want the convenience of living on or near the campus, the university provides one residence hall, Hamilton Hall, as well as an apartment complex. The residence hall has furnished rooms but lacks major cooking facilities; it houses both new and continuing students. Most of the rooms in Hamilton Hall are doubles, although some triple rooms are available at reduced rates. The university apartment complex adjacent to the campus contains both four-person furnished apartments and two-person furnished efficiency apartments. Certain minimum academic standards (2.0 grade point average) are required for a student to continue living in university housing.

The Office of Student Development also can provide information on area off-campus housing.

Participation

Sports

For the sports-minded, the university has a well-developed program of intramural sports for men and women. The Department of Intramural-Recreational Sports sponsors teams in touch football, basketball, wrestling, soccer, volleyball, and softball, and individual activities including table tennis, handball, golf, racquetball, squash, tennis, and archery. There are also open recreation periods when any student may use the physical education facilities.

Adapted intramural sports introduce students who cannot take part in regular intramurals to a variety of recreational activities through an instructional approach. Rules and equipment are modified and activities such as archery, aquatics, billiards, bowling, and racquet squash, as well as individualized therapy programs, are taught.

Wright State's intercollegiate athletic program benefits both the student and the university. The university is a member of Division II of the National Collegiate Athletic Association, and will be moving to Division I in 1987.

The continued growth of the intercollegiate program has led to increased participation in national tournaments. Most men's sports have been represented at NCAA championship events. Wright State's men's basketball team won the Division II National Championship in 1983. Women's volleyball



and swimming have been represented at NCAA championship events. All-Americans have been named in women's volleyball, basketball, tennis, and swimming.

Intercollegiate Wheelchair Athletics provides sports and activities for students who use wheelchairs. Such sports as basketball, swimming, and track and field are available on a competitive intercollegiate basis. Regional, national, and international games provide outstanding competition. Wright State is a member of the Central Intercollegiate Conference, the only intercollegiate conference in the world for disabled student athletes.

Organizations and Activities

Many opportunities for extracurricular involvement exist through participation in student organizations, clubs, and activities. Several academic departments sponsor departmental clubs and honoraries. Eleven chapters of Greek letter fraternities and sororities offer service, social activities, and friendship. Sports, religious, and special-interest clubs provide many avenues for exploring your interest with a group.

Inter-Club Council (ICC) is made up of representatives from the various student organizations on campus. Each year ICC sponsors October Daze, homecoming activities, Raider Week, and May Daze, which give member organizations a chance to have money-making projects and recruit new members. It also sponsors fund-raising events such as the Petrofsky Benefit Bash.

For students who wish to put their creative talent to work, there are several student media outlets on campus. The student newspaper, *The Daily Guardian*, which utilizes editors, writers, proof-readers, salespeople, and photographers, is published four times a week during the academic year. The literary magazine *Nexus* comes out three times a year and includes writing and original

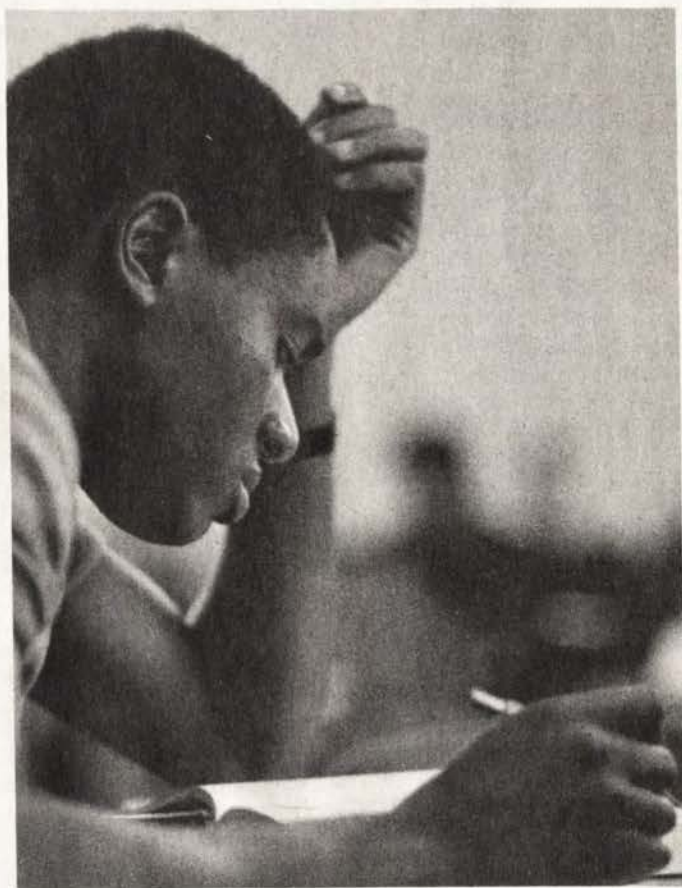
artwork from members of the university community. *Chimaera*, issued two or three times each year by the University Honors Program, features a wide range of undergraduate writing; essays, book reviews, research papers, poetry, and short fiction are invited for consideration. Students can also work on and off the air at the student-run campus radio station, WWSU-FM.

Many cultural opportunities on campus allow students both to see and to participate in the performing arts. The Department of Music presents many concerts and recitals by student and faculty soloists and choral and instrumental groups. University Theatre presents several major productions, several one-act plays, and at least one children's theatre production during the academic year. The Department of Theatre Arts has also offered a motion picture series and the University Center Board sponsors many current popular films, concerts, speakers, and cultural events. The Contemporary Lecture Series brings notable speakers to campus throughout the year. The University Art Galleries regularly schedules exhibitions and events, both in the Main Gallery and the Experimental Gallery. The University Artist Series arranges visits by nationally known artists.





The School of Graduate Studies



The School of Graduate Studies had a total enrollment of 2,956 in the fall quarter of 1985, eighty percent of whom were part-time students. In addition, 507 students were enrolled in the Schools of Medicine and Professional Psychology. Master's degrees are awarded through the School of Graduate Studies and the departments offering graduate programs. The graduate school offers twenty-seven master's degree programs and one post-master's degree program through the Colleges of Business and Administration, Education and Human Services, Engineering and Computer Science, Liberal Arts, Science and Mathematics, and the School of Nursing. Doctoral degrees are offered through the College of Science and Mathematics, the School of Medicine, and the School of Professional Psychology. Beginning fall quarter 1985, Wright State's College of Education and Human Services began offering the Ph.D. in educational administration and supervision, in cooperation with Bowling Green State University, and the Ed.D. in school administration and in counselor education, in cooperation with Indiana University.

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 discipline-focused colleges and schools and their academic departments. (The interdisciplinary Applied Behavioral Science program is administered directly by the School of Graduate Studies.) The graduate school also helps develop new programs and maintains appropriate standards for graduate-level programs. The administrative services of the school are provided by the graduate school office, consisting of the dean, the associate dean, the assistant dean and director of graduate admissions and records, and their staff.

Graduate Policy/ Instruction

The Graduate Council

The Graduate Council is comprised of deans, elected representatives, and alternates from each of the six colleges and the School of Medicine, the School of Nursing, the School of Professional Psychology, the Biomedical Sciences Ph.D. Program, and one graduate student. 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 records 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.

Graduate Students/ Representation

Student Government, the elected representative student assembly, represents the interest of the student body on the Academic and Graduate Councils, communicates with the student body on matters of policy, appoints students to university committees, and researches matters of interest to the student body. Student Government includes a representative from the School of Graduate Studies and one each from the Schools of Medicine and Professional Psychology. Student representatives also serve on several Graduate Council Committees.

Students who do not know where to take a grievance, problem, or suggestion can go to the Office of the Ombudsman. The ombudsman provides accurate information about the university, investigates and tries to resolve student problems, and makes students' concerns known to the faculty and administration.

Research

A prime 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 toward professional practice more 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, and 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 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 Office of University 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.

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

The university's Institutional Review Board reports to the dean of the graduate school and monitors all research projects involving human subjects. The committee is responsible for ensuring 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 that includes education for research carefully assess their research interests and needs for research experience. They should contact interested faculty members who will advise and work with them in these efforts, and then begin their research work at the earliest possible time. Graduate students should discuss this with the department chair or dean shortly after beginning graduate study.

Admission

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

All correspondence pertaining to the admission of a student should be addressed to the School of Graduate Studies, Wright State University, Dayton, Ohio 45435. The School of Graduate Studies will coordinate the processing of the application materials with the appropriate graduate department.

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

All documents received by the university in connection with application 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.

Degree-Seeking Students

Regular Status

The student is admitted as fully qualified to pursue a program leading toward a graduate degree.

Provisional Status

Under certain conditions, a student may be admitted provisionally (for one quarter only), pending receipt of credentials. If admission requirements are not met during the quarter in which a student has been admitted provisionally, registration for future quarters will be denied.

Conditional Status

The student is admitted in this category to a graduate program under certain conditions. Graduate credit earned while in this status will apply toward degree requirements. If all admission requirements are satisfied and the student has completed the first twelve credit hours of graduate work, after being admitted in this status, with a 3.0 (a grade equivalent of B) cumulative grade point average, regular status will be granted upon approval of his/her graduate program. A student in this category who does not meet these conditions will be dismissed from the School of Graduate Studies.

Other Admission Categories

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 credit hours may be applied toward a graduate degree. A student in this status must maintain a 3.0 grade point average.

Certification Status

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

Senior Permission

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, the chair of the department in which graduate credit is sought, and the School of Graduate Studies.

Special Undergraduate Status

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 chair of the department offering the course.

Special Status

Students who have a bachelor's degree may enroll in certain workshop courses for graduate credit without being admitted to the graduate school. If they are appropriate, a limited number of such credits may be applied later to a degree program.

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 normally 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.

International Students

Wright State welcomes applications from qualified international students. Approximately 180 students on F-1 visas currently attend the university. Application materials may be requested from the admissions office. Applications for admission must be completed one quarter prior to the quarter in which the applicant wishes to begin studies at Wright State; applications for fall quarter must be completed by the end of May.

Graduate international applicants are expected to meet the following criteria for admission:

- 1 Graduate applicants must have earned a baccalaureate degree or its equivalent from an accredited college, university, or other institution of higher learning. Only an official transcript, translated into English, will be accepted as evidence of academic preparation. If the credentials cannot be evaluated by the Office of

International Admissions, the applicant will be required to submit the credentials to an evaluation service and pay the cost of the evaluation.

- 2 All international applicants must demonstrate proficiency in English. If the applicant's native language is not English, a minimum score of 500 on the Test of English as a Foreign Language (TOEFL) is required. (Students applying to the master's degree program in English must score 600 or better and meet additional requirements. See the program description for English.) In addition, students other than transfer students will be required to take a university-administered English placement test prior to registering for classes. Students failing this test will be required to take supplemental on-campus classes to strengthen their English skills.
- 3 Since the only type of internal financial assistance available to international graduate students is in the form of graduate assistantships, the university must be assured that all international applicants have adequate financial resources to attend Wright State. If the applicant is being sponsored, the financial statement form must be accompanied by an affidavit of support and a bank statement provided by the sponsor, indicating the amount of money available to the applicant for the purpose of studying at Wright State University. Assistantships to first-year international students are granted by exception only, with the approval of the dean of the School of Graduate Studies. In addition to meeting the standard English requirements, graduate teaching assistant (GTA) applicants must score 210 or higher on the Test of Spoken English (TSE) before they will be assigned to classroom duties. The TSE should be taken at least one year preceding the GTA appointment; however, students who have not taken the TSE prior to arrival at Wright State will have the opportunity to take the test on campus. Those applicants financing their own education from personal funds must also submit a bank statement together with the financial statement. Bank statements are to be sent by the bank directly to the Office of International Admissions. Wright State University reserves the right to require prepayment equivalent to one year's expenses.
- 4 Form I-20 will be issued by the international student adviser when the applicant has met the above requirements and has been admitted to the university.
- 5 International students already in the United States who wish to transfer from another university will not be considered for admission if they are not currently in status according to the Department of Immigration and Naturalization.

The transfer student must present evidence of above-average ability to do college work.

Requirements for Admission

- 1 Complete an application form.
- 2 Pay a nonrefundable application fee.
- 3 Have an earned bachelor's degree from an accredited college or university.
- 4 Submit 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 School of Graduate Studies. (Note: If the applicant is applying for nondegree status only and he or she holds a master's degree or higher degree from an accredited college or university, then only proof of the highest degree is needed.)
- 5 Meet the minimum requirements for the appropriate admission category.

Regular Status An overall undergraduate grade point average of 2.7 (based on a 4.0 grading system) or an overall undergraduate grade point average of 2.5, but with a 3.0 or better for the last ninety-three quarter hours (sixty semester hours) earned toward the undergraduate degree.

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 Submit admission test scores, if applicable. (See the following section for test requirements.)
- 7 Students who have taken graduate courses prior to seeking regular status admission to Wright State University must have an overall graduate grade point average of 3.0 or better and must be in good standing (not holding probationary, conditional, or equivalent status) at all previously attended colleges or universities.
- 8 To be a degree-seeking student, a candidate must be admitted to a department and college/school for an identified program of study, as well as be admitted to the School of Graduate Studies.
- 9 For international student requirements, see the previous section.
- 10 *Admission by Petition* An applicant who does not meet minimum requirements for admission, who has been dismissed from a program, or who has been denied admission to a program may submit a petition to the School of Graduate Studies for review. The petition form may be

obtained from the School of Graduate Studies. The petition must contain supporting documentation of why any requirement should be waived. Submission of test grades such as the Graduate Record Examination and/or the Miller Analogies Test may be required by the applicant's prospective graduate program in instances where the applicant has a grade point average below the minimum required for admission. Applicants should contact their graduate program officer for further details. The petition is submitted for review to the petitioner's proposed graduate program, and it, along with the program's recommendation, will then be reviewed by the dean of the School of Graduate Studies, who will make the decision.

Individual departments and colleges/schools may have requirements over and above those of the School of Graduate Studies. Candidates should consult the specific requirements set forth by the department and college/school. (See program descriptions in this catalog.)

Admission Test Requirements

Graduate Management Admission Test (GMAT)

Each applicant for admission to the Master of Business Administration program or the Master of Science in logistics management 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. Preregistration directly with the Educational Testing Service is required several weeks in advance of test dates. Registration forms may be obtained from the Office of Admissions, the graduate school, or the testing service.

Miller Analogies Test (MAT)

Applicants for admission to the College of Education and Human Services must submit satisfactory scores on either the Miller Analogies Test (MAT) or the Graduate Record Examination (GRE). Information concerning the MAT may be obtained from the School of Graduate Studies.

Graduate Record Examination (GRE)

Applicants for admission to certain programs, under particular circumstances, may be required to submit scores on the aptitude and advanced portions of the Graduate Record Examination (GRE). The GRE consists of two parts: the aptitude test, which contains verbal, analytical, and quantitative portions, and the advanced tests, which assess achievement in the student's major field. Students will be advised by the School of Graduate Studies when the GRE is required as an additional admission requirement.

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, the graduate school, or the testing service.

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

Students with visual or upper extremity impairment who wish to take the GRE should follow the directions outlined in the GRE brochure, which is available in the Office of Admissions, from the graduate school, or directly from the testing service.

Readmission

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

- 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 four consecutive quarters
- 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. However, students granted special status are permitted to register for workshop courses for graduate credit.

Procedures

Initial Registration

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

The following are exceptions to this mailing:

- 1 Students admitted to the Biomedical Sciences Ph.D. program will be given registration materials during the fall quarter program orientation period.
- 2 Students admitted to the Geological Sciences program will receive their registration materials at the orientation meeting in the geological sciences department prior to fall quarter.
- 3 Students admitted to the M.B.A. program and the M.S. programs in social and applied economics and logistics management are advised in their admission letter that they must contact an adviser for an appointment to

complete a Program of Study form. Subsequent to this advising session, the adviser will provide the student with registration materials and assist in the selection of classes.

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 chair, 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.

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 School of Graduate Studies 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 student admitted to the School of Graduate Studies may audit a graduate 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.

Withdrawal from Courses

A student may drop a course or withdraw from the university without a grade through the third week of class. From the fourth week through the eighth week, a grade of W is assigned and appears on the student's transcript for each course dropped. Students may not drop a course or withdraw from the university after the eighth week of the quarter.

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

Course Repeat

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

Only the hours and grade points earned from the repeated course 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.

Continuing Registration

A student who has completed all requirements for a graduate degree in the quarter prior to submission of an application for graduation need not be registered during the quarter of graduation.

A student who has not completed all required courses (including thesis defense and submission) in the quarter of graduation will be required to register for at least one hour of graduate credit. Courses in each department are reserved for continuing registration credit as follows: 789 for master's degree candidates; 899 for post-master's and doctoral candidates. The quarter in which the successful defense of the thesis is accomplished constitutes the last quarter of continuing registration. The department notifies the School of Graduate Studies by memorandum when the defense has been completed.

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

Petition Procedure

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

Petition forms are available in the graduate school. 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 completed form should be returned to the School of Graduate Studies office.

An action taken on petitions will not be considered as a precedent for any future action.

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 school.

Program changes within the College of Education and Human Services may be initiated by submitting a change of program form available in the student services office in the College of Education and Human Services or the graduate school office. Approval is granted by the College of Education and Human Services 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 must 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 graduate admissions office. The application and supporting documentation will be forwarded to and reviewed by the department concerned. The graduate admissions office will notify the student of the admission decision.

The Grading System

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 Failure/0 points
- X Failure to complete a course for which registered, without officially withdrawing/0 points (figured as an F in the grade point average)

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 progress; a permanent grade will be 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 the instructor to complete the work. An agreement for the grade of incomplete must be signed and submitted by the instructor at the time the grade sheet is submitted. If the work is not completed by the end of the date agreed upon the I grade automatically becomes an F, unless the instructor submits another I grade. An asterisk will appear next to an I grade on the grade report to indicate that the I will be changed to an F if the incomplete is not made up within the specified time. The maximum time allowed for the make up of an incomplete is the last day of class of the following quarter, except for spring quarter; spring quarter incompletes must be made up by the last day of class of the fall quarter.
- W Withdrew; given for courses from which the student withdrew or dropped during the fourth through eighth weeks of classes or equivalent or for which student petitioned for withdrawal.

Grade reports are sent at the end of each quarter to the addresses on file in the registrar's office.

Students and graduates who think an error has been made in the recording of a grade, either on the grade report or on the official transcript, must notify the Office of the Registrar before the end of the following quarter. A student has until the end of the fall quarter to challenge a grade received for the previous spring quarter.

Graduate Credit

Credit Hour Limits

The maximum number of credit hours for which a graduate student may register in a quarter is sixteen. In a summer term of five weeks, nine hours is a maximum.

Students holding graduate assistantships must register for a minimum of eight quarter hours of graduate credit during each quarter they hold the appointment. Predoctoral fellows are required to register for a minimum of twelve credit hours.

A student who wishes to deviate from the normal registration loads listed above must have the approval of the program adviser and the School of Graduate Studies.

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 records, and the nature of the course taken.

Categories of Graduate Credit

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 by the School of Graduate Studies are permitted to take workshop courses for graduate credit *without being admitted* to the School of Graduate Studies.

Transfer Credit

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

Credit may be transferred if the following conditions are met:

- 1 The student is in good standing at the other institution.
- 2 The grades in the courses to be transferred are B or better.
- 3 The credit is within the five-year time limit for completing a master's degree.
- 4 The number of hours to be transferred does not exceed twelve.
- 5 An official transcript reflecting the course work is on file in the School of Graduate Studies.

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

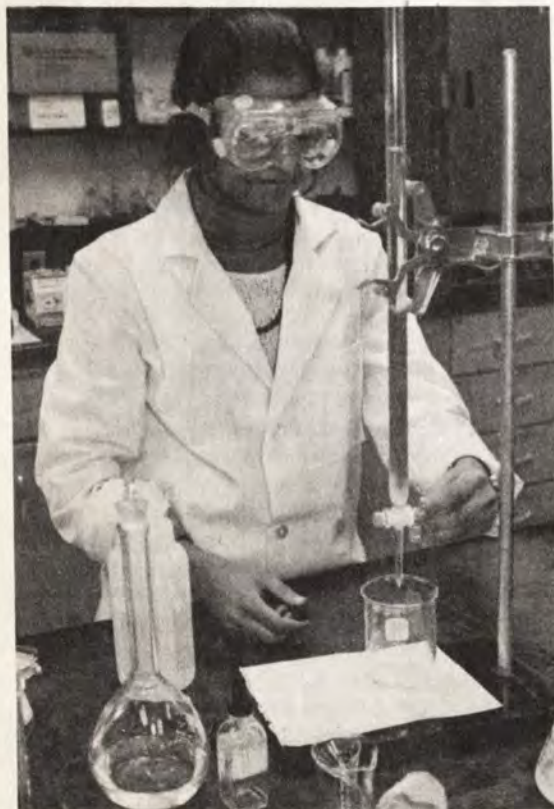
Credit by Examination

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 chair are required to indicate successful completion of the examination.

The completed form is presented to the bursar's office with a payment of \$10 per credit hour. The bursar will forward the form to the registrar for posting to the student's permanent record.



Graduate Degrees



Master's Degrees

Master of Arts

Applied Behavioral Science, Classroom Teacher, Counseling, Educational Leadership, English, History, Selected Graduate Studies, Student Personnel Services

Master of Art Therapy**Master of Business Administration**

Accountancy, Finance, Financial Administration, Health Care Management, Logistics Management, Management, Management Science, Marketing

Master of Education

Classroom Teacher, Educational Leadership, Student Personnel Services

Master of Humanities**Master of Music**

Music Education

Master of Rehabilitation Counseling**Master of Science**

Aerospace Medicine, Biology, Chemistry, Computer Science, Counseling, Geological Sciences, Logistics Management, Mathematics, Nursing, Physics, Selected Graduate Studies, Social and Applied Economics, Systems Engineering

Master of Science in Computer Engineering**Master of Science in Teaching**

Earth Science, Physics

Educational Specialist Degree

Educational Specialist

Educational Leadership, Curriculum and Supervision

Doctoral Degrees

Doctor of Philosophy

Biomedical Sciences, Computer Science and Engineering (program development approval: see page 37)

Doctor of Psychology

Contact the School of Professional Psychology for information.

Doctor of Medicine

Contact the School of Medicine for information.

Doctoral Degrees in Cooperation with Other Universities

Doctor of Philosophy

Educational Administration and Supervision (in cooperation with Bowling Green State University)

Doctor of Education

Counselor Education, School Administration (both in cooperation with Indiana University)

The Master's Degree

General Requirements

A student's program of study is administered by the department or college/school and is subject to approval by the School of Graduate Studies. Since program requirements vary by department and college/school, it is important for students to become acquainted with these specific requirements since they, as well as university requirements, must be satisfied. The following description covers the graduate school requirements and serves as a general guide.

Program of Study

Certain graduate programs have opted to use the Program of Study form. The Program of Study form defines a program which is contracted between the student and the graduate program. The graduate program specifically indicates that it will recommend awarding the degree sought by the student if the work contracted for is satisfactorily completed. Similarly, students specifically agree to their responsibility for completing the program. The Program of Study form is subject to modification as the student progresses, but all changes must have the adviser's approval.

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 completion of forty-five or more credit hours of graduate course work. A department may require completion of more than forty-five credit hours. Please consult requirements for a specific degree and major area.

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, completion of a minimum of thirty-three credit 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 earning workshop credits under Special Student status (i.e., not admitted to the School of Graduate Studies) 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.

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 credit hours of C may be applied toward a master's degree. The attainment 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 credit 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 end of twelve credit hours of graduate work, a student's grade point average will be reviewed by the graduate school. Based on this review, a student who has a cumulative grade point average less than 3.0 may be placed on probation or dismissed from the School of Graduate Studies.

At the completion of one year of graduate work or twenty-four credit 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 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. Failure to achieve the 3.0 grade point average will result in the student's dismissal from the School of Graduate Studies. If a portion of these credits is 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. Students are encouraged, but not required, to obtain a format check prior to the final deposit of their thesis. This format check significantly reduces the likelihood of a last-minute rejection. The School of Graduate Studies requires two working days to perform a format check.

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 numbered 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 will 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 credit hours applied toward the degree. This time does not include a leave of absence granted for adequate cause.

Second Master's Degree

A second master's degree may be earned by taking a minimum of thirty-three credit hours beyond the first master's degree. These hours must be taken at Wright State University. Departments or programs may specify additional requirements depending upon the length of the program, prerequisites for the individual student, and/or the nature of the first degree. Admission policies and procedures are the same as those for any student applying to the program, except that an application fee is not required if the first degree was earned at Wright State.

Application for Degree

The university has established the following filing periods for submitting applications for degrees, based on anticipated date of completion (indicated in parentheses).

September 1 to October 1 (December)
 December 1 to January 15 (March)
 February 1 to March 1 (June)
 May 1 to June 1 (August)

Applications for graduation may be obtained in the registrar's office. A fee of \$15 must be paid to the bursar, then the completed application should be returned to the registrar's office.

If the degree requirements are not completed at the time specified, another application (no fee), which will replace any previously submitted, must be filed.

Commencement is held twice annually, in December and June. Students who complete their degree requirements in August and December may participate in the December ceremony. March and June graduates may participate in the June ceremony.

Individuals completing their degree requirements in June will receive their diplomas at the June commencement. Those completing their degree requirements in December will receive their diplomas at the December commencement. Those completing their degree requirements in August or March will have their diplomas mailed to them approximately four weeks after the conferral date.

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 Complete a Program of Study form to be filed in the Office of Graduate Studies, if required by the program.
- 2 Complete the requirements for the graduate degree within five calendar years.
- 3 Achieve 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 Be registered in the quarter the degree is conferred.
- 5 Successfully complete the final comprehensive examination (if required in program).
- 6 Present 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.

The Educational Specialist Degree

Wright State University offers a post-master's program in educational leadership which leads to an Ed.S. degree. This program was created for administrators and educational leaders who seek additional training and expertise.

Admission Requirements

Admission requirements include:

- 1 Admission to the School of Graduate Studies
- 2 A master's degree

- 3 *Superintendency Focus*: Three years of experience in administration or supervision
Curriculum and Instruction Focus: Three years of teaching experience
- 4 Submission of letters of recommendation
- 5 Earned cumulative grade point average of 3.5 in master's degree study
- 6 Acceptance by faculty interviewing team
- 7 Satisfactory scores on either the GRE or the MAT

A candidate for the Educational Specialist degree must fulfill the residency requirements by completing two courses per quarter over a two-year period. Normally, the program will begin each fall quarter.

An action-oriented research project is required for completing the degree. Planning for the research project will begin in the research courses and will be implemented during the two years of the program. An oral report of the findings will be given in the advanced seminar.

Candidacy for the Educational Specialist degree is attained when the applicant has completed the action-oriented research project proposal and received the approval of his or her committee. The applicant must earn at least a B in each course to that date. This minimum requirement must be maintained after a student has been admitted as a candidate.

The Doctor of Philosophy Degree

An interdisciplinary Ph.D. program in biomedical sciences is offered by a program faculty in a cooperative effort between the College of Science and Mathematics, the School of Medicine, and the College of Engineering and Computer Science.

A Ph.D. program in computer science and engineering has received program development approval from the Ohio Board of Regents and will be implemented when program faculty development goals are met. The doctoral degree will be offered by a program faculty in a cooperative effort between the College of Engineering and Computer Science and the College of Science and Mathematics. A graduate catalog supplement for this program will be issued when the program is implemented (projected for 1986/87).

Admission Requirements

See individual program descriptions.

Program of Study

See individual program descriptions.

Credit Hour Requirements

Doctoral students are required to earn a minimum of 150 acceptable quarter hours of credit. Individual programs may have a higher credit requirement.

Residence Requirements

Residency rules require doctoral students to be enrolled full time for a minimum of four quarters. A minimum of seventy-six credit hours toward the doctoral degree must be completed at Wright State University. Individual programs may have additional residence requirements.

Grade Standards

Graduate students working toward the Doctor of Philosophy degree must maintain at least a 3.0 grade point average in all graduate courses in which a letter grade is assigned. Students who do not meet these requirements are subject to dismissal. Individual programs have probationary procedures concerning students who are temporarily not meeting grade standards. Individual programs may utilize criteria in addition to course work grades to evaluate a student's status in the program. Matters pertaining to dismissal for nonacademic matters are handled by the Office of Student Development.

Candidacy Examination

Students must pass a candidacy examination before they begin their dissertation research. Individual programs will specify the nature and forms of their candidacy examination.

Dissertation

Students pursuing the Ph.D. degree must conduct an acceptable original research effort and submit a dissertation based upon that research. The dissertation must be approved by the thesis director and advisory committee.

Final Examination and Submission of Approved Dissertation

Students pursuing the Ph.D. degree must successfully defend their dissertation before an appropriate dissertation committee. Individual programs will specify the specific format for the thesis defense.

A copy of the approved and defended thesis, signed by the thesis supervisor, dissertation or advisory committee, and program director must be submitted to the graduate dean for approval. The thesis must be submitted to the office of the Dean of Graduate Studies no later than two weeks before the date of graduation.

Time Limit

Graduate credit applied toward the doctoral degree is valid for only nine years from the date the student enters the program. Extenuating circumstances must be acceptable to the Academic Policy Committee of the biomedical sciences faculty.

Graduate students who fail to take courses or otherwise pursue their graduate education for a period of two years will be automatically retired from the active files of the program and of the School of Graduate Studies. Students must reapply for admission in order to reactivate their records.

Summary of Requirements for the Doctor of Philosophy Degree

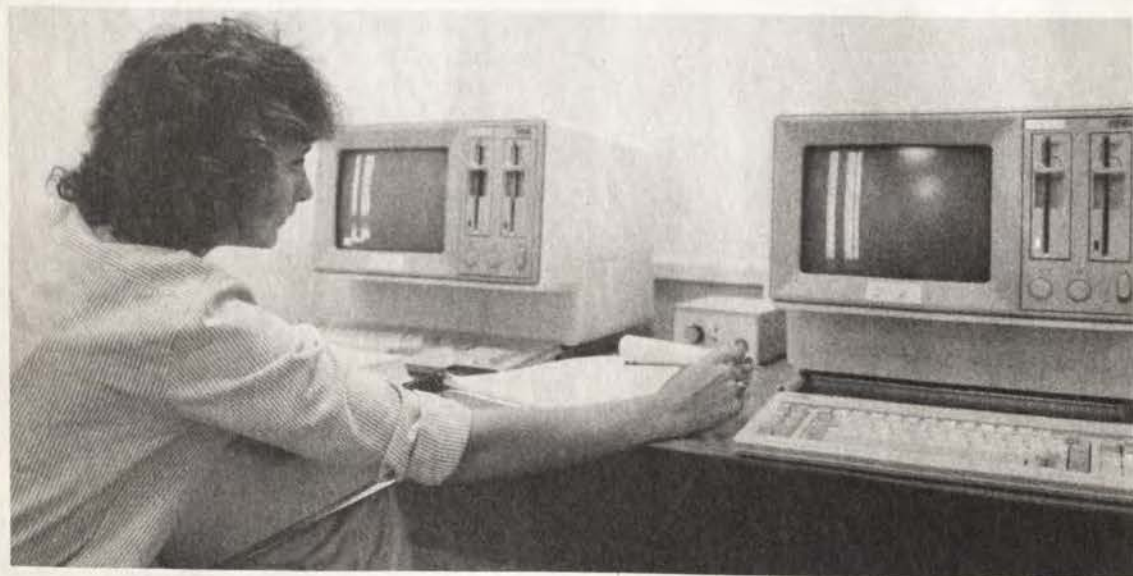
The following list is a summary of the requirements graduate students must complete to earn a Doctor of Philosophy degree at Wright State University.

- 1 Maintain a minimum grade point average of 3.0 (B)
- 2 Complete minimum program course work requirements
- 3 Be admitted to doctoral candidacy by passing a written/oral candidacy examination
- 4 Conduct an acceptable original research problem and submit an approved dissertation
- 5 Accumulate a minimum of 150 hours of acceptable graduate credit
- 6 Meet residency requirements
- 7 Make a successful defense of the dissertation
- 8 Be registered in the quarter the degree is conferred
- 9 Present two copies of the approved dissertation to the graduate office
- 10 Fulfill all requirements within nine years of entrance into the program

Certification and Certificate Programs

In addition to graduate degree programs, Wright State offers two additional types of structured curricula. One such program leads to certification status for teachers and consists of a series of courses that will qualify a teacher for certification in a specific area (see Education and Human Services section). The College of Education and Human Services also offers certificate programs for school counselors, supervisors, and school administrators. The second type of curriculum leads to a certificate awarded by the university after the completion of a specific sequence of courses. These courses may be an independent academic program or part of a master's degree program. If a student pursues the certificate as an independent program, he or she will be enrolled in nondegree status.

Certificates may be earned in the Department of English (Teaching of English to Speakers of Other Languages, TESOL; and Business and Professional Writing); in the Department of Geography (Cartography, Photogrammetry, and Remote Sensing; and Urban Studies); in the Department of History (Professional Archival and Historical Administration); and in the Department of Theatre Arts (Theatre Technology). Interested students should contact the appropriate department for further information.



Course Abbreviations

The following abbreviations are used in lists of degree requirements and in the course descriptions section of this catalog.

ACC	Accountancy
ADM	Administration
AIS	Administrative Information Systems
ANT	Anatomy
ATH	Anthropology
ABS	Applied Behavioral Science
ART	Art and Art History
AED	Art Education
AT	Art Therapy
BCH	Biological Chemistry
BIO	Biological Sciences
BMS	Biomedical Sciences
CHM	Chemistry
CLS	Classics
COM	Communication
CME	Community Medicine
CEG	Computer Engineering
CS	Computer Science
CNL	Counseling
ECO	Economic Education, Center for
EC	Economics
ED	Education
EGR	Engineering
ENG	English
ENV	Environmental Studies
FIN	Finance
FR	French
GEO	Geography
GL	Geological Sciences
GER	German
HPR	Health, Physical Education, and Recreation
HST	History
HUM	Humanities
LCS	Library and Communication Science
LI	Linguistics
MGT	Management
MKT	Marketing
MTH	Mathematics
M&I	Microbiology and Immunology
ML	Modern Language Humanities
MUS	Music
NUR	Nursing
PHA	Pharmacology
PHL	Philosophy
PHY	Physics
P&B	Physiology and Biophysics
PLS	Political Science

PSI	Professional Psychology
PSY	Psychology
QBA	Quantitative Business Analysis
RHB	Rehabilitation
REL	Religion
SW	Social Work
SOC	Sociology
SPN	Spanish
STT	Statistics
TH	Theatre
URS	Urban Affairs

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 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.)

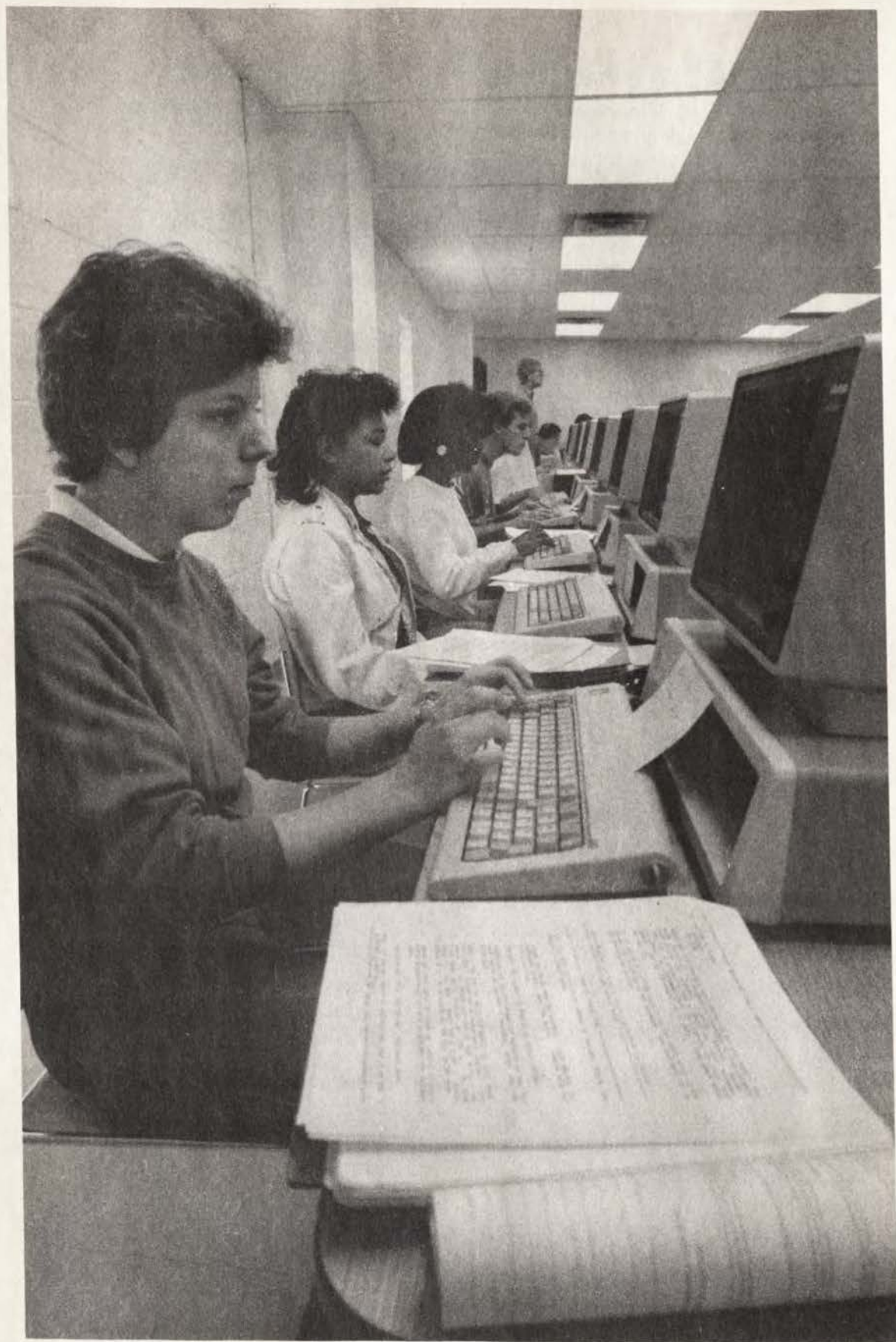
800-999 Courses intended for post-master's or doctoral-level work.

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

Policy on Dual-Listed Courses

Students who wish to receive graduate credit for dual-listed courses, e.g., courses offered at both the 400 and 600 levels, must be required to perform additional work that reflects both quantitative and qualitative advances over undergraduate requirements:

- 1 When additional readings are assigned, they should involve the student with scholarly literature related to the subject of the course.
- 2 When graduate research is assigned, it should adhere to rigorous methodological strategies, emphasize primary source material where appropriate, and conform to accepted standards of scholarly style, organization, and content.
- 3 Graduate examinations may require additional or different questions and should require abstract thinking and theoretical assimilation of the course material.



Graduate Programs



Accountancy

See Business and Administration

Aerospace Medicine

The aerospace medicine Master of Science degree program is conducted by the School of Medicine's Department of Community Medicine. The program provides fundamental information about aviation and space-flight biomedical factors, including physiological, psychological, bioengineering, and clinical factors. Selection and periodic examination requirements for airmen and airwomen are detailed as are normal and pathological changes associated with aging of airmen and airwomen.

The Graduate Faculty

Professors

Joseph D. Alter, public health
Winslow J. Bashe, Jr., epidemiology
Stanley R. Mohler (director), aerospace medicine

Associate Professors

Kenneth N. Beers, aerospace medicine
Satya P. Sangal, biostatistics

Associate Clinical Professor

George Mohr, aerospace medicine

Assistant Clinical Professor

Arthur L. Ventura, environmental medicine

Admission

The minimum requirement for admission to the M.S. degree program in aerospace medicine is the M.D. degree and a clinical year of medical training. The prospective student communicates with the Department of Community Medicine for acceptance. It is possible that certain advanced students can take individual courses in the curriculum and apply these to other degree programs.

Degree Requirements

Students must complete the required courses plus certain electives and must conduct specific research that becomes part of the required thesis. The research may be of laboratory, field, or, in selected cases, conceptual nature.

Program

Required Core Courses

CME 601, 602, 621, 622, 641, 642, 650, 651, 652, 653, 701, 731, 899; MGT 621

Anatomy

See Biological Sciences

Applied Behavioral Science

The Applied Behavioral Science (ABS) program leads to the Master of Arts degree. The program trains students to perform applied behavioral research in social science, governmental, and industrial settings, and its curriculum may benefit students seeking admission to doctoral-level programs. Entering students receive interdisciplinary training in the statistical and methodological bases of research and of planning and evaluating applied behavioral programs. Following this basic training, each student engages in an individualized course of study in one of the areas of concentration based on his or her personal interests and professional goals. The areas of concentration are training and development, human factors, and human services. Specialization can also be arranged in related areas depending on faculty interest. The individual course of study includes courses in the area of concentration, practicum experience in a relevant applied setting, and supervised applied thesis research. Each student will be guided through the program by a faculty adviser selected to suit his or her interests and goals.

Participating Faculty

Training and Development

Professors

Robert E. Pruett (chair), public relations, mass media, persuasion theory
James E. Sayer, mass communication, rhetorical analysis

Associate Professors

Beverly A. Byrum, androgyny, process consulting
Daniel DeStephen, communication theory, research methodology

Barbara W. Eakins, male/female and nonverbal communication

Ronald C. Fetzer (area head), organizational theory training

Human Factors

Professor

George H. Crampton, vestibular function

Associate Professors

Herbert A. Colle (area head), workload and attention, memory

Harry N. Davis, psychophysiology

Daniel Weber, psychoacoustics, cognitive mathematics

Assistant Professors

F. Thomas Eggemeier, attention, training
 Michael Hennessy, psychobiology, stress

Human Services**Professors**

Jeanne H. Ballantine (area head), relations in complex organizations, role transitions
 Leonard Cargan, intergroup relations
 Lawrence J. Cross, the family, society and technology
 Helen A. Klein (director), developmental processes, early childhood
 Lawrence A. Kurdek, developmental process
 Perry D. Moore, public administration, organizational change
 Jerald O. Savells (area head), social deviance, the family, stress management
 Harvey A. Siegal, community human services, alcohol treatment
 Warner R. Wilson, interpersonal relations, skills training

Associate Professors

Robert W. Adams, American political parties, public opinion
 Bela J. Bogner, social gerontology, community mental health
 Charles Funderburk, research design and methodology
 Thomas Koebernick, organizational networks, research methods
 Mary Ellen Mazey, community development
 Martin K. Moss, community mental health, behavior theory
 Richard A. Page, environmental psychology
 James L. Walker, urban studies, political science

Assistant Professors

Ellen M. Murray, penology, correctional reform
 Mark R. Sirkin, research methods, statistics

Admission

An applicant should have a baccalaureate degree from an accredited institution, preferably in the social, behavioral, or natural sciences. 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 behavioral or social research setting is desirable but not necessary.

A prospective student must submit official transcripts from all undergraduate institutions. Graduate Record Examination scores (verbal, analytical, and quantitative portions) are normally required. 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 ABS program.

Although students can be admitted any quarter, fall admission is recommended because of course sequencing.

Financial Assistance

Several forms of financial support are available to incoming students. Teaching assistantships have been available through several academic departments. Research assistantships are available through the ABS program as well as through individual faculty grants that support specific research projects. Direct employment, fellowships, and loans are also available to some students. All prospective full-time students are encouraged to apply for these opportunities.

Degree Requirements

Entering students develop research competence by completing the methodology course sequence. Each student completes an individualized program of study, developed in conjunction with an adviser, in the student's area of concentration. The program consists of courses, seminars, and individually directed study. There are required and elective courses. The third part of the training, the practicum, consists of supervised observation and participation in an agency, laboratory, or organization appropriate to the concentration area. The fourth part of the training is the thesis. Thesis research involves a field or laboratory study appropriate to the concentration area. Field studies may be evaluations of total programs or more detailed studies of aspects of a program or system. The development of a program design or the implementation of a program may be part of the thesis research. Laboratory research can cover a wide range of areas.

Students select an area of concentration from training and development, human factors, or human services. Credit hours required for graduation vary with the concentration selected.

Program of Study

Research Methods	13
ABS 721, 722, 731	
Concentration Courses	22-32
Planned by student and adviser	
Practicum ABS 779	10
Thesis ABS 799	10
Total	55-65

Training and Development

The training and development concentration is concerned with human resource development. The consulting process is used to identify such problem areas as skill deficiencies, growth constraints, and dysfunctional organizational behavioral patterns, and to devise an appropriate action for change. The training and development process is used to eliminate the problems and to provide the growth situation identified by the communication process. Students typically undertake practicum placements in industrial and organizational settings.

Course Offerings

- COM 651 Communication Consulting for Training and Development
 COM 741 Principles and Application of Communication Theory
 ABS 751 Organizational Training and Development
 ABS 752 Process Consultation
 ABS 766 Work Motivation and Psychometric Assessment

Human Factors

Human factors is an area of study and research which uses knowledge of human perceptual and cognitive abilities and knowledge of motivational and social relationships to design person-machine and other environments so that the work performed in them is efficacious, efficient, and safe. The course of study includes fundamental science courses as well as application courses. Students are expected to be familiar with both laboratory and field research. The concentration follows a scientist-practitioner model.

Course Offerings

- ABS 756 Human Factors in the Systems Development Process
 PSY 665 Information Processing
 PSY 766 Human Information Processing Laboratory
 PSY 721 Advanced Engineering Psychology
 PSY 776 Vision Research
 PSY 777 Vision Research Laboratory
 ABS 766 Work Motivation and Psychometric Assessment

Human Services

The human services concentration is concerned with human service delivery systems. Areas of interest include life stages (infancy, adolescence, occupational role transitions); gerontology; problems (teen pregnancy, mental illness, divorce, unemployment); deviance (juvenile delinquency, substance abuse, family violence), corrections; health care delivery (stress, preventive education, treatment), and community development. The program is designed to produce skilled applied behavioral scientists to function within diverse settings.

Course Offerings

- ABS 703 Human Service Delivery Systems
 ABS 741 Life Stages and Life Changes
 ABS 761 Social Deviance
 ABS 788 Seminar in Organization

Applied Mathematics

See Mathematics and Statistics

Art Education

See Education and Human Services

Art Therapy

See Education and Human Services

Biological Sciences

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, enzymes, and nutrition through the Department of Biological Chemistry; microbial physiology, immunology, pathogenic bacteriology, medical mycology, and virology through the Department of Microbiology and Immunology; and physiology and biophysics of blood and the cardiovascular/respiratory systems, the intestinal and renal organs, the endocrine glands, and the nervous system—all with particular emphasis on the molecular, cellular, and membrane transport/transduction level, but also based on classic organ or whole organism approach in health and disease—through the Department of Physiology and Biophysics. Students interested in a particular concentration area should make their preference known to the appropriate department as early as possible to ensure 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, Geological Sciences, Mathematics and Statistics, Physics, Psychology,

and the College of Engineering and Computer Science 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 may pursue an M.S. degree in biology through one of three options. Option One requires the submission and oral defense of a thesis based upon original research performed while enrolled as a graduate student at the university. Option Two requires the submission and oral defense of a thesis based on a critical review of a topic. Although there is no formal course work requirement for these two options, candidates will be advised to enroll in graduate-level courses deemed appropriate for successful understanding of the research to be undertaken. Option Three is a course work option that requires the successful completion of 45 quarter credits of graduate-level course work offered by the College of Science and Mathematics and the passing of a comprehensive examination. The desired option can be elected by the student only after consultation with the chair of the Graduate Committee. Considerations for electing an option must be given to the availability of research topics and advisers and to the student's research and educational interests.

All candidates, regardless of the option chosen, are 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 or of an appropriate option, the department graduate committee will assign a temporary adviser who will function in place of an advisory committee until the student selects an option and is accepted by an advisory professor.

Participants in all options must meet requirements for the Master of Science degree defined in the section Degree Requirements. They must, in addition, meet the specific requirements of the option chosen.

The Graduate Faculty

Anatomy

Professor

Joseph Zambarnard (chair), histochemistry of the dynamics of cellular transformation by oncogenic viruses

Associate Professors

Frank Nagy, ultrastructure, cell division, kinetics, male reproductive system, embryology

John C. Pearson, comparative primate neuroanatomy

Creighton H. Phelps, neuroanatomy, cellular neurobiology

Larry J. Ream, osteobiology

Jane N. Scott, embryology, male and female reproductive systems

Assistant Professor

Andrew J. Kuntzman, *in vivo* microcirculation

Biological Chemistry

Professors

Prem P. Batra, nucleotide metabolism, photobiology

Emil Kmetec, mammalian kidney, basement membranes

Partab T. Varandani, metabolism and action of insulin

Robert A. Weisman (chair), *in vivo* magnetic resonance

Associate Professors

Gerald M. Alter, protein structure, hemoglobin conformation

H. Ira Fritz, embryo nutrition, experimental teratology

Ira M. Leffak, chromatin structure and function

Daniel T. Organisciak, visual biochemistry, membrane metabolism, neuronal lipid metabolism

Assistant Professor

Lawrence J. Prochaska, energy-transducing membranes

Adjunct and Joint Faculty

Paul G. Seybold, professor (chemistry), chemical carcinogens, physical biochemistry

Biological Sciences

Professors

Larry G. Arlian, water balance, osmoregulatory physiology, parasitology

Shigeru I. Honda, plant organelle structure and function

Jerry H. Hubschman, ecological physiology of aquatic animals

George J. Kantor, molecular genetics, DNA repair in eukaryotes

Associate Professors

James P. Amon, molecular and environmental biology of microorganisms

Clyde D. Barbour, systematics and ecology of fishes

Wayne W. Carmichael, aquatic biology; culture, isolation, and toxicology of toxic algae

Adrian V. Rake, molecular development, reassociation of DNA

John D. Rossmiller (chair), metabolic control processes

James R. Runkle, plant ecology, general ecology

Marvin B. Seiger, behavioral genetics, ecological genetics

Timothy S. Wood, invertebrate ecology, biology of freshwater bryozoans

Assistant Professors

Barbara E. Hull, cell biology, histology, electron microscopy, immunology and replacement of burn-damaged skin

Mark D. Mamrack, cell biology, carcinogenesis, protein biochemistry

Microbiology and Immunology

Professors

Nancy J. Bigley (chair), immunology

David J. Giron, virology

J. Robert Suriano, virology

Associate Professors

Charles McFarland, microbial physiology

Randall A. Smith, immunology

Donald C. Thomas, viral genetics

Richard L. Warren, microbial genetics

Physiology and Biophysics

Professors

Roger M. Glaser, exercise physiology, cardiopulmonary stresses of wheelchair locomotion

Peter K. Lauf (chair), molecular physiology and biophysics of membrane transport in erythrocytes

Associate Professors

Robert W. Gotshall, renal and cardiovascular physiology

Daniel S. Miles, respiratory and cardiovascular physiology

Noel S. Nussbaum, endocrinology, connective tissue dynamics

Thomas J. Sernka, gastrointestinal physiology, mechanism of electrolyte secretion and absorption

Assistant Professor

Melvyn D. Goldfinger, neuroscience and biophysics of somatosensory afferents and relay nuclei

Admission

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 on 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.

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 a biological sciences building was completed in 1975. The building contains approximately 100,000 square feet and houses facilities of the biological and health sciences departments.

Major items of available research equipment include liquid scintillation, gas flow, and well-type scintillation counters; infrared, ultraviolet, and visible light spectrophotometers; preparative ultracentrifuge; nuclear magnetic resonance spectrometer; mass spectrometer; x-ray diffraction apparatus; polarizing, phase-contrast, and fluorescence photomicroscopes; and access to transmission and scanning electron microscopes.

A 200-acre biological preserve plus additional wooded areas on campus provide opportunities for field-oriented research and teaching experiences.

The departments 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, and with the Fels Research Institute and the Cox Institute at the Kettering Medical Center, which are affiliated with the Wright State University School of Medicine.

Financial Assistance

Several forms of financial assistance, including assistantships, fellowships, direct individual employment, and loans, 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. Students may obtain supplemental support for the fourth (summer) quarter through either teaching or research assistantships, if they are available, or may use this period for full-time study or research. Some research assistantships are available through individual faculty grants that support students in specific research projects. Assistantship appointments usually carry a partial waiver of fees for both residents and nonresidents. Special fellowships for predoctoral students are available through the School of Graduate Studies. 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.

Degree Requirements

Students who are candidates for the Master of Science degree in biology must meet all of the following requirements. In addition, some departments may have other requirements; students should check with the individual department offices for information about additional requirements.

- 1 The candidate must complete a minimum of forty-five quarter credits. A maximum of ten credits of graduate courses may be transferred from other institutions. The candidate must 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 credit hours of C grades applicable to the degree.
- 4 Candidates who choose Option One must submit and orally defend a thesis based upon original research performed while enrolled as a graduate student at the university. Candidates who desire to participate in Option Two must have a petition signed and approved by a member of the graduate faculty who will serve as the thesis adviser, by the department chair, and by the Graduate Studies Committee of the participating life sciences department. The course work Option Three requires the completion of forty-five credit hours of course work. A maximum of twelve credits can be earned in other departments of the College of Engineering and Computer Science, the College of Science and Mathematics, and the School of Medicine if approval to enroll in such courses is granted by the adviser. The remainder of the credits, including the four seminar credits, must be earned in the life sciences departments. A maximum of six credits of BIO 699, Special Problems in Biology, is applicable to the Option Three requirements. In addition, candidates participating in Option Three must pass a comprehensive examination administered by the advisory committee after completion of all course work.

Biomedical Sciences Ph.D. Program

This interdisciplinary program leads to the Doctor of Philosophy degree in biomedical sciences. It recognizes the interrelatedness of the various traditional disciplines and seeks to educate scientists who are qualified to develop this potential. Classroom and laboratory instruction stresses

experiences that span a broad spectrum of knowledge.

The program provides an integrated background in physical, chemical, and biological disciplines and an in-depth experience in research. Graduates are expected to be sufficiently flexible to participate in solving a broad range of complex biomedical problems.

In-depth study in the program is possible in a number of areas, including bioengineering, cellular and reproductive biology, genetics, immunobiology, molecular biology and biochemistry, neuroscience, systems and integrative biology, and toxicology and environmental chemistry. The primary aim of the program is to prepare the student for a research career.

Participating Faculty

The program is a cooperative effort between the College of Engineering and Computer Science, the College of Science and Mathematics, and the School of Medicine, and includes scientists from the Cox Institute; the National Center for Rehabilitation Engineering; the Charles F. Kettering Laboratories in Yellow Springs, Ohio; and the 6570th Aerospace Medical Research Laboratory at Wright-Patterson Air Force Base.

The program faculty at Wright State reside in a number of departments including anatomy, biological chemistry, biological sciences, chemistry, community medicine, computer science, engineering, family practice, mathematics and statistics, medicine, microbiology and immunology, pathology, pediatrics, pharmacology and toxicology, physiology and biophysics, psychiatry, psychology, and surgery. There are more than one hundred thirty faculty members.

Admission

The applicant should have:

- 1 A baccalaureate degree from an accredited institution
- 2 An undergraduate grade point average of at least 3.0 on a 4.0 scale
- 3 One year of mathematics, including introductory calculus
- 4 One year of physics
- 5 One year of biology
- 6 Two years of chemistry, including an organic chemistry sequence

The Graduate Record Examination is not usually necessary, but the program faculty reserves the right to require it of individual applicants upon the request of the Admissions Committee. A prospective student must submit one official transcript from each institution attended. Under special circumstances, deficiencies in prerequisites may be waived or corrective measures arranged by action of the Admissions Committee.

Financial Assistance

Support is available to students on a competitive basis, and includes predoctoral fellowships and teaching assistantships. Students awarded support are eligible for stipends and remission of tuition fees. Interest in financial support should be indicated at the time of application.

Degree Requirements

Students are asked to master a series of core courses, advanced content courses, and laboratory rotations. These serve as an interdisciplinary base for the development of dissertation research. The institution awards the degree when the student satisfactorily completes the required work.

The program first develops a reservoir of basic knowledge through an interdisciplinary core, consisting of molecular, cellular and systems biology, biostatistics, computer science, and immunology. The core curriculum prepares the student to choose an area of advanced study. The advanced curriculum is organized into interdisciplinary tracks or areas of concentration.

The program requires that the student take eighteen credit hours of advanced courses and three seminars, pass a preliminary examination based on the advanced curriculum (usually at the end of the second year), and produce an acceptable dissertation based on original research.

Waiver of Program Requirements

Students may petition to be exempted from all or part of the core curriculum, usually by scoring a passing grade on an appropriate proficiency examination. Petitions may also be submitted for waiver of credit for previous graduate courses taken in another accredited program. Course credit of up to twelve credit hours may be waived providing (a) the grade attained in each course is a B or better, (b) the course was taken within five years of the actual waiver, and (c) the course relates to the area of concentration chosen in this program. Petitions for obtaining credit for laboratory experiences may be made, subject to the same credit hour limitations and time constraints as for courses.

Program of Study

Interdisciplinary Core	
Molecular Biology	13
Cell Biology	5
Cellular Biophysics	5
Physiological Systems	4
Principles of Drug Action	3
Immunobiology	5
Radioisotopes	2
Biostatistics	6
Computer Science	4
Advanced Courses	18
Seminars	3
A minimum of three	
Laboratory Rotations	9-18
A minimum of three	
Dissertation Research	
Credit hours arranged	
Total (minimum requirement)	150

The program does not have a fixed time for the awarding of the Ph.D. degree. This depends on the rate of progress of the individual student, but averages four to five years. Graduate credit applied toward the doctoral degree is valid for only nine years from the date the student enters the program. Extenuating circumstances must be acceptable to the Academic Policies Committee of the Biomedical Sciences faculty, the program director, and the dean of the School of Graduate Studies.

A minimum of seventy-six credit hours toward the doctoral degree must be completed at Wright State University. After passing the preliminary examination, a student must maintain full-time registration or be retired from the program. A doctoral student must be enrolled full time for a minimum of four quarters.

Curriculum Overview

Year I

Quarter I

Molecular Biology I
Cellular Biophysics
Introduction to Research
Radioisotopes
Biomedical Sciences Lab

Quarter II

Molecular Biology II
Elective
Physiological Systems
Biomedical Sciences Lab

Quarter III

Immunobiology
Principles of Drug Action
Cell Biology
Core Seminar
Biomedical Sciences Lab

Quarter IV

Biostatistics
Computer Science
Lab Rotations

Year II

Biostatistical Applications
Eighteen hours of advanced courses
Three seminars
Completion of three lab rotations
Begin research by selecting a dissertation director
and an area of concentration
Preliminary exam

After Year II

Research, leading to dissertation and defense

Dissertation

The student chooses a faculty member to guide and direct the dissertation research on a daily basis. In addition, a supervisory committee is formed to periodically review the student's progress. The relationship among the student, the faculty adviser, and the committee is central to the program. The committee determines when the research may be considered completed and must approve the written dissertation, as well as the student's public defense of it. The committee certifies to the program director the competency and achievement of the dissertation.

Grade Standards

Graduate students working toward the Doctor of Philosophy degree must maintain at least a 3.0 grade point average in all graduate courses and in all other graduate work that is assigned letter grades. The overall minimum grade point average applies only to formal academic course work, since laboratory rotations and dissertation research credits are not calculated in the grade point average. Dissertation research will receive grades of satisfactory (S) or unsatisfactory (U) until the dissertation is accepted; these will then be converted to a standard letter grade. A 3.0 average and the recommendation of the student's supervisory committee and the program director are required for graduation.

Any student whose cumulative grade point average falls below 3.0 will be placed on probation. For students beyond the core curriculum, failure to reattain a cumulative grade point average of 3.0 within the next twelve credit hours of course work will result in a recommendation for dismissal from the program.

A student enrolled in the core curriculum must achieve an overall grade point average of at least 3.0 at the completion of the core requirements. A student who completes the core curriculum with a grade point average of less than 2.7 will be recommended to the dean of the School of Graduate Studies for dismissal from the program. A student with a grade point average above 2.7 but below 3.0 will be given an opportunity to repeat part of the curriculum while continuing into advanced courses on a probationary status as determined by the program director.

Students who repeat all or part of the core curriculum must achieve an overall 3.0 grade point average by the time an additional twenty-four credit hours of letter-graded course work have been completed. Failure to do so will result in a recommendation for dismissal.

A student must attain a grade of A or B in any repeated core course or face dismissal from the program. The grade received the second time will be used in calculating the student's grade point average.

A student who fails the preliminary examination at the end of the second year will either be dropped from the program or be allowed one reexamination, depending on the recommendation of the Examination Committee.

Matters pertaining to dismissal for nonacademic matters are handled by the Office of Student Development.

Summary of Requirements

Listed below is a summary of the requirements for the Doctor of Philosophy degree in biomedical sciences at Wright State University. A student must:

- 1 Complete core and advanced courses with a minimum grade point average of 3.0 (B)
- 2 Choose a dissertation director and a supervisory committee with the approval of the program director
- 3 Pass a preliminary examination over the advanced curricular content
- 4 Successfully prepare a written dissertation proposal and make an oral presentation of it to the supervisory committee
- 5 Accumulate a minimum of 150 didactic, laboratory, and research quarter hours
- 6 Conduct an acceptable original research problem, submit an approved written dissertation, and make a successful public defense of it
- 7 Be certified by the Certification Advisory Group and the program director as having completed all requirements for the Ph.D. degree, including the accomplishment of an acceptable dissertation
- 8 Meet residency requirements
- 9 Be registered in the quarter in which the degree is conferred

- 10 Present two copies of the approved dissertation to the School of Graduate Studies
- 11 Fulfill all requirements within nine years of entrance into the program

Areas of Concentration

Bioengineering/Biodynamics

Advanced study in biomedical engineering and biodynamics has emerged as a valuable approach to the understanding of complex biological systems. Several goals may be pursued in the present program. One pathway emphasizes mathematical modeling and advanced data manipulation via computer simulation, while another is concerned with methods of data acquisition and instrumentation.

Bioengineering and biodynamics contribute significantly to the treatment and rehabilitation of the injured and physically disabled person. The scope of health care is increasingly dependent upon engineering concepts for the invention of sophisticated new research and diagnostic instruments, prostheses, and other medical devices. The application of systems engineering to pharmacokinetics in disease states is expected to provide more effective drug therapy. Courses emphasize engineering principles, mathematical modeling, computer simulation, and instrumentation.

BMS 655 Matrix Algebra	5
BMS 701 Advanced Biomedical Computers	4
BMS 702 Control Systems I	4.5
BMS 703 Control Systems II	4.5
BMS 705 Linear Systems I	3
BMS 706 Linear Systems II	4.5
BMS 708 Digital Signal Processing	3
BMS 712 Biodynamics	3
BMS 713 Advanced Biomechanics and Biofluids	3
BMS 714 Advanced Engineering Biophysics	3
BMS 717 Advanced Bioinstrumentation	4
BMS 721 Biomedical Electronics	4
BMS 855 Cardiovascular Control Mechanisms	3
BMS 856 Cardiac Dynamics	3
BMS 858 Renal Function	3
BMS 859 Gastrointestinal Physiology	3
BMS 860 General Endocrinology	3
BMS 861 General Endocrinology Lab	2
BMS 862 Physiological Control Mechanisms	3
BMS 863 Physiological Control Mechanisms Lab	2
BMS 864 Physiological Aspects of Exercise	5
BMS 990 Seminar	1
BMS 991 Special Topics	1-15
BMS 999 Dissertation Research	1-15

Biosystems

Coronary artery disease, hypertension, and stroke are major causes of human morbidity and mortality in the United States. Chronic renal disease and broncho-pulmonary illnesses, such as emphysema and asthma, contribute heavily to the patient population, and gastrointestinal illnesses,

such as ulcers, cause more hospitalizations than any other diseases. Nervous and mental disorders also cause human suffering. Inroads are being made in containing these diseases, but research toward a greater understanding of each of these organ systems and the interactions among them is needed to conquer the diseases. The further need for more rapid progress in meeting the challenges of behavioral disorders, problems with pain, sleep disorders, paralysis, population control, birth defects, and sterility is well known.

In addition to the core curriculum, students in the biosystems concentration select from available courses on the cardiovascular, pulmonary, renal, gastrointestinal, endocrine, skeletal, muscle, and reproductive systems. Additional course offerings in neuroscience, exercise physiology, control mechanisms, biophysics and bioengineering, and human reproduction consider the organism as a complex system.

Students will have the option of performing research with human or animal models. Faculty research interests include regulation of blood pressure and renal blood flow, the effect of stress on cardiovascular and pulmonary function, the effect of hypertension on the placenta and fetus, muscle and exercise physiology, autonomic control, bone formation and growth, fluid and electrolyte balance, transport in the gastrointestinal system, the structure and function of the reproductive systems, and the structure and function of the nervous system.

BMS 701 Advanced Biomedical Computers	4
BMS 713 Advanced Biomechanics and Biofluids	3
BMS 714 Advanced Engineering Biophysics	3
BMS 717 Advanced Bioinstrumentation	4
BMS 754 Molecular Biology of Learning and Memory	3
BMS 837 Human Gross Anatomy	8
BMS 840 Reproductive Anatomy and Physiology	2
BMS 842 Experimental Teratology	3
BMS 843 Experimental Teratology	3
BMS 855 Cardiovascular Control Mechanisms	3
BMS 856 Cardiac Dynamics	3
BMS 857 Pulmonary Physiology	3
BMS 858 Renal Function	3
BMS 859 Gastrointestinal Physiology	3
BMS 860 General Endocrinology	3
BMS 861 General Endocrinology Lab	3
BMS 862 Physiological Control Mechanisms	3
BMS 863 Physiological Control Mechanisms Lab	2
BMS 864 Physiological Aspects of Exercise	5
BMS 898 Neuropharmacology	3
BMS 902 Neurophysiology	3
BMS 903 Human Neuroanatomy	6
BMS 904 Cellular Neuroanatomy	3
BMS 905 Information Processing	4
BMS 909 Sensory Processes	4
BMS 911 Neuropsychology	4
BMS 912 Experimental Methods in Neuroscience	4

BMS 913 Fundamentals of Human Neurobiology	4
BMS 990 Seminar	1
BMS 991 Special Topics	1-15
BMS 999 Dissertation Research	1-15

Genetics

The structure and functional diversities of cells and organisms reflect differences in their inherited genetic information. The study of genetics is an attempt to correlate the observed characteristics of cells, tissues, or organisms with the information carried by the DNA. Recent successes in this area are embodied by our ability to dissect and recombine DNA at the molecular level, to prenatally diagnose certain inherited diseases, and to approach an understanding of the mechanisms of tumor formation.

A student in the genetics concentration initially receives thorough instruction in one of the broad fields of genetics (molecular, microbial, or human) and, through subsequent course work, then defines a more limited area of interest and investigation. Through a series of lecture, laboratory, seminar, and independent study experiences, the student is exposed to modern methods of characterizing the genetic material. The methods used in such a characterization are at any level from the cell to the individual. The techniques used include recombinant DNA methodology, gel electrophoresis, modern cytogenetic procedures, and computerized statistical analysis.

The goal of the genetics group is to produce researchers with broad expertise, capable of drawing on a multidisciplinary background to attack current problems in genetics.

BMS 769 Biochemistry of Membranes	3
BMS 770 Biological Macromolecules	3
BMS 772 Heritable Metabolic Diseases	4
BMS 773 Biochemical Regulation	3
BMS 779 Molecular Genetics	3
BMS 780 Human Genetics	3
BMS 785 Advanced Seminar in Genetics	2
BMS 786 Behavior Genetics	3
BMS 791 Microbial Genetics	3
BMS 792 Microbial Genetics Lab	3
BMS 808 Molecular Virology	3
BMS 809 Viral Oncology	3
BMS 812 Immunobiology	5
BMS 990 Seminar	5
BMS 991 Special Topics	1-15
BMS 992 Dissertation Research	1-15

Molecular and Cellular Regulation

One of the most important aspects of present-day biomedical research is the determination of the regulatory mechanisms of cellular and molecular processes. Research in this area has a great bearing on cancer, heart disease, and aging. In addition, basic research in regulation is necessary for an understanding of normal human growth, the ontogenic development of the immune system, and

tissue differentiation. An understanding of the etiology of disease must consider tissue receptor-ligand binding, membrane properties, macromolecular conformation of biological units and subunits, control of enzymatic activity in metabolic pathways, cyclic nucleotide effects, chromatin structure, gene expression, energy metabolism, immunological reactions, cell-cell interactions, and hormonal effects, as well as a number of other regulatory phenomena. Each of these areas is covered within the molecular and cellular regulation track. The purpose is to train investigators to take an interdisciplinary approach to problems of regulation.

After the student takes the core curriculum and enters the advanced curriculum, he or she is required to take at least one course from each of three subset groups identified as molecular, cellular, and genetic. Examples of the subset courses are enzymes (molecular), membrane biochemistry (cellular), immune regulation (cellular), molecular genetics (genetic), and molecular virology (genetic). Other advanced courses may come from any of the subset groups or outside the area, depending on the student's individual program.

BMS 736 Chemical Kinetics	3
BMS 737 Chemical Thermodynamics	3
BMS 738 Selected Topics in Physical Chemistry	3
BMS 767 Enzymes	3
BMS 768 Peptide Hormones	3
BMS 769 Biochemistry of Membranes	3
BMS 770 Biological Macromolecules	3
BMS 771 Radioisotopic Principles	2
BMS 772 Heritable Metabolic Diseases	4
BMS 773 Biochemical Regulation	3
BMS 774 Biochemistry of Connective Tissue	3
BMS 775 Photobiology	3
BMS 791 Microbial Genetics	3
BMS 792 Microbial Genetics Lab	3
BMS 793 Microbial Ecology	5
BMS 795 Microbial Physiology	3
BMS 796 Microbial Physiology Lab	2
BMS 799 Human Parasitology	2
BMS 801 Host Parasite Interaction	4
BMS 802 Pathogenic Microbiology	3
BMS 804 Medical Mycology	4
BMS 808 Molecular Virology	3
BMS 809 Viral Oncology	3
BMS 812 Immunobiology	5
BMS 813 Selected Topics in Immunology	2-8
BMS 818 Infection and Immunity	3
BMS 990 Seminar	1
BMS 991 Special Topics	1-15
BMS 999 Dissertation Research	1-15

Toxicology and Environmental Chemistry

Courses in this concentration are arranged for a specific curriculum in either professional toxicology, environmental characterization and control, or environmental toxicology.

The fundamental role of chemicals in life processes is well recognized, but there is also great

concern about the impact that chemicals from biogenic, anthropogenic, or physical environmental sources have on man and all other forms of life. Scientists with qualifications in a wide range of areas are needed to solve the problems of incompatibility between life and chemicals, many of which seem essential for humans to flourish. Complex issues, such as risk-versus-benefit, must be addressed by these scientists. Examples of potentially life-threatening substances include pollutants synthesized by humans with the intention of aiding survival, such as insecticides and herbicides; chemicals arising from photochemical processes after their precursors are introduced into the atmosphere; drugs administered for therapeutic purposes or otherwise; and poisons which are normal byproducts of plant or animal metabolism. Research and service contributions will depend on individuals who are thoroughly prepared in analytical chemistry, environmental health, pathology, pharmacology, and toxicology.

BMS 735 Advanced Inorganic Chemistry	3
BMS 740 Advanced Bioanalytical Chemistry	5
BMS 879 General Pharmacology I	4
BMS 880 General Pharmacology II	5
BMS 886 General Pathology	5
BMS 887 General Toxicology I	4
BMS 888 General Toxicology II	4
BMS 890 Biotransformation and Kinetics	3
BMS 893 Methods in Environmental Toxicology	4
BMS 990 Seminar	1
BMS 991 Special Topics	1-15
BMS 999 Dissertation Research	1-15

Business and Administration

The College of Business and Administration offers degree programs leading to the Master of Business Administration (M.B.A.) and Master of Science in logistics management degrees. Each program is planned on an individual basis, taking into consideration the student's background, needs, and objectives. This allows either program to be built on undergraduate work in business, the arts, sciences, engineering, or other fields of study.

The specific aims and basic assumptions of the M.B.A. program include the following: emphasis on broad concepts and analytical tools rather than on descriptive information and techniques; development and enlargement of the individual's understanding of the economic, political, social, and technological environment of business and the responsibility of those in business to these environments; an opportunity to develop professional competence in a special field of the student's own choosing; and the provision of a foundation for continuing education and development.

An internship program is available to superior full-time M.B.A. students, to provide an opportunity to apply theoretical and analytical skills in the real business environment of a private or governmental organization. The internship is especially valuable to individuals who lack an undergraduate business education or working experience in business. Students interested in further information should contact the chair of the department in which they wish to do their internship.

The Master of Science in logistics management program offers an alternative to the traditional business degree. The program combines the study of business administration with advanced logistics courses. In an era of shrinking product life cycles, proliferating product lines, shifting distribution chains, and changing technology, mastery of logistics has become an essential ingredient of competitive success. The M.S. in logistics management program provides an excellent educational background for this purpose.

The curriculum offers an interdisciplinary approach to cover broad concepts and analytical tools. The objective is to provide a broad preparation to students for positions in acquisition, systems management, materials management, warehouse management, inventory control, distribution, and logistics planning. The program is both applied- and research-oriented and hence offers students an opportunity to achieve their varied professional and educational goals.

The curriculum approach, the program orientation, and the program emphasis on the "business" and "systems" of logistics, all combine in a degree program to support the needs of a wide range of persons such as the following:

- 1 Technical logisticians who need the management education and preparation for growth and career advancement
- 2 Individuals with an educational background (either technical or liberal) who seek both a management and a technically focused graduate program in logistics
- 3 Practicing logisticians who wish to develop a broader knowledge of the logistics fields

Programs in the College of Business and Administration are accredited by the American Assembly of Collegiate Schools of Business at both the graduate and undergraduate levels.

A chapter of Beta Gamma Sigma, the national scholastic honor society in the field of business and administration, was established by the College of Business and Administration in 1976.

The College of Business and Administration also offers a dual major program that combines the M.B.A. with a Master of Science degree in social and applied economics. See the dual major entry at the end of this section for details.

The Graduate Faculty

Accountancy

Professors

Joseph F. Castellano, financial and managerial accounting

Dean S. Eiteman, financial and managerial accounting

Nabil Hassan, managerial and financial accounting

Donald F. Pabst, financial and managerial accounting

Jacob B. Paperman (chair), auditing and accounting systems

Harper A. Roehm (coordinator), financial and managerial accounting

John C. Talbott, Jr., taxes and managerial accounting

Assistant Professor

Sonia Brecha, financial accounting and systems

Economics

For list of Department of Economics graduate faculty, see Economics.

Finance, Insurance, and Real Estate

Professors

Peter W. Bacon (chair), financial management

Lawrence J. Gitman, financial management

Waldemar M. Goulet, financial management, real estate

Nicolas Gressis, financial management, investments

Associate Professors

Khurshid Ahmad, insurance, real estate, personal finance

Charles E. Maxwell, international finance, financial institutions

Richard E. Williams, financial management, investments

Management

Professors

Michael J. Cleary, quantitative methods, computer applications, quality management

Myron K. Cox, research methodology

Charles J. Hartmann, legal environment of business, government regulation, economic analysis of law

George E. Kirk, administrative law, management

Horace W. Lanford, technical forecasting, technology assessment, research and development management, systems management, long-range planning

John V. Murray, organizational behavior, long-range forecasting, strategic management

Frank A. Stickney, strategic management, systems management, business policy, organizational behavior

Thomas J. Von der Embse, organizational behavior and design, management theory, health care management, noncognitive skills for management

Associate Professors

Gordon K. Constable, logistics management, production operations, quality, statistics

James M. Daily (chair), organizational behavior, personnel management, organization development

W. Steven Demmy, management information systems, logistics, production and inventory management

Jon R. Hobbs, logistics modeling, simulation, reliability, management information systems

Andrew W. Lai, quantitative methods for business, logistics systems, computer simulation

Herman A. Waggner, computer-based management information systems, materials management, strategic management

Marketing

Professors

Herbert E. Brown, pricing management, product management, marketing management

Peter S. Carusone, contemporary marketing issues, entrepreneurship, marketing strategy

Robert J. Kegerreis, consumer behavior, marketing management and strategy

Inder P. Khera, marketing strategy, consumer behavior, marketing communications, international marketing

M. Venkatesan (David L. Rike Professor of Marketing), consumer behavior, marketing research

Associate Professors

Beverlee B. Anderson, marketing research, consumer behavior, advertising

Thomas A. Dovel, marketing policy, marketing research

Gordon L. Wise (acting chair), retailing, consumer behavior

Assistant Professor

Wade Lancaster, channels of distribution, retailing, health services marketing, marketing management

Admission

Admission to the M.B.A. program or M.S. in logistics management program requires application to the School of Graduate Studies. All applicants must hold a baccalaureate degree from a regionally accredited institution and must submit official transcripts from all colleges attended and official scores on the Graduate Management Admission Test (GMAT—formerly the ATGSB).

Admission to either program is based on a variety of criteria including prior academic performance, test scores, intellectual capacity (including quantitative and analytical skills), preparedness for graduate study, and other factors which in the judgment of the College of Business and Administration indicate potential for successful graduate study in business administration or logistics management.

Permission to enroll in 600- and 700-level courses in the College of Business and Administration is required of all graduate students not admitted as degree candidates to the M.B.A. program, the M.S. program in logistics management, the M.S. program in social and applied economics, or a program with a formal articulation agreement with the College of Business and Administration. Nondegree and transient students as well as degree students in nonaffiliated programs seeking to enroll in 600- and 700-level courses must secure the written approval of the director of graduate programs in business and economics before submitting their registration forms. In the absence of such approval, the student's registration for those classes will not be processed. The College of Business and Administration reserves the right to cancel any improper or unauthorized registrations.

Regular Admission

A student who has met all standards for admission to the program will be admitted on a regular basis and without conditions.

Conditional Admission

Those students who do not meet the standards for regular admission but feel they are qualified for graduate work may petition the Graduate Programs Committee for conditional admission. All students must complete formal application requirements prior to petitioning. Petitions must be initiated through the School of Graduate Studies after consulting with the director of graduate programs in business and economics. Upon completing twelve credit hours of graduate course work and meeting all other admission requirements specified by the college, students who have been conditionally admitted will either be converted to regular status or refused further registration.

Nondegree in Business

Applicants who meet all requirements for regular admission but who do not wish to pursue a degree may be admitted as nondegree students. Nondegree students are expected to follow all graduate school requirements for such status. A nondegree student wishing to become a degree candidate must reapply to the admissions office and may apply only twelve credit hours of Stage II requirements toward the degree.

Degree Requirements

Stage I—Preparatory Course Work

The following information outlines the preparatory requirements for both the M.B.A. and M.S. in logistics management degree programs. The candidate should consult with an academic graduate adviser in the College of Business and Administration for further details concerning policies and programs.

All candidates must have or obtain a knowledge of fundamentals in the following areas: accountancy, business finance, business law, computing, economics, management, marketing, quantitative methods, and statistics. Students deficient in any of these areas are required to successfully complete up to thirty-three credit hours of Stage I preparatory course work. Individual courses may be waived for students who have successfully completed comparable courses at a regionally accredited institution. Waiver of preparatory course work is based on the grade received, credit hours, when the course was completed, course content, and focus. Additionally, the student may demonstrate preparation by proficiency testing. The Stage I Program of Study form must be completed by the student before he or she will be permitted to register for graduate business courses.

Stage I—Preparatory Courses	33
ACC 621, 622 Graduate Survey of Accounting I, II	6
ADM 611 Graduate Survey of Law and the Legal Environment	3
EC 621, 622 Graduate Survey in Principles of Economics	6
FIN 621 Graduate Survey in Financial Management	3
MGT 621 Graduate Survey in Management	3
MKT 621 Graduate Survey in Marketing	3
QBA 620 Graduate Survey of Mathematics for Business Research	3
QBA 621 Graduate Survey in Statistics	3
AIS 621 Introduction to Administrative Information Systems	3

M.B.A. Program of Study

Stage II—Core and Concentration Course Work (M.B.A.)

After completing appropriate Stage I preparatory courses, the student undertakes the Stage II core and concentration courses, a forty-eight hour program. Thirty credit hours of core courses are required of all candidates, including micro- and macro-economic theory; two courses in quantitative methods; a course in organizational behavior theory; one course each in the disciplines of accounting, finance, management, and marketing; and a course in administrative policy and decisions, which should be taken as the last course in the program.

Further, all students are required to select an area of concentration from accountancy, finance, financial administration, health care management, logistics management, management, management science, or marketing. A student has the flexibility to choose and structure a concentration to meet career objectives by selecting courses that together provide emphasis within an 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. Students taking graduate business courses are to follow course prerequisite requirements. Candidates for the M.B.A. degree will complete a Stage II Program of Study form, in conjunction with their assigned faculty adviser in accordance with university and college policy. The student must coordinate with an M.B.A. adviser prior to commencing Stage II core and concentration work and prior to meeting with his or her faculty adviser.

Stage II	48
Core Courses (M.B.A.)	30
QBA 723, 724 Quantitative Methods for Business Decisions I, II*	6
MGT 700 Organizational Behavior and Theory	3
EC 715 Advanced Price Theory	3
EC 717 Advanced National Income Analysis	3
ACC 741 Managerial Accounting	3
FIN 741 Financial Management	3
MGT 741 Operations Management	3
MKT 741 Marketing Strategy	3
MGT 731 Administrative Policy and Decisions**	3
Area of Concentration Courses (M.B.A.)	18
See the following for Stage II area of concentration course work (M.B.A.)	

*QBA 723 and 724 should be completed within the first eighteen hours of Stage II work.

**MGT 731 should be taken after all other core courses are completed, preferably during the last quarter of the program.

Stage II—Areas of Concentration Course Work (M.B.A.)

Accountancy	18-30
Required Concentration Courses	6-18
All students must take or have taken the undergraduate equivalent of the following courses:	
ACC 711, 712, 713 Financial Accounting I, II, III	9
ACC 721 Federal Income Tax Accounting	3
ACC 722 Auditing	3
ACC 723 Accounting Systems	3
Concentration Electives (Accountancy)	6-12

Concentration Electives (Nonaccountancy) 6

Note: The Accountancy Board of Ohio requires those who take the CPA exam to have completed thirty-six quarter hours of accountancy or its equivalent; however, there are some exceptions. A graduate with a concentration in accountancy will have completed at least thirty-three of these hours. Students with less than thirty-six hours who plan to take the exam should communicate with the accountancy board to confirm their eligibility. A graduate will be eligible to take the CMA (Certificate in Management Accounting) exam.

Finance	18
Required Concentration Courses	12
FIN 702 Financial Institutions Seminar	3
FIN 710 Investment Management	3
FIN 742 Financial Management II	3
Another 700-level finance course	3

Concentration Electives 6
Three of the six hours must be business courses, but none may be finance courses.

Financial Administration	18
Required Concentration Courses	12
FIN 742 Financial Management II	3
FIN 743 Seminar in Financial Management	3
ACC 711, 712 Financial Accounting Concepts I, II	6

Concentration Electives 6
Accounting seminar course 3
Finance seminar course 3

Health Care Management	18
Required Concentration Courses	12
EC 755 Economics of Health and Health Policy	3
FIN 750 The Financial Management of Health Service Organizations	3
MGT 755 Health Care Management	3
Medicine in Society*	3

Concentration Electives 6
Three of the six hours must be business courses.

*Contact the College of Business and Administration regarding arrangements for enrollment in this course.

Logistics Management	18
Required Concentration Courses	12
MKT 713 Logistics Systems	3
QBA 764 Seminar in Logistics Design	3
Two courses from the following:	
ACC 752; MGT 750, 751, 752, 761; QBA 652	6
Concentration Electives	6
Two three-hour business economics or nonbusiness graduate courses must be selected.	

Management 18**Required Concentration Courses** 6-12

The management concentration is highly flexible. The overall requirement is that the student take 6-12 hours of management courses.

Concentration Electives 6-12

Six hours must be nonmanagement business courses.

Sample Management Curricula

Personnel/Organizational Behavior
MGT 703, 705, 706, 753B, 753D, 753E
Productions/Operations
MGT 751, 752, 753A, 761, 763
Systems/Research and Development Management
MGT 711, 714, 753C, 763

A student may choose a specific program as illustrated or follow a program that suits individual or organizational needs.

Management Science 18

A total of six courses must be selected from the two groups below.

Required Concentration Courses 9-12

Three to four courses from the following:
QBA 652, 725, 726, 729, 753, 764, 781

Concentration Electives 6-9

Two to three courses from the following:
ACC 752; EC 609, 612, 780; MGT 751, 752, 753A;
MKT 707, 713

Marketing 18**Required Concentration Courses** 12

MKT 707 Marketing Research and Analysis 3
Three additional 600- or 700-level marketing courses chosen, based on the student's career objectives* 9

Concentration Electives 6

Must be nonmarketing business courses

*Examples of career objectives include sales management, international marketing, advertising, entrepreneurship, marketing research, consumer marketing management, industrial marketing management, and logistics.

Dual Major with Economics

Students may obtain both the Master of Business Administration degree and the Master of Science degree in social and applied economics under the dual major program, which permits common course work to apply to both programs. Students who complete the M.B.A. degree at Wright State may transfer up to eighteen hours to apply to the requirements of the M.S. program, as long as all M.S. program courses are completed within the time limit set for completion of graduate degree programs. This policy does not apply to students

who receive M.B.A. degrees from schools other than Wright State. For further information, contact the director of graduate programs in business and economics.

Master of Science in Logistics Management Program of Study**Stage II—Core and Concentration Course Work (M.S.)**

The following outlines the requirements for the M.S. in logistics management degree. The candidate should consult the program adviser for further details concerning policies and programs.

The program for the M.S. in logistics management requires the completion of forty-eight credit hours of Stage II work. Stage I courses that are required may be completed prior to or during the first fifteen credit hours in the Stage II program.

Students taking graduate business courses are expected to follow course prerequisite requirements. Candidates must complete a Stage II Program of Study form with their assigned faculty adviser in accordance with university and college policy. The student must coordinate with a graduate adviser prior to commencing Stage II core and concentration work and prior to meeting with his or her faculty adviser.

Of the forty-eight credit hours required for Stage II curriculum, twenty-four hours are core courses, eighteen hours are required concentration courses (including thesis), and six hours are concentration electives.

Stage II 48**Core Courses (M.S.)** 24

QBA 723, 724 Quantitative Methods for Business Decisions I, II 6
QBA 726 Applications of Management Science 3
MGT 700 Organizational Behavior and Theory 3
MGT 741 Operations Management 3
MGT 751 Production and Inventory Management 3
ACC 741 Managerial Accounting 3
ACC 752 Business Information Systems 3

Area of Concentration Courses (M.S.) 24**Stage II—Area of Concentration Course Work (M.S.)****Concentration Courses** 24**Required Concentration Courses** 18

QBA 764 Seminar in Logistics Design 3
AIS 740 Administrative Information Systems, Analysis, and Design 3
MKT 713 Logistics Systems 3
MGT 750 Materials Management 3
MGT 799 Thesis 6

Concentration Electives

Select two of the following:

QBA 652 Systems Simulation in Business
and Economics

MGT 752 Quality Assurance

MGT 763 Systems Management

ACC 753 International Accounting

6

Admission

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 graduate degree requirements.

3

3

3

3

Cartography, Photogrammetry, and Remote Sensing

Contact the Department of Geography for information about these certificate programs.

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

Sue C. Cummings, inorganic and bioinorganic chemistry

M. Paul Servé, organic and medicinal chemistry

Paul G. Seybold, physical and biophysical chemistry

Thomas O. Tiernan, physical, analytical, and environmental chemistry

Associate Professors

William A. Feld, organic and polymer chemistry

John J. Fortman, inorganic chemistry and chemical education

Subrata Ghosh (WOBC), organic natural products, and polymer chemistry

George G. Hess (chair), organic, analytical, and polymer chemistry

James J. Kane, organic and polymer chemistry

Vladimir Katovic, analytical, inorganic, and environmental chemistry

Adjunct Associate Professor

Richard L. C. Wu, physical chemistry

Research Associate Professor

Michael L. Taylor, medicinal and analytical chemistry

Assistant Professor

Kenneth Turnbull, organic chemistry

Degree Requirements

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

Courses

The candidate for the Master of Science degree must complete thirty credit hours of course work in chemistry and related fields, including designated chemistry core courses. 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 residency 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.

Thesis

The candidate must enroll in CHM 899 (thesis research) under the supervision of an adviser approved by the advisory committee. An acceptable thesis based on a minimum of fifteen credit hours of laboratory or theoretical research (CHM 899) must be submitted to an examining committee (chaired by the candidate's adviser and selected by the adviser and the department chair). The thesis must be

submitted in final form by the candidate no later than six months following the last quarter of enrollment in CHM 899. Four copies of the final draft of the thesis must be submitted to the committee and the department chair 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 chair.

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 an 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.

Classroom Teacher

See Education and Human Services

Computer Engineering

The Department of Computer Science offers a program of graduate study leading to the Master of Science in Computer Engineering degree. The program emphasizes the theory and applications of both hardware and software. Particular strengths lie with the unique faculty expertise and with the extensive computer engineering laboratories. Classes are offered in the late afternoon and evening to serve the educational needs of practicing professionals.

The Graduate Faculty

Professors

James E. Brandeberry, digital electronics, microprocessors, system theory

Larry A. Crum (chair), microprocessors, distributed computing systems, computer hardware design, computer communications

Henry W. Davis, artificial intelligence

Robert D. Dixon, software design, real-time systems, computer organization

Krishan K. Gorowara, numerical analysis, statistics, computer graphics

Jerrold S. Petrofsky, bioengineering, computers in rehabilitation engineering

Associate Professors

Richard J. Bethke, biomedical engineering, signal analysis, stochastic processes

Joseph Kohler, compilers, software design, programming languages, microprocessor software and hardware

William S. McCormick, communication theory, process control, bio-instrumentation, electro-optics

Kuldip S. Rattan, digital control systems, robotics, computer-aided design, microprocessors

Charles B. Ross, digital systems design, data communications

Alton F. Sanders, artificial intelligence, programming languages, operating systems

Admission

A student may be admitted to the Master of Science in Computer Engineering with a baccalaureate degree in computer engineering or a related area, 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 data structures, real-time programming, operating systems, computer organization, computer systems design, and electronics. It may, however, be possible to make up minor deficiencies after admission to the program by taking additional courses.

Facilities

The program is supported by an IBM 370/3083 and a DEC VAX 11/785 with both remote batch and interactive terminals. The program has laboratories which support studies in artificial intelligence, real-time programming, control/robotics, digital communications, graphics, operating systems, computer-aided design, and digital design. The laboratories are furnished with numerous minicomputers, microprocessors, and modern electronics test and development equipment.

Research

Current research projects include applications of robotics, artificial intelligence, design of local networks, distributed networks, computer controls; VLSI design, and interactive graphics. Recent and current sources of research support include federal agencies, military agencies, and local industries.

Thesis research could be related to one of the ongoing research projects or some other problem of mutual interest to the student and a faculty member.

Research at Wright State University is not limited to on-campus laboratory facilities. Several industrial 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.

Degree Requirements

The requirements for the Master of Science in Computer Engineering degree are a department-approved program which must include the following:

1. Completion of a minimum of forty-five graduate credit hours in an approved program of study.

- 2 Completion of at least twenty-two credit hours of nonthesis credit in courses available to graduate students only (700-800 level courses).
- 3 Completion of the following core courses:
CS 730 Systems Programming
CEG 720 Computer Architecture
CEG 750 Microprocessors
EGR 649 Pulse and Digital Circuits
EGR 701 Linear Systems I
- 4 Completion of a concentration of courses in a computer engineering area or a closely related area.
- 5 Satisfactory completion of a thesis. The level of sophistication must be approximately that expected of a computer engineering professional in an area in which the student is seeking preparation. The student will be examined orally by a committee concerning the thesis.
- 6 Completion of a maximum of ten credit hours of CEG 700, 795, and 799, which may be counted toward the forty-five credit hours required for the degree.

Computer Science

The Department of Computer Science offers a program of graduate study leading to the Master of Science degree. The program permits concentration of study in specific areas of computer science as resources exist. Strength lies in the unique blend of faculty expertise, in the program's marriage of theory, hardware, and software, and the program's laboratory facilities. Classes are offered in the late afternoon to serve the educational needs of practicing computer professionals.

The Graduate Faculty

Professors

James E. Brandeberry, digital electronics, microprocessors, system theory

Larry A. Crum (chair), microprocessors, distributed computing systems, computer hardware design, computer communications

Henry W. Davis, artificial intelligence

Robert D. Dixon, software design, real-time systems, computer organization

Jerrold S. Petrofsky, bioengineering, computers in rehabilitation engineering

Donald J. Schaefer, operating systems, numerical analysis, computer center operations

Associate Professors

Joseph Kohler, compilers, software design, programming languages, microprocessor software and hardware

Kuldip S. Rattan, digital control systems, robotics, computer-aided design, microprocessors

Charles B. Ross, digital systems design, data communications

Alton F. Sanders, artificial intelligence, programming languages, operating systems

Assistant Professor

Thomas A. Sudkamp, intelligent systems, automated reasoning, mathematical logic

Admission

A student may be admitted to the Master of Science program in computer science with a baccalaureate degree in computer science or a related area and appropriate experience 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 a higher-level language, data structures, real-time programming, computer organization, and operating systems; however, it may be possible to make up minor deficiencies after admission to the program by taking additional courses.

Facilities

The program is supported by an IBM 370/3083 and a DEC VAX 11/785 with both remote batch and interactive terminals. The department has laboratories which support studies in artificial intelligence, real-time programming, control systems, digital communications, graphics, and operating systems. The laboratories are furnished with numerous minicomputers, microprocessors, and modern electronics test and development equipment.

Research

Current research projects include applications of artificial intelligence, functional programming, design of local networks, interactive graphics, computer-interpreted semantics, distributed systems, and computer performance evaluation. Recent and current sources of research support include federal agencies and military agencies and local industries.

Thesis research could be related to one of the ongoing research projects or some other problem of mutual interest to the student and a faculty member.

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

Degree Requirements

Requirements for the Master of Science degree are as follows:

- 1 Completion of a minimum of forty-eight graduate credit hours in an approved program of study.
- 2 Completion of at least twenty-four credit hours of nonthesis credit in courses available to graduate students only (700-800 level courses).
- 3 Completion of four credit hours minimum from each of four specified categories:
 - A Programming Languages (principles of programming languages, compilers, software design, proving programs correct, formal semantics): CS 680, 780, 781, 784, 785
 - B Systems (operating systems, performance evaluation, architecture, microcomputers, communications, real-time systems): CS 730, 731; CEG 621, 720, 721, 750, 751
 - C Theory (formal languages, theory of computation, combinatorics, graph theory, algorithms, numerical analysis): CS 610, 658, 666, 716, 717, 718, 740, 741
 - D Applications (databases, artificial intelligence, simulation, graphics, pattern recognition, management of software systems): CS 605, 607, 670, 701, 710, 711, 735; CEG 676, 677
- 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.
- 5 Completion of a maximum of nine credit hours of CS 799 and three hours of CS 700, which may be counted toward the forty-eight credit hours required for the degree.

Counseling, School

See Education and Human Services

Curriculum and Supervision

See Education and Human Services

Earth Science

See Geological Sciences

Economic Education

The Center for Economic Education offers courses designed for the special needs of kindergarten through twelfth grade teachers and

administrators. Each course helps participants develop understanding of economics principles and concepts and demonstrates materials and methods useful in teaching the K-12 curricula. Participants are challenged to develop teaching units for their classrooms or schools.

Although graduate credit is awarded for these courses, this credit may not be applied toward the M.B.A. or M.S. in social and applied economics degrees.

Economics

The Department of Economics offers a professionally oriented and multidisciplinary graduate program that 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 that exists between research and the application of research in developing public policies for the solution of contemporary economic and social problems. Students are encouraged to develop and evaluate new approaches to problem solving in our society. Research and field experience are stressed.

The Graduate Faculty

Professors

John P. Blair (chair), urban and regional economics, economic policy

Mark Z. Fabrycy, economic theory, econometrics, applied economics, forecasting

Rishi Kumar, international economics, economics of development, comparative economic systems, economic theory, monetary and fiscal policy

Robert Premus, regional-urban economics, public finance, economic theory, monetary economics

Stephen M. Renas, cost-benefit analysis and public project evaluation, macroeconomics, monetary theory, environmental economics, financial institutions and markets

John J. Treacy, economic theory, public finance, socioeconomic data bases

Associate Professors

Charles H. Blake, Jr., political economy, human resources, and collective bargaining

Rudy Fichtenbaum, labor economics, macroeconomics, health economics

James A. Swaney, history of economic thought, methodology, environmental and resource economics

Assistant Professor

Tran Dung, microeconomics, international economics, physical economics

Admission

An application 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 General Test is required.

Application forms for admission and for the Graduate Record Examination are available in the office of the chair of the Department of Economics or from the School of Graduate Studies. Both full-time and part-time students are accepted for admission to the program.

Financial Assistance

Financial assistance is available through the School of Graduate Studies and the Department of Economics. Research graduate assistantships permit students to work with the faculty on both applied and theoretical research projects. Paid internships also provide financial support for graduate students.

Degree Requirements

Candidates for the Master of Science degree in social and applied economics must successfully complete a minimum of forty-eight credit hours in courses numbered 600 or above, exclusive of prerequisite survey courses. Of the total forty-eight hours, thirty-nine must be taken in the department (twenty-seven credit hours of courses plus twelve credit hours of internship). Students must achieve a cumulative grade point average of 3.0 in all graduate courses exclusive of the internship, which requires a grade of pass. 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.

As many as twelve graduate credit hours may be transferred into the M.S. program in social and applied economics by petition to the Graduate Studies Committee in the Department of Economics and subject to approval by the School of Graduate Studies.

All candidates are required to complete an internship. Prior to the internship, the student should have completed a minimum of twenty-four credit hours (including QBA 723 and EC 609). 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 from the director of graduate programs in business and economics.

Prerequisites

The student does not need to have earned a bachelor's degree in economics prior to entering the program; however, basic courses in economics principles, introductory statistics, and calculus are minimum requirements. Students who have not had these courses or their equivalent should complete them before entering the program. Upon approval of the Graduate Studies Committee of the Department of Economics, a student may make up deficiencies in program prerequisites after admission to the program but before taking courses requiring these specific prerequisites. The following survey courses have been designed to meet the program prerequisites: QBA 620 (for calculus), QBA 621 (for statistics), and EC 621 and 622 (for principles of micro-and macroeconomics).

Program of Study

Any modification of the following program requirements requires petition approval by the department, college, and university graduate studies committees.

Required Courses	36
EC 715 Advanced Price Theory	3
EC 717 Advanced National Income Analysis	3
EC 721 Contemporary Political Economy	3
EC 725 Economic and Social Systems I	3
QBA 723 Quantitative Methods for Business Decisions I	3
EC 609 Applied Econometrics	3
EC 780 Economic Problems Seminars	6
EC 760 Internship*	12
Electives	12
Economics	6-12
Noneconomics	0-6
Total	48

*The student may serve the internship with a private or public institution, participate in a faculty research project, or, with the approval of the department, develop an individual field research project.

Dual Major with M.B.A.

Students may obtain both the Master of Business Administration degree and the Master of Science degree in social and applied economics under the dual major program, which permits common course work to apply to both programs. Students who complete the M.B.A. degree at Wright State may transfer up to eighteen hours to apply to the requirements of the M.S. program, as long as all M.S. program courses are completed within the time limit set for completion of graduate degree programs. This policy does not apply to students who receive M.B.A. degrees from schools other than Wright State. For further information, contact the director of graduate programs in business and economics.

Education and Human Services

The College of Education and Human Services offers programs leading to graduate degrees in the following areas: art therapy (M.A.T.); educational leadership, with programs in curriculum and supervision (M.A., M.Ed.) and school administration (M.A., M.Ed.); human services with programs in counseling (M.A., M.S.), rehabilitation counseling (M.R.C.), and student personnel services (M.A., M.S., M.Ed.); and teacher education, with a classroom teacher program (M.A., M.Ed.) that includes a variety of concentrations in elementary, middle school, and secondary education, and specialized areas in K-12 such as art, physical education, reading, and special education. Concentrations in these programs are listed in the graduate programs section in the first chapter and are described in detail in the following pages.

Wright State also offers a post-master's degree program leading to the education specialist (Ed.S.) degree. In addition, Wright State has cooperative arrangements with Indiana University for students to earn an Ed.D. degree in school administration and counselor education, and with Bowling Green State University for the Ph.D. in educational administration and supervision.

The Graduate Faculty

Professors

- Oris E. Amos, special education
- Gary C. Barlow, art therapy, art education
- Carl V. Benner, mathematics education
- Marlene Bireley, school psychology, special education
- William Brown, evaluation, educational psychology
- Beatrice F. Chait (Emerita), elementary education, language arts, reading
- William E. Collie, social studies education
- James A. Dillehay, educational administration, statistics/research
- Robert D. Earl, science education
- Diane E. Frey, counselor education
- Glenn T. Graham, education statistics/research
- Mary Harbage (Emerita), language arts, reading
- Lilburn Hoehn, curriculum, supervision
- Wesley Huckins (Emeritus), counselor education
- Roger G. Iddings, science education
- Robert Medcalf, educational administration
- L. Tyrone Payne, educational psychology
- Lewis K. Shupe, art therapy
- Harold Silverman, counselor education

Ralph E. Stuckman, educational administration, curriculum

James K. Uphoff, social studies education, curriculum, supervision

Mary Lou White, children's literature, language arts

Associate Professors

- Gregory R. Bernhardt, counselor education
- Larry L. Chance, reading, language arts
- Robert L. Clark, educational foundations
- Doris E. Dittmar, early childhood education
- S. Joseph Emanuel, Jr., counselor education
- Harry Ertel (Emeritus), business education
- Stephen D. Frederick, physical education
- T. Stevenson Hansell, reading, language arts
- Larry D. Isaacs, physical education
- Mary Ann Jones, counselor education
- Mary F. Landes, special education
- Bonnie K. Mathies, library and communication science
- R. A. Pendergrass, curriculum, supervision
- Vincent Presno, curriculum
- Ruth B. Schumacher, educational psychology, counselor education
- Gerald P. Sturm, curriculum, supervision
- Alice K. Swinger, language arts
- Barbara F. Tea, teacher education
- Dorothy R. Winkeljohn, science education
- Joseph A. Young, curriculum, supervision

Adjunct Associate Professor

Darold Engebretson, counselor education

Assistant Professors

- Jan La Forge, rehabilitation counseling
- Alyce Jenkins, rehabilitation education
- Eileen F. Self, counselor education

Admission

In addition to meeting the requirements for admission as established by the School of Graduate Studies, candidates for these degrees must submit satisfactory Graduate Record Examination (GRE) or Miller Analogies Test (MAT) scores.

Any student considering graduate level courses in education and human services 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 a student is not guaranteed a master's degree by attending and completing courses, as exit requirements must be met in all programs.

Procedures for admission to the College of Education and Human Services are determined by the candidate's written statement of purpose and

undergraduate cumulative grade point average and the submission of satisfactory scores on either the MAT or the aptitude portion of the GRE. (Grade point averages are based on a 4.0 grading system.) Candidates with an average of less than 2.3 are not admitted to graduate school.

Conditional

A student who has an undergraduate grade point average of 2.5 or better, or who has an average between 2.3 and 2.5 with 2.7 or better in the last half of undergraduate work, is granted conditional admission.

After successful completion of core course work with a grade of B or better in each course, regular admission to the College of Education and Human Services is granted.

Unclassified Undergraduate

Under this alternative admission procedure, students must complete twelve credit hours of upper-level undergraduate courses approved in advance by the college's Office of Student Services. These undergraduate courses will not apply toward work for the master's degree. After completing the twelve hours with a grade of B or better in each course, students are admitted to the nondegree category.

Certification Candidate

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

Special Status

Persons who have a bachelor's degree may enroll in certain workshop courses for graduate credit without being admitted to a graduate program. Only a limited number of such credits may be applied later to a degree program if they are appropriate.

Degree Requirements

Master of Arts

The Master of Arts in education may be obtained in almost all of the programs offered by the College of Education and Human Services. This is a thesis degree, consisting of a minimum of forty-five credit hours, including nine hours of thesis credit.

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.

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.

Master of Art Therapy

The Master of Art Therapy (M.A.T.) program offers course work and clinical/internship experiences for the person preparing to become an art therapist.

Students gain experience in this health-related profession by working in both on- and off-campus settings with clients who have emotional, motor, and perceptual problems or other dysfunctions. Emphasis is placed in the expressive, learning, and adjustive aspects of art therapy.

Admission requirements include three letters of recommendation, an interview, and a portfolio of art work. Additional information may be obtained from the office of the art therapy program coordinator.

In the M.A.T. program, the student has a choice of four program exit options; a thesis, a project, a comprehensive examination, or extended clinical hours. A minimum of 600 clinical hours is included in the M.A.T. program.

Master of Education

The Master of Education (M.Ed.) 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 education concurrently with the master's degree. Such programs are individualized and must be approved by the College of Education and Human Services.

A program of concurrent degree and certification work 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 M.Ed. degree may be obtained by following one of two patterns: either by completing (a) a minimum of forty-eight credit hours of course work, or (b) a minimum of forty credit hours of course work, plus five credit hours of a research project. 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.

Each graduate degree student will be assigned an adviser upon admission to the college. 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.

Master of Science

The Master of Science (M.S.) degree in counseling and guidance offers concentrations in six specialties: mental health counseling, business and industrial counseling, gerontological counseling, marriage and family counseling, counseling exceptional children, and student personnel services in higher education.

The Master of Science degree may be obtained by following one of two patterns: either by completing (a) a minimum of sixty credit hours of course work, or (b) a minimum of fifty credit hours plus five hours of a research project.

Each graduate degree student will be assigned an adviser upon admission to the college. 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 candidacy.

Master of Rehabilitation Counseling

The Master of Rehabilitation Counseling (M.R.C.) program offers training and course work designed to develop skills in the holistic counseling process. The program prepares students for work within a wide variety of settings and the student may choose to specialize in either the rehabilitation of the severely disabled or the rehabilitation of the chemically dependent. Students who choose the rehabilitation of the severely disabled concentration may elect to do an internship with a special population for intensive study.

Educational Specialist

The Educational Specialist (Ed.S.) program is an advanced (post-master's) degree program in educational leadership for individuals who have career interests in superintendency or central office administration.

Final Evaluation for 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 in the M.Ed. and M.S. programs, the final evaluation varies according to the program. Final evaluation processes and procedures for specific programs may be obtained either in the college's Office of Student Services or from the program coordinator. M.R.C. students must have a minimum of a B grade in their internship and complete an end of program project.

Should the student fail to pass the final evaluation, 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

increased. Students may retake all or any part of the final evaluation a maximum of three times.

Thesis and/or Project Procedures

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

- 1 Complete ED 751 and ED 752.
- 2 Prepare a preliminary thesis or project proposal following the college outline for proposals. This proposal is to be developed with the assistance of the faculty adviser.
- 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 style manuals of the College of Education and Human Services and School of Graduate Studies, of the final project or thesis to the college's Office of Student Services. The outline for thesis and project proposals may be obtained from the college's Office of Student Services.

Educational Specialist Degree

Major Nos. 298 and 299

Wright State University offers an advanced program leading to the Educational Specialist degree (Ed.S.) in the area of educational leadership for individuals who have career interests in superintendency or central office administration. The Ed.S. degree is a terminal degree for educators preparing for positions requiring a higher level of competence and specialization than that of the master's degree. The degree is an intermediate degree between the M.Ed. and the Ph.D. Selected Ed.S. students may transfer course work to doctoral programs that are offered cooperatively with Bowling Green State University and Indiana University.

Purpose

The growing complexity of the educational enterprise has created a need for persons with additional training for public and private schools, federally and state-funded programs, and private foundations. This Ed.S. program is designed to enhance the individual capabilities for leadership in the roles of superintendents, assistant

superintendents, supervisors, and principals. The program emphasizes the achievement of competence in such concepts as leadership, institutional change, decision making, organizational structure and theory, and communication processes. Further, the program focuses upon the development of broad understanding and experiences across the professional field, the acquisition of in-depth knowledge in one specific area of educational leadership, the acquisition of concepts from related fields of knowledge, and a planned field experience which will integrate the concepts, skills, and attitudes acquired in formal course settings.

Program

The planned program of study will be individually arranged and will consist of a minimum of forty-five quarter hours of graduate work beyond the master's degree.

Required Courses	39
ED 871 Management of the School	3
ED 872 Staff Personnel Administration	3
ED 873 Pupil Personnel Administration	3
ED 874 School Business Management and Facilities	3
ED 971 Superintendent/Staff/Board Relationships	3
ED 972 Ideas in Education	3
ED 986 Organizations as Social Systems	3
ED 987 Administrative Leadership Skills	3
ED 899 Thesis	3
ED 991 Advanced Seminar in Educational Leadership	3
ED 974 Seminar in Educational Leadership	3
ED 890 Administrative Practicum	3
ED 988 Research and the Educational Leader	3
Cognates/Electives	6
Total	45

Note: This is a sample program appropriate for those who want the Ed.S. degree and the Ohio Superintendent's certificate (major no. 299). Those who fall into one of the following three categories must complete a different program:

- 1 Those who desire enrollment in the cooperative doctoral program with Bowling Green State University.
- 2 Those who desire a curriculum and instruction concentration (major no. 298).
- 3 Those who have not completed prerequisites in educational administration.

Classroom Teacher Program

The classroom teacher program leads to a Master of Education degree for individuals who are qualified for a provisional teacher certificate, or a Master of Arts degree for persons who plan to do research and a thesis. The purpose of this program

is to enhance the effectiveness of the teacher through the development of new skills and the enrichment of existing skills, to add to content knowledge in the teacher's teaching fields, or, in some cases, to add new certification areas.

The classroom teacher program consists of sixteen concentrations: art; business; certification, elementary; certification, secondary; early childhood; general; physical education (HPR); international literature for children and young people; mathematics; reading; retraining; science; special education—children and youth with multiple impairments (MSPR); special education—learning disabilities and/or behavior disorders (LD/BD); special education—developmentally handicapped (DH); and special education—gifted.

Classroom Teacher: International Literature for Children and Young People Major No. 245

This major is designed to extend knowledge of international literature for children and young people, to build skills of scholarship, and to develop a global perspective toward children and books. The courses are planned for teachers, school media specialists, and other students interested in a strong literary program. Graduates will be prepared to teach literature-based programs in elementary and secondary schools, to work in trade book publishing, to do certain aspects of library service, to serve as literary critics, and to participate internationally in the field of literature for children and young people.

Core Requirements	12
ED 751 Educational Statistics and Research	5
ED 747 Leadership for School Improvement	4
ED 711 Foundations of International Education	3
Professional Requirements	11-12
ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4
ED 721 Children's Literature or LCS 663 Adolescent Literature	3-4
Program Concentration	15
ED 810/820 Seminar in Elementary/Secondary Education	3
ED 739 Cultural Studies in Literature for Children and Young People (changing subtitles)	3
ED 748 Teaching Literature to Children and Young People	3
ED 737 Survey of World Literature for Children and Young People	3
ED 745 Genre Studies in International Literature for Children and Young People (changing subtitles)	3
Electives	9-10
Total	48-49

Classroom Teacher: Business Major No. 248

Core Requirements	13
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership Skills for School Improvement	4
ED 751 Educational Statistics and Research*	5
Professional Requirements	11
ED 734 Analysis of Teaching	4
LCS 649 Introduction to Instructional Media	3
ED 820 Seminar in Secondary Education: Business Education***	4
Program Concentration	24-29

Business Education Core:

ECO 500 Consumer Economics for K-12 Teachers	3
ED 724 Foundations of Business Education*	3
ED 824 Curriculum for Vocational Business Education**	3

Five courses to be selected from the following:

ED 606 Survey of Vocational Education*	3
ED 607 Cooperative Office Education*	3
ED 608 Intensive Office Education*	3
ED 633 Business Education Curriculum and Materials: Basic Business Subjects	4
ED 634 Business Education Curriculum and Materials: Typing and Office Procedures	3
ED 635 Business Education Curriculum and Materials: Shorthand and Transcription	4
ED 725 Administration and Supervision in Vocational Business Education**	3
ED 726 Adult Programs in Vocational Business Education*	3
ED 727 Teaching Strategies and Curriculum Trends in Nonskilled Business Education Subjects	3
ED 729 Teaching Strategies and Curriculum Trends in Accounting and Data Processing	3
ED 730 Teaching Strategies and Curriculum Trends in the Skilled Business Education Subjects	3
ED 825 Facilities and Management of Vocational Business Education*	3
ED 826 Coordination Techniques for Vocational Business Education*	3
ED 827 Evaluation of Vocational Business Education*	3
ED 828 Teaching Strategies and Equipment Adaptations for the Disadvantaged and Handicapped Student in Business Education*	3

LCS 685 Computers for Educators	3
LCS 686 Applications of Computers in Education	3
LCS 687 Introduction to BASIC for Educators	4

Total **48-53**

*Courses are approved for business and office education supervisor's certificate.

**Courses are required for business and office education supervisor's certificate.

***Required of all master's degree students; to be taken toward the end of the program.

Classroom Teacher: Art Major No. 250

The classroom teacher program in art may be used to enhance leadership or studio skills for improvement of classroom teaching. This program may also prepare students for instructional roles in museums and other nonschool settings.

Core Requirements **13**

To be taken in any sequence during the first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5

Professional Requirements **11-12**

ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4

One of the following:

ED 710 Classroom Strategies for Atypical Populations	4
ED 784 Legal and Professional Issues	4
LCS 649 Introduction to Instructional Technology	3

Program Concentration **23-24**

AED 731 Theories and Philosophies in Art Education	4
AED 752 Research in Art Education	4

15-16 hours selected by student and adviser from the following:

AED 623 Fibers and Fabrics	4
AED 624 Weaving	4
AED 625 Textiles	4
AED 626 Creative Stitchery	4
AED 636 Minor Problems in Art Education	1-4
AED 637 Minor Problems in Art Education	1-4
AED 641 Art Appreciation and Criticism in the Schools	4
AED 642 Advanced Problems in Art Education	3
AED 643 Architectural and Environmental Awareness	4
AED 770 Independent Study	1-3

Total **48-49**

Classroom Teacher: Early Childhood Major No. 251

Early childhood education at Wright State University focuses on experiences with young children and the production and use of creative resources for teaching. Early childhood education students interact with children, and the emphasis is on individualization of instruction and a variety of materials and experiences for multicultural/multi-ethnic children. Students are trained for employment in industrial, business, parochial, private, and public programs.

Core Requirements	13
To be taken in any sequence during the first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5
Professional Requirements	11
ED 734 Analysis of Teaching	4
ED 710 Classroom Strategies for Atypical Populations	4
ED 810 Seminar in Education: Early Childhood	3
Program Electives	24
Selected from the following:	
ED 609 Early Childhood Curriculum and Materials: Sociocultural	4
ED 611 Early Childhood Education*	4
ED 612 Kindergarten: Curriculum and Materials*	4
ED 614 Early Childhood Education Curriculum and Materials: Language	4
ED 658 Practicum in Education	3-6
ED 670 Curriculum and Instruction Workshop	3-6
ED 713 Working with Parents of Young Children	3
ED 714 Creativity and Self-Concept of the Young Child	3
ED 715 Role of Administrator in Early Childhood Education	3
ED 717 Early Childhood Curriculum and Materials: Mathematics and Science Readiness	3
ED 770 Independent Reading and Minor Problems	3
Total	48

*An elementary teacher's certificate may be validated for kindergarten teaching following successful completion of ED 613 and either ED 611 or ED 614.

Classroom Teacher: General Major No. 252

The general classroom teacher program is designed for elementary and secondary teachers

who desire additional preparation in a field or area not offering a specialized program or certificate. This program offers a more flexible option for highly motivated persons who seek a master's degree with a specific professional objective, such as additional course work to update knowledge or skills in the content field. Twelve hours may be taken either in advanced professional studies or in courses offered outside the College of Education and Human Services in a teaching discipline.

Core Requirements	13
To be taken in any sequence during the first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5
Professional Requirements	23
ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4
ED 710 Classroom Strategies for Atypical Populations	4
ED 784 Legal and Professional Issues	4
LCS 649 Introduction to Instructional Media	3
ED 820 Seminar in Secondary Education*	4
Program Electives	12
Twelve hours to be chosen by student and adviser. Electives may be selected from courses offered by the College of Education and Human Services or one of the other colleges offering appropriate graduate courses. For example, courses may be chosen in the areas of English, math, religion, science, social studies, student learning and behavior, or other special-interest teaching fields.	
Total	48

*To be taken near the end of the program

Classroom Teacher: Reading Major No. 255

The reading program is designed to aid the classroom teacher in helping students improve reading and thinking skills. The program leads to a validation of a standard elementary certificate for a K-12 reading teacher. Opportunities for graduates of this program include classroom teaching, tutoring in a variety of settings, and work in training departments in business and industry.

This major could also lead to supervisory positions for the coordination and improvement of school or district-wide reading programs. Upon completion of this program, an additional course (ED 776, Supervision of Instruction and Personnel, 3 credit hours), and evidence of at least twenty-seven months of successful classroom teaching experience under a standard teacher's certificate, a person may qualify for an Ohio provisional reading supervisor's certificate.

Core Requirements	13
To be taken in any sequence during the first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership Skills for School Improvement	4
ED 751 Educational Statistics and Research	5
Professional Requirements	12
ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4
ED 716 Advanced Reading Instruction	4
Program Concentration	18-19
ED 721 Literature for Elementary Children or LCS 663 Adolescent Literature	
ED 654 Administration and Interpretation of Educational Data	3-4
ED 656 Clinical Practice in Remediation	3
ED 815 Teaching Children to Write	3
ED 832 Diagnosing and Correcting Secondary Reading Problems	3
ED 810 Seminar in Elementary Education: Reading	3
Electives	4-5
Total	48-49

Classroom Teacher: Retraining Major No. 256

The Division of Teacher Education offers a concentration that enables the holder of a provisional, professional, or permanent high school or special teacher's certificate to meet the state of Ohio requirements for obtaining a retraining certificate. The retraining certificate is valid for only four years and can be made standard upon completion of all the areas necessary for certification in elementary education. If interested in this certification, please see the teacher certification adviser for an evaluation and a prescribed outline of courses.

Retraining Certificate	12
ED 603 Child Development*	3
ED 615 Improvement of Elementary Reading Instruction*	3
ED 637 Elementary School Mathematics: Curriculum and Materials*	3
ED 663 Teaching Skills and Strategies	3
Core Requirements	13
To be taken in any sequence within first twenty-four hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5

Professional Requirements	23
ED 710 Classroom Strategies for Atypical Populations	4
ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4
ED 784 Legal and Professional Issues	4
ED 820 Seminar in Secondary Education	4
LCS 649 Introduction to Instructional Media	3
Total	48

*Meets state standards for retraining certificate

Classroom Teacher: Special Education Developmentally Handicapped (DH) Major No. 257

This program leads to certification in developmentally handicapped education for the holder of an elementary education teaching certificate. Persons who do not hold an elementary education teaching certificate should check with the teacher certification adviser in the Office of Student Services for the necessary prerequisites before beginning this program.

Core Requirements	13
To be taken in any sequence within first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5
Professional Requirements	10
ED 734 Analysis of Teaching	4
LCS 649 Introduction to Instructional Media or LCS 685 Computers for Educators	3
ED 850 Seminar in Special Education	3
Program Concentration	27-28
ED 641 Mental Retardation and Developmental Disabilities	3
ED 655 Education of Individuals with Learning Disabilities/Disorders	2
ED 654 Administration and Interpretation of Educational Data	3
ED 642 Curriculum Development and Materials for Exceptional Individuals	4
ED 656 Clinical Practice in Remediation	3
ED 802 Behavior Analysis in the Classroom	3
ED 645 Career Education and Occupational Training for Exceptional Individuals	3
ED 658 Practicum in Education	6-7
Total	50-51

Classroom Teacher: Special Education Learning Disabilities and/or Behavior Disorders (LD/BD)

Major No. 258

This program leads to certification in learning disabilities for the holder of an elementary education teaching certificate. Persons interested in this program who are not certified elementary teachers should consult with the teacher certification adviser in the Office of Student Services.

Core Requirements 13

To be taken in any sequence within first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5

Professional Requirements 10

ED 734 Analysis of Teaching	4
LCS 649 Introduction to Instructional Media or LCS 685 Computers for Educators	3
ED 850 Seminar in Special Education	3

Program Concentration 24-25

ED 641 Mental Retardation and Developmental Disabilities	3
ED 655 Education of Individuals with Learning Disabilities/Disorders	2
ED 654 Administration and Interpretation of Educational Data	3
ED 642 Curriculum Development and Materials for Exceptional Individuals	4
ED 656 Clinical Practice in Remediation	3
ED 802 Behavior Analysis in the Classroom	3
ED 658 Practicum in Education	6-7

To add certification in developmentally handicapped (DH), ED 645, Occupational Training, and ED 658, Practicum, are required.

Total 48

Classroom Teacher: Special Education Children and Youth with Multiple Impairments

Major No. 259

This concentration emphasizes the moderately, severely, and profoundly retarded (MSPR), the autistic, and children and youth with severe physical and mental impairments. Completion of this program fulfills current standards for certification in the MSPR (trainable retarded), and the orthopedically impaired, and the qualified mental retardation professional certification (QMRP) issued by the Department of Mental Retardation for nonteaching personnel.

Core Requirements 13

To be taken in any sequence within first

twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5

Professional Requirements 14

ED 642 Curriculum Development and Materials for Exceptional Individuals	4
ED 734 Analysis of Teaching	4
LCS 649 Introduction to Instructional Media or LCS 685 Computers for Educators	3
ED 850 Seminar in Special Education (to be taken at end of program)	3

Concentration in the Multiply Impaired and Certification Courses 24-25

ED 641 Mental Retardation and Developmental Disabilities	3
ED 651 Introduction to Multiply Impaired Individuals (offered fall only)	3
ED 652 Education of Individuals with Physical/Sensory/Communication Disorders (offered winter only)	3
ED 653 Education and Training of Multiply Impaired Individuals (offered spring only)	3
ED 659 Techniques for Counseling Parents of Exceptional Individuals	3
ED 802 Behavior Analysis in the Classroom	3
ED 658 Practicum in Education (MSPR and/or Physically Impaired)	6-7

Total 51-52

Classroom Teacher K-12: Special Education/Gifted Major No. 260

Core Requirements 13

To be taken in any sequence within first twenty-four credit hours of graduate education course work	
ED 747 Leadership Skills for School Improvement	4
ED 751 Educational Statistics and Research	5
ED 704 Introduction to Foundations of Education	4

Professional Requirements 6-9

<i>Two of the following:</i>	
ED 734 Analysis of Teaching	4
ED 710 Classroom Strategies for Atypical Populations	4
ED 784 Legal and Professional Issues	4
LCS 685 Computers for Educators	3
LCS 781 Logo and Problem Solving	3

Program Concentration 18-21

ED 722 Gifted Children and Youth (offered fall only)	3
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ED 723 Teaching the Gifted: Curriculum and Materials (offered winter only)	3
ED 720 Creative Problem Solving in Classrooms (offered spring only)	3
CNL 961 Counseling the Gifted (offered fall only)	3
ED 658 Practicum in Education	3-6
ED 850 Seminar in Special Education	3
Content Concentration	6-11

Courses developing a concentration in curriculum/humanities/counseling or supervision selected by the students and the adviser

Total **48**

Classroom Teacher: Science Major No. 261

This program enables students to take substantial advanced graduate course work in the sciences in order to update skills and strengthen knowledge in their major teaching field.

Core Requirements **13**

To be taken in any sequence within first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5

Professional Requirements **11**

ED 734 Analysis of Teaching	4
LCS 649 Introduction to Instructional Media	3
ED 820 Seminar in Secondary Education*	4

Program Electives **24**

Twenty-four hours of graduate courses in science taken outside the College of Education and Human Services

Total **48**

*To be taken near the end of the student's program

Classroom Teacher: Mathematics Major No. 262

This program enables students to take substantial advanced graduate course work in mathematics in order to update skills and strengthen knowledge in their major teaching field.

Core Requirements **13**

To be taken in any sequence within first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5

Professional Requirements **11**

ED 734 Analysis of Teaching	4
LCS 649 Introduction to Instructional Media	3
ED 820 Seminar in Secondary Education*	4

Program Electives **24**

Twenty-four hours of graduate courses (approved by adviser) in mathematics and related disciplines. These must be taken outside the College of Education and Human Services

Total **48**

*To be taken near the end of the student's program

Classroom Teacher: Secondary Certification Major No. 263

This option is designed for persons with a baccalaureate degree in a field other than education who wish to combine secondary certification with a master's degree in the classroom teacher program. This accelerated program requires a full-time commitment for at least one year, and students must start in the fall quarter.

Applicants should have completed most of the course requirements in a valid teaching field. Additional course work may be necessary in order to meet state certification requirements. The professional sequence consists of three phases. Phase I is an introductory phase that has a strong field component and is completed in the first quarter. Phase II is directed toward curriculum competence and teaching skills in the content area. Phase III combines full-time student teaching with a professional seminar. To complete the master's degree, three additional courses may be taken in any sequence.

Prior to beginning the program, participants must complete an additional application through the college's Office of Student Services.

Core: Phase I **15**

To be taken concurrently during the first quarter in the program (offered fall quarter only)	
ED 661 Introduction to the Sociological Foundations of Education	6
ED 662 Introduction to the Psychological Foundations of Education	6
ED 666 Introduction to Schooling	3

Professional Requirements: Phase II **15-23**

ED 604 Adolescent Psychology	3
ED 632 Improving Reading in Secondary Schools	3
ED 663 Teaching Skills and Strategies	3
ED 664 Evaluation (e.g., Specified Curriculum and Materials course)	3
ED 631 Secondary School Science	3
ED 633 Business and Office Education (basic business subjects)	4
ED 634 Business and Office Education (typewriting and office procedures)	3

ED 635 Business and Office Education (typewriting, office procedures, shorthand and transcription)	4
ED 638 Secondary School Mathematics	3
ED 639 Secondary School Social Studies	3
ED 623 Secondary School English	3
ED 624 Secondary School Speech and Drama	3
ED 625 Modern Foreign Languages	3
Professional Requirements: Phase III	30
ED 667 Supervised Teaching: Secondary	13
ED 784 Legal and Professional Issues	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5
ED 791 Curriculum Design and Evaluation	4
Total	60-68

Classroom Teacher: Elementary Certification Major No. 264

This option is designed for persons with a baccalaureate degree in a field other than education who wish to combine elementary certification with a master's degree in the classroom teacher program. This accelerated program requires a full-time commitment for at least fifteen months, and students must start in the fall quarter.

The professional sequence consists of three phases. Phase I is an introductory phase that has a strong field component and is completed in the first quarter. Phase II is directed toward developing teaching skills in the elementary curriculum and may be completed in two quarters. Phase III combines full-time student teaching with a professional seminar. To complete the master's degree, three additional courses may be taken in any sequence. Additional course work may be necessary to meet state certification requirements.

Prior to beginning the program, participants must complete an additional application through the college's Office of Student Services.

Core: Phase I	15
To be taken concurrently during the first quarter in the program (offered fall quarter only)	
ED 666 Introduction to Schooling	3
ED 661 Studies in Social Foundations of Education	6
ED 662 Studies in the Psychological Foundations of Education	6
Professional Requirements: Phase II	25
ED 663 Teaching Skills and Strategies	3
ED 603 Child Development	3
ED 615 Improvement of Elementary Reading Instruction	3
ED 616 Improving Science Instruction in the Elementary School	3
ED 617 Elementary Social Studies: Curriculum and Materials	3

ED 637 Elementary School Mathematics: Curriculum and Materials	3
ED 664 Evaluation	3
ED 721 Literature for Elementary Children	4
Professional Requirements: Phase III	30
ED 665 Supervised Teaching: Elementary	13
ED 784 Legal and Professional Issues	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5
ED 791 Curriculum Design and Evaluation	4
Total	70

Classroom Teacher: Physical Education (HPR) Major No. 243

This concentration is appropriate for physical education teachers who desire to enhance their effectiveness in teaching motor skills, in working with students with special needs, and in understanding various methods of conditioning. This program can benefit those who wish to learn new techniques for assessing physical activity through the use of educational technology such as the computer. It can also aid in applying current research findings to daily teaching practices. These courses can also help coaches who wish to improve their ability to administer interscholastic athletic programs. Physical education teachers and coaches who currently have a master's degree may want to take individual courses to meet special needs.

Core Requirements	13
To be taken in any sequence during the first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5
Professional Requirements	12
ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4
ED 784 Legal and Professional Issues	4
Program Concentration	25
HPR 710 Physical Education for Children with Special Needs	4
HPR 720 Motor Development and Acquisition of Motor Skills	4
HPR 740 Administration of Interscholastic Athletics	4
HPR 750 Scientific Foundations for Conditioning	4
HPR 753 Assessment of Physical Activity	4
HPR 780 Research in Physical Education	5
Total	50

Educational Leadership Programs

The programs within educational leadership are designed primarily for those who want to prepare for leadership roles in educational settings. All of the programs lead to new certification except the teacher leader program.

The supervision programs lead to certification as a supervisor in the same area as the individual's teaching certificate. There is no certification in the state of Ohio for curriculum, but the person who wants that emphasis should take the supervision/curriculum program. The other two supervision programs, supervisor/special education and supervisor/media, offer some specialty courses to the student in conjunction with certification in supervision. Initial certification requires three years of classroom teaching experience under a standard certificate.

The principalship program leads to certification as a school principal in the same level (elementary, secondary) as the individual's teaching certificate. Initial certification requires three years of classroom teaching experience under a standard certificate.

Through the educational administrative specialist program, seven certification areas are available. This program is primarily for persons who desire positions in school district administrative offices. Initial certification requires three years of classroom teaching experience under a standard teaching certificate.

New standards for administrator certificates in the state of Ohio became effective September 1, 1985, and require a minimum of sixty-eight quarter hours of graduate credit. Students will receive, however, a master's degree at the end of 48 hours and will also be eligible for the supervisor's certificate.

The teacher leader program is primarily for teachers who wish to remain in the classroom and combine a teaching improvement program with leadership and curriculum development skills. The program is offered in an off-campus setting only and does not lead to a new certificate.

Educational Leadership Program Curriculum/Supervision Certification Major No. 288

Core Courses	11
May be taken in any sequence	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5
Common Educational Leadership Courses	21
<i>Administrative Strand: Focus on Administrative Behavior</i>	
ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

<i>Curriculum Strand: Focus on Program Development</i>	
ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

<i>Instruction Strand: Focus on Instructional Leadership</i>	
ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Curriculum and Supervision Courses	14
ED 791 Curriculum Design and Evaluation	4
ED 792 Models of Supervision and Staff Development	4
ED 793 Computer Application for Educational Leaders	3
ED 790 Practicum in Instructional Leadership	3
Electives	3-4
Total	49-50

Educational Leadership Program: with Principalship Certification Major No. 294

Core Courses	11
May be taken in any sequence	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5
Common Educational Leadership Courses	21
<i>Administrative Strand: Focus on Administrative Behavior</i>	
ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3
<i>Curriculum Strand: Focus on Program Development</i>	
ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3
<i>Instruction Strand: Focus on Instructional Leadership</i>	
ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3
Administrative Courses	15
ED 780 Public Relations and Politics in Education	3
ED 781 School Finance and Economics	3
ED 782 School Law	3
ED 793 Computer Application for Educational Leaders	3
ED 790 Practicum in Instructional Leadership	3

Electives	2-3
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Total	49-50
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Post-Master's Requirements (Certification)

Concentration Courses	21
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ED 871 Management of the School	3
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ED 872 Staff Personnel Administration	3
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ED 873 Pupil Personnel Administration	3
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ED 874 School Business Management and Facilities	3
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ED 890 Practicum in School Administration	3
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Cognates (Economics, Political Science, Finance, Communication)	6
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Total	70-71
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Educational Leadership Program Supervisor/Special Education Major No. 290

Core Courses	11
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May be taken in any sequence

ED 701 Advanced Educational Psychology	3
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ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
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ED 751 Education Statistics and Research	5
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Common Educational Leadership Courses	18
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Administrative Strand: Focus on Administrative Behavior

ED 771 Educational Leadership Behavior	3
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ED 772 Educational Administrative Behavior	3
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Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
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ED 774 Program Development	3
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Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
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ED 776 Supervision of Instruction and Personnel	3
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Curriculum and Supervisor Courses	22
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ED 791 Curriculum Design and Evaluation	4
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ED 792 Models of Supervision and Staff Development	4
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ED 793 Computer Application for Educational Leaders	3
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ED 790 Practicum in Instructional Leadership	3
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ED 765 Pupil Personnel Services in the School and Community Resources	4
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ED 857 Consultation in the Schools	4
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Total	51
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Educational Leadership Program: Educational Administrative Specialist with Instructional Service Certification Major No. 280

Core Courses	11
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May be taken in any sequence

ED 701 Advanced Educational Psychology	3
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ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
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ED 751 Educational Statistics and Research	5
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Common Educational Leadership Courses	21
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Administrative Strand: Focus on Administrative Behavior

ED 771 Educational Leadership Behavior	3
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ED 772 Educational Administrative Behavior	3
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Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
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ED 774 Program Development	3
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Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
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ED 776 Supervision of Instruction and Personnel	3
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ED 777 Prepracticum: Role and Function of Educational Leaders	3
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Administrative Courses	15
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ED 780 Public Relations and Politics in Education	3
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ED 781 School Finance and Economics	3
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ED 782 School Law	3
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ED 793 Computer Application for Educational Leaders	3
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ED 790 Practicum in Instructional Leadership	3
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Electives	2-3
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Total	49-50
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Post-Master's Requirements (Certification)

Concentration Courses	17
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ED 872 Staff Personnel Administration	3
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ED 890 Practicum in School Administration	3
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ED 791 Curriculum Design and Evaluation	4
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ED 792 Models of Supervision	4
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ED 873 Pupil Personnel Administration	3
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Electives	4
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Total	70-71
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Educational Leadership Program: Educational Administrative Specialist with Pupil Personnel Certification Major No. 281

Core Courses	11
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May be taken in any sequence

ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5
Common Educational Leadership Courses	21

Administrative Strand: Focus on Administrative Behavior

ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Administrative Courses

ED 780 Public Relations and Politics in Education	3
ED 781 School Finance and Economics	3
ED 782 School Law	3
ED 793 Computer Application for Educational Leaders	3
ED 790 Practicum in Instructional Leadership	3

Electives	2-3
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Total	49-50
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Post-Master's Requirements (Certification)

Concentration Courses

ED 873 Pupil Personnel Administration	3
ED 890 Practicum in School Administration	3
ED 874 School Business Management and Facilities	3
ED 971 Superintendent/Staff/Board Relationships	3
ED 765 Pupil Personnel Services in the School and Community Resources	4
RHB 701 Counseling Theory and Practice	4

Total	69-70
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**Educational Leadership Program:
Educational Administrative Specialist
with Educational Research Certification
Major No. 282**

Core Courses

May be taken in any sequence	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5

Common Educational Leadership Courses

Administrative Strand: Focus on Administrative Behavior

ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Administrative Courses

ED 780 Public Relations and Politics in Education	3
ED 781 School Finance and Economics	3
ED 782 School Law	3
ED 793 Computer Application for Educational Leaders	3
Ed 790 Practicum in Instructional Leadership	3

Electives	2-3
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Total	49-50
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Post-Master's Requirements (Certification)

Concentration Courses

ED 752 Statistical Analysis and Research Design	4
ED 753 Advanced Educational Statistics	4
ED 757 Student Appraisal Methods	4
ED 755 Research Projects or Thesis	5-9

Electives	0-4
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Total	70-75
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**Educational Leadership Program:
Educational Administrative Specialist
with Special Education Certification
Major No. 283**

Core Courses

May be taken in any sequence	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5

Common Educational Leadership Courses

Administrative Strand: Focus on Administrative Behavior

ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Administrative Courses 15

ED 780 Public Relations and Politics in Education	3
ED 781 School Finance and Economics	3
ED 782 School Law	3
ED 793 Computer Application for Educational Leaders	3
ED 790 Practicum in Instructional Leadership	3

Electives 2-3**Total** 49-50**Post-Master's Requirements (Certification)****Concentration Courses** 23

ED 765 Pupil Personnel Services in the School and Community Resources	4
ED 890 Practicum in School Administration	3
CNL 661 Principles of Counseling	4
ED 857 Consultation in the Schools	4
ED 791 Curriculum Design and Evaluation	4
ED 792 Models of Supervision	4

Total 72-73**Educational Leadership Program: Educational Administrative Specialist with School Community Relations Certification Major No. 284****Core Courses** 11

May be taken in any sequence	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5

Common Educational Leadership Courses 21**Administrative Strand: Focus on Administrative Behavior**

ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
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ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Administrative Courses 15

ED 780 Public Relations and Politics in Education	3
ED 781 School Finance and Economics	3
ED 782 School Law	3
ED 793 Computer Application for Educational Leaders	3
ED 790 Practicum in Instructional Leadership	3

Electives 2-3**Total** 49-50**Post-Master's Requirements (Certification)****Concentration Courses** 18

ED 785 Introduction to Community Education	3
ED 786 Community School	3
ED 787 School and Community	3
ED 890 Practicum in School Administration	3
ED 971 Superintendent/Staff/Board Relationships	6

Electives 3**Total** 70-71**Educational Leadership Program: Educational Administrative Specialist with Staff Personnel Certification Major No. 285****Core Courses** 11

May be taken in any sequence	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5

Common Educational Leadership Courses 21**Administrative Strand: Focus on Administrative Behavior**

ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Administrative Courses	15
ED 780 Public Relations and Politics in Education	3
ED 781 School Finance and Economics	3
ED 782 School Law	3
ED 793 Computer Application for Educational Leaders	3
ED 790 Practicum in Instructional Leadership	3
Electives	2-3
Total	49-50

Post-Master's Requirements (Certification)

Concentration Courses	16
ED 872 Staff Personnel Administration	3
ED 890 Practicum in School Administration	3
ED 792 Models of Supervision	4
ED 874 School Business Management and Facilities	3
ED 971 Superintendent/Staff/Board Relationships	3
Electives	4
Total	69-70

Educational Leadership Program: Educational Administrative Specialist with Business Management Certification Major No. 286

Core Courses	11
May be taken in any sequence	
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5
Common Educational Leadership Courses	21

Administrative Strand: Focus on Administrative Behavior

ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Administrative Courses	17
ED 873 Pupil Personnel Administration	3
ED 890 Practicum in School Administration	3
ED 791 Curriculum Design and Evaluation	4

ED 792 Models of Supervision	4
ED 873 Pupil Personnel Administration	3
Electives	4
Total	53

Post-Master's Requirements (Certification)

Concentration Courses	18
ED 874 School Business Management and Facilities	3
ED 890 Practicum in School Administration	3
ED 871 School Management	3
ED 872 Staff Personnel Administration	3
Cognates in Business	6
Electives	3
Total	74

Educational Leadership Program Teacher Leader Concentration Major No. 291

Core Courses	12
May be taken in any sequence	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 754 Applied Research and Statistics	4

Concentration Courses	31
ED 734 Analysis of Teaching	4
ED 741 Instructional Design	4
ED 759 Research on Teaching	4
ED 761 Applied Curriculum Theory	4
ED 763 Instructional Management and Evaluation	4
ED 784 Legal and Professional Issues	4
ED 835 Supervised Field Experience	3
ED 670 Teacher Leader Seminar	4
Electives	5

Total	48
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Educational Leadership Program Assistant Superintendent Certification Major No. 293

Core Courses	11
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5
Common Educational Leadership Courses	21

Administrative Strand: Focus on Administrative Behavior

ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3

Curriculum Strand: Focus on Program Development

ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3

Instruction Strand: Focus on Instructional Leadership

ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3

Educational Administration Concentration 15

ED 780 Public Relations and Politics in Education	3
ED 781 School Finance and Economics	3
ED 782 School Law	3
ED 793 Computer Applications for Education Leaders	3
ED 790 Practicum in Instructional Leadership	3

Electives 2-3**Total (M.Ed.) 49-50****Post-Master's Requirements (Certification)**

Concentration Courses 21	
ED 871 Management of the School	3
ED 872 Staff Personnel Administration	3
ED 873 Pupil Personnel Administration	3
ED 874 School Business Management and Facilities	3
ED 890 Practicum in School Administration	3
Cognates (Economics, Political Science, Finance, Communication)	3
ED 971 Superintendent/Staff/Board Relations	3

Total (Principal Certificate; EAS Certificate) 70-71**Human Services (Counseling) Programs**

The human services programs share a common curriculum of courses associated with six different counseling concentrations. The student may choose to obtain an M.A. or M.S. degree in counseling with a specialization in mental health counseling, business and industrial counseling management, or gerontology; marriage and family counseling, student personnel services in higher education, or counseling exceptional children; or the student may choose to obtain an M.R.C. degree with a specialization in counseling of the severely disabled or the chemically dependent.

Students entering the human services division must complete both the admission procedures and the appropriate graduate core requirements for their area of concentration. Students plan their program of study in consultation with their adviser and elective courses may be chosen as appropriate.

Business and Industrial Counseling Management Major No. 265**Core Requirements 13**

RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5

Professional Requirements 43

CNL 667 Group Background and Theory	4
CNL 762 Career Development and Information Services	4
CNL 860 Advanced Graduate Seminar	3
CNL 864 Internship	4
CNL 971 Counseling for Life-Span Development	4
CNL 972 Professional, Ethical, and Legal Issues in Human Services	4
CNL 973 Social and Cultural Foundations in Counseling	4
MGT 621 Graduate Survey in Management	3
MGT 700 Organizational Behavior and Theory	3
MGT 703 Seminar in Personnel Administration	3
MGT 705 Seminar in Industrial Relations	3
RHB 705 Behavioral Assessment	4

Recommended Electives 4

CNL 663 Mental Health I	4
CNL 767 Group Processes in Counseling and Guidance	3
CNL 770 Independent Study	1-3
CNL 779 Marriage and Family Counseling	4
COM 643 Interviewing	4
COM 645 Conference Leadership	4
COM 647 Organizational Communication	4
COM 651 Communication Consulting and Training	4
COM 653 Communication and Conflict	4
MGT 706 Organizational Development and Change	3
MGT 754 Dynamics of Organization Design	3
RHB 730 Epidemiology of Chemical Dependency	4

Total 60**Gerontology Major No. 266****Core Requirements 13**

RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5

Professional Requirements 39

CNL 667 Group Background and Theory	4
CNL 860 Advanced Graduate Seminar	3
CNL 865 Individual Practicum	4

CNL 866 Advanced Individual and Group Practicum	4
CNL 971 Counseling for Life-Span Development	4
CNL 972 Legal, Professional, and Ethical Issues in Human Services	4
CNL 973 Social and Cultural Foundations in Counseling	4
RHB 702 Medical Assessment in Gerontology	4
RHB 705 Behavioral Assessment	4
SW 662 Social Gerontology	4

Recommended Electives

AT 743 Art with the Older Person	1-3
CNL 670 Counseling Older Adults	3
CNL 762 Career Development and Information Services	4
CNL 779 Marriage and Family Counseling	4
ED 651 Introduction to the Multiply Impaired Individual	3
ED 657 Habilitation Programming	3
MGT 621 Graduate Survey in Management	3
MGT 703 Seminar in Personnel Administration	3
PSY 647 Psychology of Aging	4
SW 663 Social Gerontology II	4
Total	60

**Mental Health Counseling
Major No. 267**

Core Requirements	13
RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5
Professional Requirements	46-47
CNL 663 Mental Health I	4
CNL 667 Group Background and Theory or CNL 767 Group Process in Counseling and Guidance	3-4
CNL 762 Career Development and Information Services	4
CNL 773 Mental Health II	4
CNL 779 Marriage and Family Counseling	4
CNL 860 Advanced Graduate Seminar	3
CNL 865 Individual Practicum I	4
CNL 866 Advanced Individual and Group Practicum	4
CNL 971 Counseling for Life-Span Development	4
CNL 972 Professional, Ethical, and Legal Issues in Human Services	4
CNL 973 Social and Cultural Foundations in Counseling	4
RHB 705 Behavioral Assessment	4

Recommended Electives

Although professional requirements encompass the total sixty hours, courses in areas to increase one's level of expertise are recommended.	
CNL 664 Crisis Intervention Counseling	4
CNL 670 Human Sexuality I and II	6
CNL 670 Counseling Older Adults	3
CNL 767 Group Processes in Counseling	3
CNL 769 Techniques of Child Counseling	4
CNL 778 Play Therapy	4
RHB 730 Epidemiology of Chemical Dependency	4
RHB 731 Treatment Approaches in Chemical Dependency	4
Total	60

**Marriage and Family Counseling
Major No. 268**

Core Requirements	13
RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5
Professional Requirements	43
CNL 663 Mental Health I	4
CNL 667 Group Background and Theory	4
CNL 670 Human Sexuality	4
CNL 779 Marriage and Family Counseling	4
CNL 860 Advanced Graduate Seminar	3
CNL 865 Individual Practicum	4
CNL 866 Advanced Individual and Group Practicum	4
CNL 971 Counseling for Life-Span Development	4
CNL 972 Legal, Professional, and Ethical Issues in Human Services	4
CNL 973 Social and Cultural Foundations in Counseling	4
RHB 705 Behavioral Assessment	4
Recommended Electives	4
CNL 670 Counseling and Human Sexuality II	4
CNL 769 Techniques of Child Counseling	4
CNL 773 Mental Health II	4
CNL 778 Play Therapy	4
SOC 540 Social Organization	4
SOC 560 Sociology of the Family	4
SOC 670 The Future of the Family	4
Total	60

**Rehabilitation Counseling:
Chemical Dependency
Major No. 270**

Core Requirements	13
RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5

Professional Requirements 49-50

CNL 663 Mental Health I	4
CNL 762 Career Development and Information Services	4
CNL 667 Group Background and Theory or CNL 767 Group Processes in Counseling and Guidance	3-4
CNL 973 Social and Cultural Foundations in Counseling	4
RHB 702 Medical Assessment	2
RHB 705 Behavioral Assessment	4
RHB 730 Epidemiology of Chemical Dependency	4
RHB 731 Treatment Approaches in Chemical Dependency	4
RHB 801-802 Internship I and II	20

Recommended Electives

CNL 972 Legal, Professional, and Ethical Issues in Human Services	4
CNL 971 Counseling for Life-Span Development	4
CNL 779 Marriage and Family Counseling	4

Total 62-63**Rehabilitation Counseling: Severely Disabled Major No. 271**

Core Requirements	13
RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5

Professional Requirements 48-49

CNL 667 Group Background and Theory or CNL 767 Group Processes in Counseling and Guidance	3-4
CNL 762 Career Development and Information Services	4
CNL 971 Counseling for Life-Span Development	4
RHB 702 Medical Assessment	4
RHB 704 Psychological Adjustment to Disability	4
RHB 705 Appraisal of Individual	4
RHB 711 Introduction to Vocational Evaluation	4
RHB 775 Rehabilitation Seminar	1
RHB 801, 802, 803 Internship	20

Recommended Electives

CNL 973 Social and Cultural Foundations in Counseling	4
CNL 972 Legal, Professional, and Ethical Issues in Human Services	4

Total 61-62**Student Personnel Services in Higher Education Major No. 274****Core Requirements** 13

RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5

Professional Requirements 48-49

CNL 661 Principles of Counseling	3
CNL 662 Problems in Student Personality and Development	4
CNL 667 Group Background and Theory or CNL 767 Group Processes in Counseling and Guidance	3-4
CNL 762 Career Development and Information Services	4
CNL 860 Advanced Graduate Seminar	3
CNL 865 Individual Practicum	4
CNL 866 Advanced Individual and Group Practicum	4
CNL 971 Counseling for Life-Span Development	4
CNL 972 Legal, Professional, and Ethical Issues in Human Services	4
CNL 973 Social and Cultural Foundations in Counseling	4
ED 704 An Introduction of Foundations of Education	4
ED 765 Pupil Personnel Services in the School and Community Resources	4
ED 869 Student Personnel Administration in Higher Education	3

Total 61-62**Counseling Exceptional Children Major No. 278****Core Requirements** 13

RHB 701 Counseling Theory and Practice	4
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5

Professional Requirements (Counseling) 19-20

CNL 662 Problems in Student Personality and Development or CNL 663 Mental Health I	4
CNL 667 Group Background and Theory or CNL 767 Group Processes in Counseling and Guidance	3-4
CNL 769 Techniques of Child Counseling or CNL 778 Techniques of Play Therapy	4
CNL 860 Advanced Seminar in Counseling	4
CNL 865 Individual Practicum (with exceptional children)	4

Professional Requirements (Special Education) 9-12

CNL 960 Counseling the Gifted	3
ED 641 Mental Retardation and Developmental Disabilities or ED 652 Education of Individuals with Physical, Sensory, and Communication Disorders	3
ED 659 Techniques for Counseling Families of Exceptional Children	3
and/or ED 722 Gifted Children and Youth	3

Recommended Electives 15-19

CNL 779 Marriage and Family Counseling	4
CNL 973 Sociocultural Foundations of Counseling	4
ED 603 Child Development	3
ED 604 Adolescent Development	3
ED 645 Career Education and Occupational Training for Exceptional Individuals	3
ED 655 Education of Children with Learning Disabilities/Behavior Disorders	2
ED 720 Creative Problem Solving in Classrooms	3
ED 723 Teaching the Gifted	3
ED 740 Education of Children with Severe Behavior Disorders	3
RHB 705 Behavioral Assessment	4
Total	60

Student Personnel Services Program

The student personnel services program, leading to the Master of Arts or Master of Education degree, offers concentrations in school counseling, school psychology, or visiting teacher. 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.

Students entering the program of counselor preparation must complete both the admission procedures and the appropriate graduate core requirements for their area of concentration.

The school psychology program has limited enrollment and additional admission requirements. Contact the Division of Human Services for more information.

The following requirements and procedures must be met by students applying for the M.Ed. or M.A. degrees within student personnel services: 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 for which application is made during the first two weeks of spring quarter.

New state certification requirements were adopted January 1, 1986. Students should contact the director of the Division of Human Services for information.

School Counseling Major No. 275

Core Requirements	13
CNL 863 Techniques of Counseling	4
ED 751 Educational Statistics and Research	5
RHB 701 Counseling Theory and Practice	4
Professional Requirements	30-31
CNL 662 Problems in Student Personality and Development	4
CNL 762 Career Development and Information Services	4
CNL 767 Group Processes in Guidance and Counseling or CNL 667 Group Background and Theory	3-4
ED 765 Pupil Personnel Services in the School and Community Resources	4
RHB 705 Behavioral Assessment	4
CNL 860 Advanced Seminar in Counseling	3
CNL 865 Individual Practicum	4
CNL 866 Advanced Individual and Group Practicum	4
Electives	4-5

Total 48-49

*For those entering elementary counseling, the following courses are recommended before practicum:

CNL 769 Techniques of Child Counseling	4
CNL 778 Play Therapy	4

School Psychology Major No. 276

Core Requirements	12
May be taken in any sequence	
ED 751 Educational Statistics and Research	5
RHB 701 Counseling Theory and Practice	4
ED 701 Advanced Educational Psychology	3
Professional Requirements for M.Ed. and M.A.	19
ED 603 Child Development or PSY 541 Developmental Psychology	3

PSY 531 Theories of Personality or CNL 662 Problems in Student Personality and Development	4
RHB 705 Behavioral Assessment or ED 757 Student Appraisal Methods or PSY 643 Tests and Measurements	4
CNL 863 Techniques of Counseling	4
CNL 865 Practicum in Counseling	4
Concentration for M.Ed. only	14-17
ED 654 Administration and Interpretation of Educational Data	3
ED 656 Clinical Practice in Remediation or ED 641 Mental Retardation and Developmental Disorders or ED 655 Introduction to Learning Disabilities and Behavior Disorders	2-3
CNL 769 Techniques of Child Counseling or CNL 667 Group Background and Theory or CNL 778 Techniques in Play Therapy	4
ED 802 Behavior Analysis in the Classroom	3
ED 735 Curriculum Analysis or ED 615 Improvement in Elementary Reading Instruction or ED 716 Advanced Reading Instruction or ED 818 Diagnosis and Remediation of Learning Difficulties in Elementary School Mathematics	2-4
Concentration for M.A. only	22
ED 654 Administration and Interpretation of Educational Data	3
ED 641 Mental Retardation and Developmental Disorders	3
ED 802 Behavioral Analysis in the Classroom	3
ED 752 Statistical Analysis and Research Design	4
ED 899 Thesis	9
School Psychology Core for M.A. and M.Ed.	19-20
ED 854 Intellectual Assessment for School Psychologists	4
ED 855 Assessment of Exceptional Populations	4
ED 856 Individual Assessment of Behavior and Personality Disorders	4
ED 857 Consultation in the Schools (Practicum Emphasis)	4
ED 868 Role and Function of the School Psychologist	3-4
Total (minimum requirement) for M.Ed.	68
Total (minimum requirement) for M.A.	72

Post-Master's Requirement (Certification)	18
ED 829 Internship in School Psychology	
Total (minimum requirement) with certification	90-93
Note: Additional requirements for M.A. students:	
ED 752 Statistical Analysis and Research Design	3
ED 899 Thesis	9

Visiting Teacher Major No. 277

Core Requirements	13
May be taken in any sequence	
ED 751 Educational Statistics and Research	5
ED 747 Leadership Skills	4
RHB 701 Counseling Theory and Practice	4
Professional Requirements	33-36
CNL 667 Group Background and Theory or CNL 767 Group Processes in Guidance and Counseling	3-4
ED 603 Child Development or ED 604 Adolescent Development or PSY 541 Developmental Psychology	3-4
PSY 633 Exceptional Child	4
CNL 662 Problems in Student Personality and Development	4
ED 757 Student Appraisal Methods or RHB 705 Behavioral Assessment or PSY 643 Psychometrics	3-4
ED 765 Pupil Personnel Services in the School and Community Resources	4
CNL 779 Marriage and Family Counseling	4
CNL 863 Techniques of Counseling	4
CNL 865 Individual Practicum or CNL 866 Advanced Individual and Group Practicum	4
Elective	2
Total (minimum requirement)	48

Note: CNL 866 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 these areas.

Master of Art Therapy

Major No. 249

The Master of Art Therapy program prepares professionals to work with people in treatment, education, rehabilitation, nonverbal expression, and communication. Training and course work in art therapy are important for the student preparing to become an art therapist, for the art teacher desiring specialized courses, and for people in the human services professions.

Art therapists work with persons of all ages with various degrees and kinds of disabilities and handicapping conditions, with individuals, groups and families, and in a multitude of settings such as

mental health centers, psychiatric and general hospitals, educational and rehabilitative settings, nursing homes and residential treatment centers, and others.

Admission to the program is based on the applicant's previous academic work (with any prerequisites identified at the beginning of the program), letters of reference, work in art media, and successful completion of the graduate core courses. A personal interview is scheduled during the first quarter of work at which time a portfolio of work is shown. Students admitted to the M.A.T. program may choose full-time or part-time courses of study. With the required clinical internship, the normal course of study may be completed in approximately two years.

Professional Course Sequence

Core Requirements	12
May be taken in any sequence	
AT 730 Art Therapy	3
ED 751 Educational Statistics and Research	5
RHB 701 Counseling Theory and Practice	4
Art Therapy Foundations I	12
AT 735 Art Therapy I: Theories and Methods	3
AT 736 Art Therapy II: Theories and Methods	3
AT 738 Art Therapy III: Theories and Methods	3
AT 739 Art Therapy IV: Theories and Methods	3
Art Therapy Foundations II	13
AT 644 Art and the Special Student	3
AT 648 Arts with the Disabled/Handicapped Person	3
AT 723 Art Media in the Special Setting	3
AT 743 Art with the Older Adult	3
AT 753 Research in Art Therapy	1
Art Therapy Clinic/Seminar	11
AT 771 Art Therapy Clinic I	1
AT 772 Art Therapy Clinic II	9
AT 774 Art Therapy Clinic Seminar	1
Art Therapy Program Exit Options	5-9
<i>Selected from the following:</i>	
AT 766 Project in Art Therapy	5
AT 773 Art Therapy Clinic III	5
AT 899 Thesis	9
Art Therapy Comprehensive Examination	
Advised Electives	3-12
AT 629 Workshop in Art Therapy	1-6
AT 744 Art with Exceptional Populations	3
AT 770 Independent Study in Art Therapy	1
AED 631 Art and the Child	3

AED 741 Art with the Gifted and Talented	3
CNL 663 Mental Health I	4
CNL 778 Techniques of Play Therapy	4
ED 603 Child Development	3
ED 740 Education of Children with Severe Emotional Problems	3
ED 747 Leadership Skills	3
PSY 505 Abnormal Psychology	4
PSY 531 Theory and Research in Personality	4
PSY 639 Theories of Individual Therapy	4

Note: Additional electives may be added to this list. A minimum of 600 clinical hours is included in the M.A.T.

Total (minimum requirement) 60

Library and Communication Science

Technological advancements have redefined the role of library and communication science personnel in the 1980s from collector of resources and management of facilities to that of instructional designer, computer education specialist, instructional technologist, and most importantly, teacher. New concepts and theories related to learning, such as individualized instruction, instructional development, instructional materials production, multicultural education, and new delivery mechanisms via technology have contributed to this change.

The Division of Library and Communication Science reflects this new role with course and program offerings in the areas of school library media programs, instructional technology, and computer education.

Library Media Concentration

An M.Ed. degree with a concentration in library media is available. The objectives of the library media program are to acquaint students with the social and educational role of the library media center as a service institution in contemporary society; to familiarize students with the field of librarianship as a profession; to establish a foundation for service by developing professional attitudes toward the responsibilities of library media centers; to acquaint students with current trends and issues in the profession; and to qualify personnel to meet certification requirements of school library media specialists in Ohio and other states.

Excellent facilities support the offerings of the Division of Library and Communication Science. These include the Educational Resource Center, the University Library, computer services, a graphic production laboratory, television studios, and access to the resources of the Southwestern Ohio Council for Higher Education.

Classroom Teacher: Media Major No. 253

The master's degree program with a concentration in educational media can lead to state certification which would allow a professional to work in a public school library/media center in the elementary and/or secondary level. Students who already hold library media certification can develop an in-depth area within the field.

Students with an educational media background have also found employment in the health sciences, religious organizations, business and industry, and training facilities. A Master of Arts degree in educational media is also available for graduate students who do not have an education background.

Core Requirements	13
To be taken in any sequence during the first twenty-four credit hours of graduate education course work	
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
ED 751 Educational Statistics and Research	5
Professional Requirements	14
ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4
LCS 649 Introduction to Instructional Media	3
LCS 779 Seminar	3
Program Concentration	21*

Holder of Education Media Certification

The holder of either an elementary, secondary, or special certificate with educational media may complete this concentration by completing twenty-one hours of LCS electives selected by the adviser and student.

Validation of Ohio Teaching Certificate

The holder of a standard elementary teacher's certificate may have that certificate validated for educational media in the elementary school by completing the following courses: LCS 611, Reference and Bibliography; LCS 621, Cataloging and Classification; LCS 635, Production of Instructional Materials; LCS 649, Introduction to Instructional Media (included in professional requirements); LCS 661, Selection of Materials; LCS 691, Organization and Administration of School Media Centers; ED 721, Literature for Elementary Children; LCS 780, Internship; and additional courses to complete thirty hours of LCS course work.

The holder of a standard secondary teacher's certificate may have educational media added to that certification by completing the following

courses: LCS 611, Reference and Bibliography; LCS 621, Cataloging and Classification; LCS 635, Production of Instructional Materials; LCS 649, Introduction to Instructional Media (included in professional requirements); LCS 661, Selection of Materials; LCS 663, Literature for Adolescents and Young Adults; LCS 691, Organization and Administration of School Media Centers; LCS 721, Literature for Elementary Children; and LCS 780, Internship.

The holder of an elementary or secondary teacher's certificate may obtain a special (K-12) teacher's certificate by completing the teaching field requirements of forty-five hours of course work in LCS including the following: LCS 611, Reference and Bibliography; LCS 621, Cataloging and Classification; LCS 635, Production of Instructional Materials; LCS 649, Introduction to Instructional Media; LCS 661, Selection of Materials; LCS 663, Literature for Adolescents and Young Adults; LCS 691, Organization and Administration of School Media Centers; ED 721, Literature for Elementary Children; LCS 780, Internship; and additional courses to complete forty-five credit hours of LCS course work.

Total	48*
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*Additional courses required for validation.

Supervisor/Media Major No. 289

This concentration is primarily for students who desire a curriculum and/or supervision position in media. They must have twenty-seven months of teaching experience under a standard certificate in the field (educational media) for which the supervisor's certificate is sought.

Core Requirements	11
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or 703 Philosophy of Education	3
ED 751 Educational Statistics and Research	5
Professional Requirements	21
ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3
ED 773 Curriculum Theory and Development	3
ED 774 Program Development	3
ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 777 Prepracticum: Role and Function of Educational Leaders	3
Supervision Concentration	17
ED 791 Curriculum Design and Evaluation	4
ED 792 Models of Supervision and Staff Development	4

ED 793 Computer Applications for Educational Leaders	3
ED 790 Practicum in Instructional Leadership	3
LCS 795 Administration and Supervision of the Audiovisual Program	3
Total	49

Computers in Education Concentrations

The intent of the Classroom Teacher: Computer Education program of study is to prepare teachers to make more effective use of computers in their classroom. The program covers computers in computer-assisted instruction, selecting and evaluating appropriate computer software, developing lessons incorporating courseware, and using computer tools and utilities to make the job of teaching more efficient. It is *not* the intent of this program to prepare a teacher to teach any of the programming languages such as BASIC or Pascal.

Classroom Teacher: Computer Education Major No. 244

Core Requirements	13
ED 751 Educational Statistics and Research	5
ED 704 Introduction to Foundations of Education	4
ED 747 Leadership for School Improvement	4
Professional Requirements	11
ED 734 Analysis of Teaching	4
ED 791 Curriculum Design and Evaluation	4
LCS 749 Developing Materials for Instruction	3
Program Requirements	23
LCS 685 Computers for Educators	3
LCS 686 Applications of Computers in Education	3
LCS 687 Introduction to BASIC for Educators	4
LCS 781 Logo and Problem Solving	3
LCS 782 Designing Educational Software	3
LCS 780 Internship	4
ED 810 or ED 820 Seminar	3
Electives	1-3

Total 48-50

Note: In addition, students will need to demonstrate functional knowledge of BASIC and one of the following languages: Pascal, COBOL, or FORTRAN.

The intent of the Curriculum and Supervision: Computer Facilitator program of study is to prepare teachers to work with teachers, administrators, vendors, and computer scientists as related to computer use in schools. Supervisory skills,

curriculum development, and general knowledge of computers and computers in education are covered. It is *not* the intent of this program to prepare a teacher to teach any of the programming languages such as BASIC or Pascal.

Curriculum and Supervision: Computer Facilitator Major No. 292

Core Requirements	11
ED 751 Educational Statistics and Research	5
ED 701 Advanced Educational Psychology	3
ED 702 Social Foundations of Education or ED 703 Philosophy of Education	3
Professional Requirements	21
ED 771 Educational Leadership Behavior	3
ED 772 Educational Administrative Behavior	3
ED 773 Curriculum Theory and Practice	3
ED 774 Program Development	3
ED 775 Leadership for Instructional Improvement	3
ED 776 Supervision of Instruction and Personnel	3
ED 790 Practicum in Educational Leadership	3
Program Requirements	16
LCS 685 Computers for Educators	3
LCS 868 Applications of Computers in Education	3
LCS 687 Introduction to BASIC for Educators	4
LCS 781 Logo and Problem Solving	3
LCS 782 Designing Educational Software	3
Total	48

Note: In addition, students will need to demonstrate functional knowledge of BASIC and one of the following languages: Pascal, COBOL, or FORTRAN.

Elementary Education

See Education and Human Services

Engineering

See Systems Engineering

English

The Department of English offers a flexible M.A. program designed to meet various needs, including those of prospective or practicing high school or junior college English teachers and those of predoctoral students. The program is structured around work in language, literature, and writing.

Courses are regularly available in the standard areas of English and American literature, linguistics and in nontraditional and interdisciplinary studies. Options allow students to design programs to meet their educational goals. In addition to the course and thesis options, an interdisciplinary option permits work in communications, reading, religion studies, or history. Internships prepare students for junior college positions by providing teaching experience at a two-year college or for positions in special collections and archives and private and rare book libraries by offering on-the-job experience at appropriate institutions. Other course options include creative writing; professional, business, and technical writing; TESOL, which includes linguistics; and women's studies. Full-time or part-time study 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, iconography

Norman R. Cary, literary criticism, American literature

O. Elizabeth Harden, English romantic literature, English novel

Lillie P. Howard, black American literature, eighteenth-century novel, Jane Austen

James M. Hughes, American literature, American studies, popular culture

Lawrence E. Hussman (chair), American literature, naturalism

Gary B. Pacernick, creative writing, modern poetry

Mary Beth Pringle, modern novel; women's literary studies; professional, business, and technical writing

Donald R. Swanson, nineteenth- and twentieth-century English literature, English novel

Thomas H. Wetmore, linguistics

Thomas R. Whissen, modern British literature, comparative literature, English novel

Associate Professors

Cecile Cary, Shakespeare, Renaissance studies

Robert M. Correale, Chaucer, Middle English literature

James J. Gleason, American literature, twentieth-century British literature

Henry S. Limouze, Milton, seventeenth-century literature, linguistics

Martin Maner, eighteenth-century English literature

Martha C. Sammons, nineteenth-century English literature, literary criticism, science and literature

Admission

Regular

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

Conditional

Applicants whose overall grade point average is between 2.7 and 2.5 will be admitted to conditional standing by action of the English department graduate committee if they meet the first and second requirements above. To attain regular standing, students must be reviewed by the graduate committee, and must earn a grade of B or better in each of the first three graduate courses (twelve credit hours) taken.

Upon petition of the student seeking admission, reasonable exceptions to these requirements may be made for sufficient cause.

International Students

It is essential that applicants for an M.A. in English be able to demonstrate their proficiency in written and spoken English. In addition to a minimum TOEFL score of 600, applicants should submit (1) a sample of written English in the form of one or two school papers, one that the applicant regards as his or her best effort and perhaps a second showing a professor's marks and grade; and (2) a score on TOEFL's Test of Spoken English, which can be taken in the applicant's native country or upon arrival at Wright State University.

Nondegree in English

Nondegree students enrolled in English graduate courses are subject to review and approval by the English department graduate committee.

Advising

No student should take graduate work without departmental advisement. Both full- and part-time students should consult regularly each term with the director of graduate studies, the department's graduate adviser. Students taking graduate English courses who are not enrolled in the M.A. program

should also consult the director of graduate studies to determine the courses that will best meet their needs.

Graduate Handbook

The English department publishes a handbook for graduate students. It provides detailed information on all aspects of the M.A. program. No student should pursue graduate work in English without obtaining a copy from the departmental office.

Financial Assistance

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.

International students who wish to apply for teaching assistantships must demonstrate near-native proficiency in English on the Test of Spoken English (see previous section, International Students).

Degree Requirements

The master's program in English enables students to increase their knowledge of English and American literature and language and to improve their critical skills and their grasp of scholarly method. To meet these goals the program utilizes three groups of 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; all students in the program are required to take both ENG 701 and 702.

The 700-level seminar courses offer 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 in language and writing.

All students are required to take the M.A. examination.

Program of Study

Core Courses	8
ENG 701 Methods and Materials of Research	4
ENG 702 History of Literary Criticism	4

Additional Courses 20

Five 700-level courses, at least three of which must be seminars: ENG 730, 740, 750, 760, 770 (prerequisite ENG 701)

Elective Options 20-22

Course Option

Five additional courses at the 600 or 700 level 20

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

Communication Option

Organizational Communication Option 20-22

This track is designed to develop or enhance applied communication skills appropriate to work in organizations in the public and private sectors.

Required 16

COM 741 Principles and Application
of Communication Theory
COM 643 Interviewing
COM 647 Organizational Communication
COM 651 Communication Consulting
and Training

Elective(s) 4-6

One or two courses chosen by the student from offerings in the department and approved by the departmental adviser.

Mass Communication Option 20-22

This track is designed to develop or enhance applied communication skills appropriate to work in the mass media of radio, television, print journalism, cable, and videotape.

Required 16

COM 741 Principles and Application
of Communication Theory
COM 654 Feature Story Writing
COM 658 Editing for the Media
COM 662 Mass Media: Law and
Regulation

Elective(s) 4-6

One or two courses chosen by the student from offerings in the department and approved by the departmental adviser

Communication Studies Option 20-22

This track is designed to allow the student to design a program of study which coherently complements the English curriculum and allows for the development of applied communication skills or enhancement of theoretical sophistication in the communicative arts.

Required	4	Women's Studies Option	
COM 741 Principles and Application of Communication Theory		ENG 720 Women's Studies through Literature	4
Electives	16-18	Two additional graduate-level courses in English or other departments focusing on women, e.g., ENG 630 Virginia Woolf; HST 685 History of American Women; GEO 599 Women's Role in Spatial Organization of Society	8
Two-Year College Teaching Option		Two or three more graduate-level courses as described immediately above or four to eight hours in ENG 799 Thesis.	8
ENG 717 The Study of Writing	4		
ENG 795 Internship and Apprenticeship	4-8		
Additional courses: recommended are ENG 716 The Study of Literature or approved courses in communication or education	8-12	TESOL (Teaching English as a Second Language) Option*	
Thesis Option		ENG 679 History of the English Language	4
Three additional courses at the 600 or 700 level	12	ENG 680 Theory of ESL	4
ENG 799 Thesis (total of eight credits required)	8	ED 620 TESOL Methods and Materials	4
		ENG 680 Grammatical Structures of English	4
		ENG 680 Sociolinguistics	4
		ED 660 Practicum	2
Creative Writing Option		Total	48
ENG 694 Creative Writing Seminar	4		
ENG 799 Thesis (total of eight credits required)	8	*The above twenty-two hours constitute a certificate program in TESOL as well as an option in the English M.A. program.	
Two other courses chosen in consultation with the thesis director (e.g., ENG 694, ENG 710, ENG 712, contemporary literature, literary criticism; aesthetics)	8		
Archival/Library Option		Examination	
HST 710, 714 Archival Administration	6	During the last quarter in the program, a candidate for a degree must pass a written examination. This examination is based on a selective reading list of major works in English and American literature and is intended to complement the program's emphasis on general skills and specialized courses. The examination consists of two parts: a general examination over either English or American literature and a special examination covering a major author of the student's choice. Consult the departmental graduate handbook for further details. The reading list is available in the departmental office.	8
HST 712, 713 Historical Administration	6		
HST 711 Local History	2		
ENG 795 Internship	5		
MGT 621 Graduate Survey of Management or MKT 720 Service and Nonprofit Marketing	3		
LCS 740 History of Books and Printing (optional)	3		
Professional, Business, and Technical Writing Option		Thesis	
ENG 718 The Study of Professional Writing	4	Students who elect the thesis option or the creative writing option are required to enroll for eight quarter hours of credit under ENG 799 and prepare a thesis or, in the case of creative writing students, a work of imaginative literature, 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.	8
ENG 795 Internship and Apprenticeship	4-8		
Choose one or two from the following additional courses:	4-8		
FIN 621 Graduate Survey in Financial Management			
MGT 621 Graduate Survey in Management			
MKT 621 Graduate Survey in Marketing			
ADM 611 Graduate Survey of Law and the Legal Environment			
PSY 504 Industrial and Organizational Psychology			
COM 643 Interviewing			
COM 629 Urban Communications Theory			
COM 781 Independent Research			

Language Requirement

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.

Finance, Insurance, and Real Estate

See Business and Administration

Financial Administration

See Business and Administration

Geological Sciences

The Department of Geological Sciences 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 the 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, geochemistry, sedimentology

Byron F. Kulander, structural geology, geophysics

Paul Pushkar, isotopic geochemistry, igneous and metamorphic petrology, field geology

Benjamin H. Richard, field geology, exploration geophysics

Ronald G. Schmidt, hydrogeology, environmental geology, engineering geology

Karel Toman, crystallography, x-ray crystallography, x-ray spectroscopy, geophysical data processing materials science

Raphael Unrug (chair), basin analysis tectonics

Associate Professors

Kenneth Kramer, geochemistry, mineralogy, optical crystallography

Paul J. Wolfe, exploration geophysics

Assistant Professor

G. Robert Brakenridge, clastic sedimentology, stratigraphy, quaternary geology, fluvial processes

Facilities and Research

The Department of Geological Sciences is housed in the Brehm Laboratory with some segments in Oelman Hall and Fawcett Hall.

Department facilities include twelve teaching and research laboratories and a wide variety of specialized facilities. Active research programs exist in a wide range of theoretical and applied areas.

In addition to the laboratory facilities described here, the department has an unusual array of field equipment for faculty and student use. This equipment includes three truck-mounted drilling rigs, trucks, vans, and other vehicles for extensive field research. A technician is employed to maintain and improve equipment capability of both field and laboratory equipment.

The mineralogy/crystallography/petrology laboratories feature reference and display mineral and rock collections, three x-ray diffraction units equipped with powder and single-crystal accessories, an electron microprobe, a Zeiss universal microscope, and several student model microscopes. A Logitech thin-sectioning machine and facilities for mineral separations are available. Current projects involve mineral solid solutions and the characterization of basalts and amphibolites.

The geochemistry laboratory has complete facilities for analysis of geological materials using chromatographic, atomic absorption, and x-ray fluorescence techniques. Current projects deal with the chemistry of polluted groundwaters and the isotope geochemistry of brines and reservoir rocks of petroleum fields in the Illinois basin.

The sedimentary petrology laboratory is equipped with an ISI scanning electron microscope (shared with Mechanical Engineering), a Wild stereomicroscope with drawing attachment, Nuclide Cathodoluminescence Luminoscope, Zeiss Universal R Pol petrographic microscope, Nikon 35mm macrophotography equipment, a complete darkroom for black-and-white photography, an air abrasive, and the petrologic equipment listed previously. Current research projects include the study of Blue Ridge turbidites in Tennessee and the Oriscany sandstone in the Appalachian basin.

Two laboratories serve the needs of environmental geology, engineering geology, and hydrogeology. The hydrogeochemistry laboratory has available the instrumentation for geochemical analyses listed previously. The hydrolab has a complete line of field equipment for pumping, water sampling, and field analysis of nonconservative chemical parameters, as well as an ion chromatograph, spectrophotometer, and AA spectrophotometer equipment. The engineering/environmental laboratory has both typical and special equipment for field and laboratory determination of physical properties and structure of sedimentary materials. Current research includes tracing groundwater contaminants, insular water resource planning and management, and chemical water budget analysis of small ecosystems, hydrodynamic dispersion, isotope hydrology, stochastic analysis of subsurface flow environments,

depository and site hydrogeologic characterization for the disposal of radioactive waste, and groundwater flow and solute transport modeling.

The Laboratory of Applied Sedimentology has been recently upgraded and has facilities for close-interval sieve size and large settling tube size analysis. The latter includes a digital output, computer interface, and a dedicated microcomputer for data retrieval, storage, and analysis. A research petrographic microscope with photomicrographic attachments and an automated point-counting device facilitate research using thin sections. The college's scanning electron microscope is also used in faculty and student sedimentology research. An indexed sedimentology reprint file and computer-generated descriptive statistics and graphics package are part of the laboratory's equipment. Current research projects include field and laboratory investigations of recent fluvial sediments and the mineralogy of sands in relation to plate tectonic setting.

The geophysics laboratory has field equipment for seismic, gravity, magnetic, and electrical surveys. The seismic equipment consists of two forty-eight channel and one twenty-four channel digital recording systems, a twelve-trace portable refraction system, truck-mounted and portable drill rigs, geophones, and cables. Field equipment for potential field studies consists of three gravimeters and a magnetometer. Resistivity meters and equipotential instruments are used for electrical surveys. Current research includes gravity, magnetic, and seismic refraction, and reflection studies relating to the geology of Ohio, Michigan, and West Virginia. Field work in tectonics and structural geology is concentrated in the Appalachian Mountains and includes projects in the valley and ridge and the Blue Ridge regions in West Virginia and Tennessee.

A Gould-SEL 33/77 computer is used for seismic data processing. A network of microcomputer work stations can perform seismic modeling and data analysis. A variety of other microcomputers are available for running applications programs and data storage. Several terminals are maintained for direct access to the IBM 3083E centralized equipment on campus.

The department has established summer field research and teaching programs in the Great Smoky Mountains of Tennessee and in the Gravelly Range of southern Montana. These offer opportunities for research in the field in a variety of geological and physiographic settings.

Excellent cooperative academic and research relationships exist with other departments on campus and with surrounding colleges and universities in southwestern Ohio. The department has wide-ranging capabilities and can accommodate through its facilities a very broad range of research ideas.

Financial Assistance

Teaching, graduate, and research/assistantships and fellowships are available for qualified persons in both of the following programs. The assistantships and fellowships involve a commitment to laboratory and classroom teaching, department operations, or geologic research.

Degree Requirements

Master of Science 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 requirements of the School of Graduate Studies, the following requirements of the Department of Geological Sciences must be met:

- 1 Completion of forty-five or more graduate credit hours apportioned in the following way: at least nine hours of thesis credit, and at least thirty-six additional hours of graduate credit in an instructional program approved by the candidate's graduate committee including continuing registration, while on campus, for GL 628, topical seminars in the geosciences
- 2 Presentation of four copies of an approved thesis
- 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. Ultimate responsibility for satisfactorily fulfilling all requirements rests with the student.

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 requirements of the School of Graduate Studies, the following requirements of the Department of Geological Sciences must be met:

- 1 Completion of a minimum of forty-five graduate credit hours apportioned in the following way: a maximum of twelve credit hours in the College of Education and Human Services, three to six credit hours of research credit, an approved geology field course, and additional graduate courses approved by the student's graduate committee to fulfill the minimum credit hour requirement

- 2 Presentation of an approved research project report
- 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.

Health Care Management

See Business and Administration

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 the following details), all of which lead to a Master of Arts degree. This program is approved by the Ohio Board of Regents and accredited by the North Central Association of Colleges and Schools.

The Graduate Faculty

Professors

Carl Becker, Ohio, Civil War

Charles R. Berry, Latin American, oral

Jacob Dorn, twentieth-century, United States intellectual

David C. Gordon, France, North Africa, Middle East

Paige E. Mulhollan, United States diplomatic, oral

Andrew P. Spiegel, European intellectual, German, British constitutional

Associate Professors

Martin Arbagi, Roman and Byzantine

Paul G. Merriam, United States, Jacksonian, urban

Patrick Nolan, United States, Jacksonian, urban, frontier, archival administration

Judith A. Sealander, United States social and labor, twentieth-century United States, quantitative

Allan Spetter (chair), United States diplomatic

Tsing Yuan, East Asian

Assistant Professors

F. Richard Swann, nineteenth- and twentieth-century British, Canadian

Harvey M. Wachtell, United States colonial revolutionary, early national

Admission

Decisions regarding admission to the graduate program of the Department of History, continuation in the program, and dismissal from it will be made by the department's curriculum committee. The candidate must meet the requirements of the graduate school, hold a bachelor's degree from an accredited institution, and meet a minimum grade point average (3.0 or better in history and 2.7 overall). Each candidate shall also include a statement of goals to be sought in the program. 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 department's curriculum committee. 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, when the curriculum committee deems it necessary, a personal interview by the 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 curriculum committee.

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

Financial Assistance

The Department of History awards a limited number of assistantships annually to qualified students. Assistants are usually assigned to a faculty member to aid in research, class preparation, and for a variety of other services. Assistantships may be renewed for a second year. Ordinarily, an assistant can complete requirements for a degree in two academic years.

Degree Requirements

The Master of Arts degree can be earned 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. Plan B is intended primarily, but not exclusively, for students not expecting to pursue doctoral studies. 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 these areas.

For the purpose of planning advanced courses and seminars, each student should consult the graduate director regularly. A student receiving two Cs will be placed on academic probation and will be required to appear before the curriculum committee to justify his or her continued participation in the graduate program. Upon review of the student's progress, the curriculum committee may dismiss him or her from the graduate program in history.

Plan A/Program of Study

Students must meet all requirements of the School of Graduate Studies, show a reading knowledge of a language necessary for thesis research, and successfully complete HST 799.

Two fields of concentration must be selected, one of which must be a United States history field. The possible areas of concentration are the following:

- 1 United States to 1865
- 2 United States since 1865
- 3 Ancient, Medieval, and Early Modern European
- 4 Modern European
- 5 Non-Western

If students have not had HST 300 and 498 or their equivalent, they must take both HST 698 and 700, only one of which will count toward the fulfillment of graduation requirements.

History Courses numbered 701 to 708	16
Electives in History and Related Subjects	20
At least twelve credit hours must be taken in history. Related subjects must be approved by the curriculum committee.	
History 799 Thesis	16
A student will be required to show a reading knowledge of a language necessary for thesis research. There is an oral examination over the thesis.	
Total	52

Plan B/Program of Study

Students must meet all requirements of the School of Graduate Studies.

Two fields of concentration must be selected, one of which must be a United States history field. The possible areas of concentration are the following:

- 1 United States to 1865
- 2 United States since 1865
- 3 Ancient, Medieval and Early Modern European
- 4 Modern European
- 5 Non-Western

If students have not had HST 300 and 498 or their equivalent, they must take both HST 698 and 700, only one of which will count toward the fulfillment of graduation requirements. Students who need to complete HST 700 are strongly encouraged to take it early in their graduate study.

History Courses numbered 701 to 708	20
Electives in History and Related Subjects	32
At least twenty credit hours must be taken in history. Related subjects must be approved by the curriculum committee.	
Written Comprehensive Examination	
The student will be examined on the two fields of concentration.	
Total	52

Plan C/Program of Study

Students must fulfill the requirements of the School of Graduate Studies and successfully complete the following curriculum.

If students have not had HST 300 or 498 or their equivalent, they must take both HST 698 and 700, neither of which will count toward the fulfillment of graduate requirements.

Professional Core	24
HST 710, 714 Archival Administration	6
HST 712, 713 Historical Administration	6
HST 711 Local History	2
HST 715 Internship and Report	5
HST 717 Practicum	2
MGT 621 Graduate Survey of Management or MKT 720 Service and Nonprofit Organization Marketing	3
History Core	24
Seminars in U.S. history	12
600-level U.S. history courses	12
Electives	6-8
To be chosen from the following courses:	
HST 716 American Architectural History	
HST 717 Practicum	
LCS 635 Production of Instructional Materials	

LCS 685 Computers for Educators
 LCS 740 History of Books and Printing
 ACC 621, 622 Graduate Survey of
 Accounting
 ART 610 Studies in American Art
 ART 697 Museology and Gallery
 Management

Evaluation

Submission of internship reports and projects and oral or written examination covering history and related elective courses

Total

54-56

Humanities

The Master of Humanities is a flexible, interdisciplinary program in the College of Liberal Arts which provides a path in the liberal arts for students who wish to pursue a curriculum based in more than one discipline. Study leads to a Master of Humanities (M.Hum.) degree.

The program serves a broad range of personal and professional needs, especially for those already established in a career who desire a nontraditional degree for professional advancement or for personal intellectual development. High school teachers of humanities who want a content-emphasis degree, persons who seek a career change at mid-career or after early retirement; and persons who seek a second master's degree in a complementary or even a contrasting field may find this program appropriate for them. Graduates of specialized undergraduate programs may welcome the breadth provided by this master's degree. Full-time or part-time study is possible.

Although anchored in the humanities, the program permits selection of some courses from other areas. At the core of the program are one methods seminar and two required seminars that introduce students to the scope and methodologies of the humanities. In cooperation with the program director, the student will design the rest of the curriculum to meet his or her individual academic goals. Thus, the program has both a specific focus on the humanities and wide flexibility within that broad curriculum area of the College of Liberal Arts.

The Graduate Faculty

Participating faculty are drawn from departments throughout the College of Liberal Arts, including humanities disciplines as well as allied fields of interest.

Director

Nicholas Piediscalzi, professor of religion

Admission

Applicants for admission to the Master of Humanities program must present a bachelor's degree from an accredited college or university with a minimum of thirty semester or forty-five quarter hours in liberal arts disciplines and a minimum grade point average of 3.0 (on a 4.0 scale) in their undergraduate work. Students deemed to have deficiencies in their undergraduate work may be asked to take additional courses.

Additionally, all prospective students are asked to submit a 250-word essay describing their professional and academic background as well as goals they wish to pursue in the Master of Humanities program.

Students who do not meet requirements for regular admission may apply to the program on conditional status.

A maximum of three courses, normally not to exceed twelve quarter hours of credit, will be accepted in transfer for work completed at the master's level at other accredited institutions. Such transfer credits are subject to approval by the program committee as well as to the regulations of the School of Graduate Studies.

Advising

Upon admission to the program, each student is advised by the director of the program. While enrolled in the program (even if attending on a part-time basis), all students must consult at least once each term with the director. In consultation with the director, the student will design a program of study appropriate to his or her goals. This program, which must also be approved by the program committee, will be filed with the office of the School of Graduate Studies. Any changes in a student's program must have the same approvals. At the appropriate time, the director will also appoint a project committee, approved by the program committee, to direct and evaluate the student's project. The project proposal must be approved by the program committee in the sixth week of the quarter prior to registration for the project (HUM 703).

Financial Assistance

The college awards a limited number of graduate assistantships annually to qualified students. Prospective students may apply to the School of Graduate Studies or the program director.

Degree Requirements

The program can be completed in four quarters of full-time work. However, it is designed not only for the full-time student but also for the part-time student; therefore, it incorporates a minimum of prerequisites and sequences and a variety of options. As a result, it is flexible enough to

accommodate the part-time student who must combine education with the demands of a full-time job.

The Master of Humanities degree can be earned through one of three programs. Plan A is intended primarily for students who desire to write a traditional thesis and thereby gain the full range of professional experience in independent academic research and writing. Plan B is intended primarily for students who desire more guided class work and an introduction to the classical literature in two related fields on a specific topic, theme, period, or problem. Plan C is intended primarily for students who desire to complete a creative work or project and write an essay that explains the humanities context of the work or project.

Plan A: Thesis	48
ENG 701 or HST 700	4
HUM 701 and 702	10
Humanities courses from at least two departments	18
Related and/or elective courses	8
Project: A traditional master's thesis (HUM 703)	8
Plan B: Essays	54
ENG 701 or HST 700	4
HUM 701 and 702	10
Primary humanities concentration	16
Secondary humanities concentration	12
Related and/or elective courses	4
Project: Essays (HUM 703) a set of comparative review essays, each six to eight pages in length, accompanied by an introduction and conclusion. The writing of these essays will be directed by a project committee composed of two faculty members, one from each of the student's two areas of concentration. In consultation with this committee of two the student will identify a question or problem as the focus of his or her final program work and will prepare a short list of the essential readings from the two fields. The student will then write a series of related, short critical essays discussing the selected readings in the light of the identified focus. After the essays have been approved by the faculty supervisors, they will be submitted to the director for final approval.	8

Plan C: Project	50
ENG 701 or HST 700	4
HUM 701 and 702	10
Humanities courses from at least two departments	16
Related and/or elective courses	12
Creative project with academic essay (HUM 703). A creative work (e.g., a novel, play, collection of poems, painting, exhibition of paintings, or sculpture, textbook, or curriculum) accompanied by an explanatory essay that is theoretical, critical, and bibliographical; that places the project in its historicocultural context; and that demonstrates that the student is critically aware of the definitions and historical and philosophical presuppositions that underlie the project.	8

Before commencing work on a thesis, a set of essays or a creative project, the student must submit a prospectus to be approved by the student's project committee and the program committee. The student and chair of the project committee will meet with the program committee to discuss the prospectus after it has been approved by the student's project committee.

The thesis, collection of essays, or project is the capstone of each individually tailored program, which requires the student to bring together in an organized fashion the results of particular investigations related to his or her curriculum.

A student who can demonstrate in an interview with the instructors of both ENG 701 and HST 700 that he or she has had adequate previous course work or professional experience in this area can petition the program committee to have the research methods requirement waived.

Logistics Management

The College of Business and Administration offers two programs of graduate study in the area of logistics management: a Master of Science degree in logistics management, and a concentration in logistics management within the Master of Business Administration degree program.

See Business and Administration

Management

See Business and Administration

Management Science

See Business and Administration

Marketing

See Business and Administration

Math Education

See Education and Human Services

Mathematics and Statistics

The Department of Mathematics and Statistics offers the Master of Science degree. The graduate program is designed to provide a solid foundation for further professional training or careers in teaching, industry, or government. Degree requirements are flexible, allowing considerable latitude in tailoring the course of study to a student's individual preferences. Options are available in mathematics, applied mathematics, and statistics, or programs may combine two or more of these areas. The applied mathematics option is designed not only for persons with undergraduate training in mathematics but also for those with degrees in related disciplines such as engineering and physics, who want a solid foundation in mathematics. The statistics option is open to persons with bachelor's degrees in a variety of fields besides mathematics or statistics. The prior mathematical training needed for the statistics option has been kept to a minimum to accommodate students with undergraduate majors in fields such as biology, business, or one of the social sciences. The department makes provision for part-time degree candidates by offering all required courses in the late afternoon or evening.

Graduate students are assigned an adviser from the graduate faculty on the basis of their proposed area of study. Early consultation with the adviser is recommended since the adviser works closely with the student in every phase of the program.

The Graduate Faculty

Professors

- Gerd H. Fricke, complex analysis
 Krishan K. Gorowara, numerical analysis, computer graphics
 Terry A. McKee, logic, graph theory
 Won Joon Park, probability, reliability
 Edgar A. Rutter (chair), algebra
 David Sachs, ordered structures, foundations of geometry
 Donald J. Schaefer, numerical analysis, computer operating systems
 Robert Silverman (Emeritus), combinatorics

Associate Professors

- William E. Copping, algebra
 Joanne M. Dombrowski, analysis
 Raymond E. Lewkowicz, analysis
 Leone Y. Low, linear models, analysis of variance
 Marc E. Low, number theory
 Carl C. Maneri, algebra, finite geometry
 Barbara L. Mann, nonparametric statistics, biostatistics
 Tapas Mazumdar, partial differential equations (abstract methods)
 Gerald E. Meike, foundations
 David F. Miller, optimization
 Manley Perkel, algebra, combinatorics
 Makarand Ratnaparkhi, mathematical statistics, biostatistics

Assistant Professors

- K. T. Arasu, combinatorics
 Anthony B. Evans, finite geometry, graph theory
 Yiming Hong, coding theory
 Harry Khamis, contingency table analysis
 Jian-Tong Lin, numerical analysis
 Richard Mercer, operator algebras, mathematical physics
 Dennis Ryan, applied mathematics, biomathematics
 Munsup Seoh, nonparametric statistics
 Alphonso L. Smith, analysis
 Larry Turyn, differential equations, multiparameter problems
 James T. Vance, Jr., Fourier analysis
 Daniel T. Voss, factorial design
 Derek J. Westwood, functional analysis

Admission

Applicants for admission are expected to meet the general requirements for admission to graduate study as established by the School of Graduate Studies. All applicants should also have completed a calculus sequence. In addition applicants must present postcalculus courses in mathematics, as well as related course requirements, appropriate for the intended program of study. The specific undergraduate preparation required for each of the department's three degree options forms part of the description of each option. Applicants with insufficient preparation may be admitted on the condition that they complete certain prerequisite work to be specified by the department at the time of admission.

Financial Assistance

The department awards a limited number of graduate teaching assistantships annually to qualified applicants. Assistantships may be renewed for a second year; assistants can complete the requirements for a degree in two years. An assistant's duties normally include classroom teaching, which is a meaningful aspect of the education of a graduate student in the mathematical sciences.

Degree Requirements

The Master of Science degree may be earned by satisfying the requirements of one of three programs. The mathematics option is a flexible program emphasizing sound, fundamental, mathematical training. A student may either complete a traditional curriculum in pure mathematics or develop with a graduate adviser a plan of study that is tailored to the student's individual needs. This option can provide a solid foundation for doctoral study in mathematics or for careers in teaching, industry, or government. The applied mathematics option and the statistics option are more structured programs but still allow a student considerable latitude in designing a course of study. These two programs are primarily intended to prepare a student for professional employment in business, industry, or government. However, either one can form a solid foundation for doctoral study or for a career in teaching.

All master's degree candidates are required to pass a comprehensive written examination which must be taken at least one quarter before the expected date of graduation.

Mathematics Option

Applicants for this program should have completed a minimum of twenty-one credit hours in mathematics beyond calculus. The types of courses which are considered most important are sequences in analysis (advanced calculus) and algebra (linear and/or modern algebra).

In addition to the requirements of the School of Graduate Studies, the following departmental requirements must be met to earn a degree under this option:

- 1 The student must complete a minimum of forty-five credit hours of courses which have prior approval of the department (departmental approval is normally given by the student's adviser). At least twenty-four of these hours must be in mathematics or statistics courses numbered 701 or above and may not include MTH 792 or STT 786.
- 2 The twenty-four credit hours at the 700 level must include at least one full-year sequence in mathematics.

The writing of a thesis is optional. Students who elect a thesis may count it for not more than ten hours of credit. The thesis must be approved by the student's adviser and must be prepared to conform to the standards established by the School of Graduate Studies. A thesis defense will be required.

Applied Mathematics Option

The applied mathematics option provides training in mathematical techniques applicable to a wide range of real-world problems. The objectives of this program are two-fold: to develop the student's ability to analyze and solve a variety of problems and to increase the student's understanding of mathematical problems encountered in other fields. To this end, the curriculum includes course sequences in pure and applied mathematics and advanced courses in related areas such as engineering, computer science, or physics. This option is designed not only for those with undergraduate training in mathematics but also for those with degrees in related fields who wish to acquire a solid foundation in applied mathematics.

Applicants for this program should have completed differential equations, linear or matrix algebra, and an analysis sequence (advanced calculus). Courses in partial differential equations and/or complex variables are also desirable. In addition, a year of general physics and a working knowledge of FORTRAN, Pascal, or some other high-level programming language are expected.

Because this program admits students with a variety of undergraduate degrees, some applicants will not have taken an analysis sequence but will present courses in an area of application that satisfies program requirements. In these circumstances, with the prior consent of the department, all or part of the required analysis sequence may be taken in lieu of appropriate program electives.

In addition to the requirements of the School of Graduate Studies, the following departmental requirements must be met to earn a degree under this option. Full-time students normally take two years to complete this program.

Required Courses

16

MTH 716, 717 Numerical Analysis I and II
MTH 731, 732 Real Analysis I and II

Applied Mathematics Electives

9-10

At least three of the following:
MTH 606 Mathematical Modeling
MTH 607 Optimization Techniques
MTH 658 Applied Graph Theory
MTH 680 Methods of Applied
Mathematics: Geometric Methods
MTH 681 Methods of Applied
Mathematics: Differential Equations
MTH 682 Methods of Applied
Mathematics: Integral Methods
MTH 736 Calculus of Variations

Other Electives 19-20

These courses are chosen in conjunction with the student's adviser from a list of electives approved by the department. They must include a minor composed of at least three approved courses from outside the department, or at least three approved statistics courses.

Sample Minors

Computer Science: CS 658, 670, CEG 676

Systems Engineering: EGR 521, 522, 523

Physics: PHY 650, 651, 652

Statistics: STT 661, 662, 666, 667

Total 45**Statistics Option**

The primary objective of the statistics option is to prepare students to function as professional statisticians in business, government, or industry. The core of required courses provides a thorough grounding in the statistical theory and methodology that are needed for the collection and analysis of data. It also ensures that students become proficient in consulting and in the use of statistical software. The advanced statistics courses familiarize students with specific theoretical and applied areas of statistics. Ten hours of electives lend flexibility to the program.

Applicants for this option should have completed a calculus sequence which includes multivariate calculus and a course in linear or matrix algebra. Some experience in computer programming and enough background in probability and statistics to begin basic graduate courses in statistics are also required. This normally means one or two prior courses in probability and statistics, depending on content and level.

In addition to the requirements of the School of Graduate Studies, the following departmental requirements must be met to earn a degree under this option. Full-time students normally take two years to complete this program.

Required Courses 23

STT 661, 662 Theory of Statistics I and II*

STT 666, 667 Statistical Methods I and II*

STT 764 Design of Experiments

STT 791 Statistical Consulting

Advanced Statistics Courses 12

Three courses chosen from the following:

STT 701 Time Series Analysis

STT 702 Applied Stochastic Processes

STT 721 Sampling Design

STT 744 Applied Multivariate Analysis

STT 761 and 762 Linear Models I and II

STT 767 Applied Regression Analysis

Electives 10

Three courses chosen from the following:

STT 601 Nonparametric Methods

STT 624 Statistical Control Methods for

Quality and Productivity

STT 626 Reliability and Life Data

STT 696 Topics in Statistics and Probability

STT 740 Contingency Table Analysis

MTH 606 Mathematical Modeling

MTH 607 Optimization Techniques

MTH 631-633 Real Variables I-III

CS 670 Systems Simulation

With the prior approval of the statistics adviser, other appropriate courses, including courses from outside the department, may be used as electives.

Credit will be allowed for STT 686 or STT 786, Independent Reading in Statistics and Probability, only if approved in advance.

Total 45

*Students who have taken any of STT 661, 662, 666, or 667 or equivalent prior to entering the program will be required to take additional elective hours in lieu of the courses taken.

Medicine

A catalog may be obtained from the School of Medicine.

Microbiology and Immunology

See Biological Sciences

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 to 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

Professor

William J. Steinohrt, music theory, composition

Associate Professors

Leland D. Bland, music theory, music history and literature

Barbara R. Foster, piano, music history and literature, chamber music

Charles S. Larkowski, musicology, music history and literature

David G. Poff, music education

Admission

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 placement examinations in music education and music history, the results of which will be used in planning the student's program. The applicant also must take a music theory proficiency examination. This examination must be successfully completed before any graduate music theory courses are taken. A student who wishes to study applied music must audition for the appropriate Applied Music Board.

In addition to completing the normal program, a student not holding a standard teaching certificate will be required to earn Ohio certification before graduation.

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 departmental permission as outlined for the particular area of study.

Each regularly enrolled student will be assigned an adviser who will, together with the director of graduate studies in music, 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 student will be assigned a committee of three faculty members who will design and evaluate the oral comprehensive examination and evaluate the thesis, project, or research paper. (See degree program options.)

The Department of Music publishes a handbook, *Guidelines for Graduate Students in Music*. It provides detailed information about all aspects of the M.Mus. program. All graduate students in music should obtain a copy from the departmental office.

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; MUS 702, Introduction to Research in Music Education; MUS 704, Foundations and Principles of Music Education; at least two 700-level courses in music theory; and at least two 700-level courses in music history and literature.
- 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-one to twenty-seven credit hours), music history and literature, music theory, and performance (twelve to eighteen credit hours), and thesis (maximum of six credit hours) for a minimum total of forty-five credit hours. The student will prepare a thesis under the supervision of a thesis director, approved by the director of graduate studies in music. The thesis will be read and approved by the candidate's committee.

Recital Option

Course work will be distributed in the areas of music education (twenty-four to thirty credit hours) and music history and literature, music theory, and performance (fifteen to twenty-one credit hours) for a minimum total of forty-five credit hours. If approved by the appropriate Applied Music Board for the recital option, the student will present a full-length public recital. The recital performance will be heard and judged on a pass-fail basis by the appropriate Applied Music Board. For specifications as to length, content, and procedures for the graduate recital, the student should consult the departmental Applied Music Policy Statement, Section IX,

Graduate Study in Applied Music. This policy statement is available in the office of the Department of Music.

In addition, the student will present a research paper related to the recital literature. The paper, equivalent in scope to a term paper, will be read and approved by a permanent member of the music history and literature or music theory faculty.

Master's Project Option

Course work will be distributed in the areas of music education (twenty-four to thirty credit hours) and music history and literature, music theory, and performance (fifteen to twenty-one credit hours) for a minimum total of forty-five credit hours. In addition, the student will present a project. The student may revise, refine, and extend a paper written for a course, or may elect to present a new paper. The project paper will be read and approved by the student's project director.

Note: In any of the options the student may, with the approval of the director of graduate studies in music 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 the courses are in cognate areas which contribute substantially to the preparation of a teacher in the arts.

Students Not Enrolled in the M.Mus. Program

A graduate student enrolled in another degree program, e.g., Master of Arts, Master of Humanities, or Master of Education, or a nondegree graduate student may, with the approval of his/her department, elect certain graduate courses in music. The requirements for courses in each area of music are listed below.

Music Education

All courses in music education require an undergraduate degree in music. Permission of the director of graduate studies in music and permission of the instructor are required.

Theory of Music, Music History, and Literature

All courses in music theory and music history and literature require a substantial background in music. Permission of the director of graduate studies in music and permission of the instructor are required.

Performance

MUS 705, Chamber Music, and MUS 715, Ensemble, require an audition and approval of the instructor. Private study in any area of applied music requires a successful audition before the appropriate Applied Music Board.

For further information, consult the departmental Applied Music Policy Statement, Section IX, *Graduate Study in Applied Music.* This policy statement is available in the office of the Department of Music.

Nursing

The School of Nursing offers a graduate program leading to a Master of Science degree with a major in nursing. The program is designed to prepare nurses to teach, to provide leadership in key administrative nursing positions, to function as clinical specialists, and to pursue doctoral study in nursing. The curriculum includes a core component of courses, three functional areas (nursing education, nursing administration, and advanced clinical practice), and a thesis or scholarly project requirement. Specialization is possible as students can focus on an area of clinical interest and specific age groups or populations. The program accommodates both full-time and part-time students, with most classes offered in the late afternoon and evening. The sequence of course offerings is somewhat flexible, allowing students to complete the program in one to five years.

The Graduate Faculty

Professor

Jeanette Lancaster (dean), nursing administration, community mental health nursing, research in health promotion

Associate Professor

Donna M. Deane, nursing administration, nursing education

Assistant Professors

Betsy Frank, administration

Eda L. Mikolaj, medical-surgical nursing, nursing education, adult education

Susan G. Praeger, parent-newborn nursing, nursing education

Admission

The School of Nursing has several admission requirements in addition to the minimum requirements of the School of Graduate Studies. All prospective students must have a baccalaureate degree in nursing from an NLN accredited college or university with an overall grade point average in undergraduate work of 3.0, or 2.7 with 3.0 or better in the upper half of undergraduate work. Completion of a statistics course before admission is highly recommended. Students admitted without a statistics course will be required to enroll in one as a prerequisite or corequisite to NUR 707. A statistics course taken after admission will not count toward the forty-eight credit hour graduation requirement.

Finally, all applicants must present evidence of licensure to practice nursing in Ohio and liability insurance for clinical courses.

All students are required to adhere to the policies and procedures set forth in the Wright State University *Graduate Catalog*.

It is recommended that all application materials for fall quarter be submitted by May 15. Applications received after that date are considered on a space-available basis, as are applications for admission for other quarters.

Facilities

The School of Nursing is housed on the fourth floor of Allyn Hall. Clinical instructional facilities are abundant and varied. In June 1984, the school entered into a collaborative agreement with the Division of Nursing at Miami Valley Hospital to form a Center for Excellence in Nursing education. This agreement affords opportunities for research, clinical practice, and education for students and faculty. In addition the school has contracts with over fifty agencies in the area including hospitals, rehabilitation centers, county health departments, nursing homes, school systems, senior citizen centers, and day care centers which can be used for clinical experiences and/or research. The School of Nursing also owns a Mobile Health Unit which serves as a health assessment and education center.

Through a cooperative arrangement with Miami University, students enrolled in the Wright State University-Miami Valley School of Nursing graduate program can take selected courses at Miami University and have them applied toward the master's degree.

For research, the University Library and the Health Sciences Library are available. The University Library provides media production services and facilities. A Television Center affords the opportunity to produce television programs for public or instructional purposes.

These resources are supplemented by a dozen area academic libraries available through the Southwestern Ohio Council for Higher Education, by membership in the Center for Research Libraries, and by excellent interlibrary loan service.

Degree Requirements

The program of study includes a core component of courses, three functional areas (nursing education, nursing administration, and advanced clinical practice), a thesis or scholarly project, and several electives.

The core courses focus on philosophy, theories, concepts, and practices of professional nursing. Courses include a progressive program of advanced nursing practice with field work related to clients who have optimal states of health as well as clients who have altered health states.

The three functional tracks—nursing education, nursing administration, and advanced clinical practice—each include three in-depth courses specific to the functional area and a practicum. Practica provide students the opportunity to apply their knowledge and skills in an institutional environment of their choice.

Candidates for the master's degree must meet all of the following requirements:

- 1 Completion of forty-eight credit hours as required
- 2 Completion of the program within five years
- 3 Maintenance of a 3.0 cumulative grade point average with no more than nine hours of C grades applicable to the degree
- 4 Successful defense of a thesis or successful completion of a scholarly project

Program of Study

Summary of Requirements	48
Core Courses	26
(Thesis or scholarly project)	
Functional Area	16
(Education/Administration/ Advanced Clinical Practice)	
Electives	6

Personnel Counseling

See Education and Human Services

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.

In addition to these degree programs, the Selected Graduate Studies format may be used to develop an individual interdisciplinary course of study. It has been used, for example, to provide an electro-optics option through a combination of engineering and physics courses.

The Graduate Faculty

Professors

Harvey M. Hanson, atmospheric physics

John S. Martin, plasma physics

Associate Professors

Merrill L. Andrews (chair), plasma physics, plasma laser media

Gust Bambakidis, theoretical physics, solid state

Joseph W. Hensky, solid state and materials

A. Edward Jaworowski, semiconductor physics

Thomas W. Listerman, solid state and materials

Paul J. Wolfe, geophysics

David R. Wood, atomic spectroscopy

Assistant Professor

Jerry D. Clark, atomic physics

Facilities and Research

The Department of Physics is involved in four major areas of research: solid state physics and materials, plasma physics, atomic spectroscopy, and exploration geophysics. There is also a program in radiological physics.

Research interests in the solid state physics/materials science area center around the properties of metals, metal alloys, semiconductors, and thin films. Typical physical properties of interest are Young's modulus, creep, effects of radiation damage on mechanical and electrical properties, and positron annihilation. The work in semiconductor physics concerns the electrical, thermal, and optical properties of semiconductors of group IV, III-V, II-VI, and IV-VI systems. Correlative studies of defects introduced by growth, heat treatment quenching, ion implantation, or irradiation are made using deep-level transient spectroscopy (DLTS), Rutherford backscattering (RBS), channelling and proton-induced x-ray excitation (PIXE), transmission electron microscopy (TEM), and positron annihilation.

The facilities for experimental work include a 2 MeV electron Van de Graaff accelerator, a 120 keV ion implanter, a 400 keV ion Van de Graaff accelerator, a Polaron modular DLTS system, a positron annihilation spectrometer, cryostats, an automatic internal friction data acquisition system, and electronics for monitoring and controlling the electrical and thermal parameters of the samples. Metallographic and tensile testing equipment is also available. Theoretical studies are directed toward understanding the defects in solids and metal hydrogen systems.

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. A mirror machine and a long high-field solenoid are available 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. Data processors include a fast S-100 and a PDP-11 system with D/A, A/D converters. These are used for rapid on-line data acquisition, processing, and storage, and for the cybernetic control of experiments. An ion beam diagnostic system has been constructed. Microwave coupling is studied and applied to sources for the mirror system as well as laser media production. In addition, plasmas utilized as gas laser media and for the deposition of semiconductors are being studied. These plasmas are typically generated with microwave sources.

The atomic spectroscopy laboratory includes the equipment necessary to study a range of experimental research topics, including the analysis of atomic spectra and time resolved absorption spectroscopy. Presently, spectra of ions are being analyzed by means of a two-meter Czerny-Turner vacuum spectrometer, with the option of higher resolution from a Fabry-Perot etalon. The time resolved absorption apparatus is used in evaluating energy flow kinetics in plasmas important to laser applications. Data acquisition ranges from photographic recording to photon counting with computer facilities available for data acquisition and reduction.

Geophysics research is conducted in cooperation with the Department of Geological Sciences. The emphasis is on using seismic reflection, seismic refraction, and gravity to study the earth's structure in southern Ohio and neighboring regions. Much of this work is related to petroleum, water, and coal resources. Equipment for field work includes 48-trace digital seismic systems, a 24-trace Minisoseismic seismic reflection system, three gravimeters, drill rigs, and field vehicles. Special computer systems are used for processing and modeling seismic data.

Atmospheric physics is studied in cooperation with the climatology group of the Department of Geography. Areas of research interest include airborne albedo measurements and atmospheric modeling for global radiation.

The program in radiological physics concerns the application of radiation physics in radiation therapy of cancer patients. The facilities available include a 6 MeV Linear Accelerator, a 112 MeV Linear Accelerator, and a 45 MeV Betatron producing bremsstrahlung x-ray beams of 6, 8, and 45 MeV and electron beam energies of 3-45 MeV.

In addition to the research facilities available within the Department of Physics, there are other supporting facilities in the College of Science and Mathematics. 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.

Master of Science in Physics

Admission

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 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.

Degree Requirements

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

- 1 Take an orientation examination before or during the first quarter of study, if asked. 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 Completion of a minimum of thirty-six credit hours in physics courses numbered 680 and above.
- 3 Completion of the core courses, quantum mechanics and theoretical physics, which are to be part of the thirty-six credit hours of number 2.
- 4 Completion of CS 210. This requirement may be waived if equivalent work has already been completed.
- 5 Pass a department final examination by the end of the last quarter of the degree program.
- 6 Presentation of an approved thesis. (Note: No more than fifteen credit 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.

Master of Science in Teaching

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

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.

Degree Requirements

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 credit 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

Physiology and Biophysics

See Biological Sciences

Political Science and Urban Affairs

See Applied Behavioral Science

Principalship— Elementary, Middle School, and Secondary

See Education and Human Services

Professional Archival and Historical Administration

See History

Professional Psychology

Program information may be obtained from the School of Professional Psychology.

Psychology

See Applied Behavioral Science, Professional Psychology

Reading Education

See Education and Human Services

Rehabilitation Counseling

See Education and Human Services

School Psychology

See Education and Human Services

Science Education

See Education and Human Services

Selected Graduate Studies

Under a carefully administered program, a student may develop a proposal for a master's degree that is not available in any one existing program, but combines elements of two or more existing master's degree programs. Students interested in such a one-of-a-kind degree should contact the School of Graduate Studies for further information.

Social Work

See Applied Behavioral Science

Sociology/ Anthropology

See Applied Behavioral Science

Special Education

See Education and Human Services

Statistics

See Mathematics and Statistics

Systems Engineering

The College of Engineering and Computer Science offers a graduate program in systems engineering leading to the Master of Science degree. The program is broad in scope, offering the student the opportunity to concentrate in either electrical, mechanical, biomedical, or materials course areas. Incoming students will be asked to indicate a primary area of interest so that an appropriate academic adviser and home department can be identified.

The Graduate Faculty

Professors

James E. Brandeberry (dean), circuit and interface design, microprocessors, digital control, robotics and computer-aided design

Wilbur Hankey, computational fluid dynamics, aerodynamics, aerothermodynamics

Jerrold S. Petrofsky, biomedical engineering, rehabilitation engineering, bioinstrumentation, computer engineering

Chandler A. Phillips, biomedical engineering, muscle biomechanics

Malcolm L. Ritchie (Emeritus), human factors engineering, engineering psychology

R. Fred Rolsten, materials engineering, impact and shock loading, materials in harsh environments, bioengineering mechanics and dynamics

Blair Rowley, development of medical devices, bioelectrical phenomena and wound healing, computer medicine, rehabilitation engineering

Joseph F. Thomas, Jr., materials engineering, mechanical behavior

Associate Professors

Richard J. Bethke, biomedical engineering, signal and systems modeling and analysis, stochastic processes

Parviz Dadras, solid mechanics, manufacturing processes

Amir Faghri, heat and mass transfer, fluid mechanics and analysis

Russell A. Hannen, electronic systems, control theory, stochastic processes

William S. McCormick, communication theory, bioengineering, electromagnetics, electro-optics

Kuldip S. Rattan, computer-aided design, digital signal processing and control, bioengineering, robotics

Raymond Siferd, VLSI, robotics and systems identification

George R. Spalding, systems identification, robotics, dynamics and control

Isaac Weiss, thermomechanical processing of austenite, deformation processing

Assistant Professors

Lokesh Datta, digital signal and image processing, communications theory, digital systems

Billy W. Friar, thermodynamics, heat transfer, fluid mechanics

Marian K. Kazimierzczuk, electronics circuit analysis, high frequency, tuned power amplifiers

David B. Reynolds, biomedical engineering, biofluid mechanics, engineering approaches to respiratory/pulmonary physiology

Admission

Candidates for admission to the systems engineering program must satisfy the requirements of the School of Graduate Studies and have a bachelor's degree in engineering or a related area. For some students, particularly those with a degree in a related area, preliminary course work, in addition to the normal degree requirements, may be necessary.

Facilities and Research

Engineering faculty members are engaged in a variety of research efforts in which graduate students may become involved. There are active programs in fluid mechanics and heat transfer, materials, biomechanics, human factors, system estimation and identification, stochastic modeling, aircraft dynamics, digital control, robotics, VLSI, electronics, pattern recognitions, and communications systems.

Current research in heat transfer and fluid mechanics includes analysis of solar cooling systems, transport in falling liquid films, condensation and evaporation, and heat pipe analysis. Investigations of unsteady fluid flows in combustion chambers and in rotating turbo machinery are being accomplished by use of numerical techniques on super computers.

Research in the materials engineering area emphasizes processing and structure-property relations for metals, ceramics, and composites. Processing activities include physical and analytical modeling of deformation processes such as forging, bending, and sheet metal forming and powder processing of both metals and ceramics. Other topics of interest include mechanical behavior modeling, rapid solidification, thermal barrier coating, and electrical ceramics. Research in the finite element method and automated design area includes modeling, analysis, and design of structures with static, dynamic, and aeroelastic requirements. Facilities include mechanical testing equipment, high temperature furnaces, computer systems for data acquisition and process modeling, and optical and scanning electron microscopes. Close interactions are maintained with polymer science, x-ray crystallography, and metal physics research programs in other departments of the college.

Projects in biomedical engineering currently include neural prosthesis (for rehabilitation), biomedical applications of microprocessors, muscle biomechanics, and biofluid mechanics. Specific areas include biophysical studies, biomathematical modeling, and physical and computer modeling of the respiratory system. Research studies are conducted in any one of four fully equipped laboratories: bioinstrumentation, biocomputers, biomechanics, and biodynamics.

Research activities in the human factors area are investigating the nature and characteristics of the engineering design process. Emphasis is on methods of modifying engineering education to improve the design capability and performance of engineers.

The faculty has a number of projects in the identification and estimation area. These include the modeling and synthesis of stationary and non-stationary stochastic processes, e.g., human speech, as well as parameter identification and

estimation in distributed systems (theoretical and experimental methods) and parameter estimation for unsteady flight conditions.

Research in the digital control area is focused on redesign of existing flight-control systems, robotics, and computer vision. Research is also being conducted in pattern recognition and image processing.

Research in electronics includes efforts in rf and power electronics, and microwave devices. VLSI research includes design of I.C.'s for signal processing and computer architecture using NMOS and CMOS technologies.

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 that are available for faculty and graduate research.

Degree Requirements

Degree candidates must plan a program of study that satisfies degree requirements and meets individual educational needs and career objectives. The program of study must be prepared in consultation with an adviser since there may be additional requirements or constraints based on the student's particular area of concentration. The program of study must be finalized by the time the student completes twelve credit hours of graduate study.

In compliance with the requirements of the School of Graduate Studies, the following requirements must be met for the M.S. degree in systems engineering:

1. Completion of forty-five graduate credit hours in courses that have prior approval by a systems engineering graduate adviser.
2. At least thirty-six of the total forty-five graduate credit hours must be engineering (EGR) or computer engineering (CEG) courses. At least twenty-four of these must be engineering courses (EGR).
3. At least twelve of the thirty-six graduate credit hours of engineering (EGR) and computer engineering (CEG) must be courses numbered 700 or above, excluding EGR 700 and EGR 899, Thesis.
4. At least six of the total forty-five graduate credit hours must be courses in mathematics (MTH), statistics (STT), or computer science (CS).

5. Students must choose either a thesis option or advanced course work option.

Thesis Option: A thesis satisfying all requirements of the School of Graduate Studies must be completed and successfully defended in an oral examination before the major committee. Up to twelve credit hours of EGR 899, Thesis, may count toward degree requirements of forty-five total graduate credit hours and thirty-six graduate credit hours in engineering or computer engineering.

Course Option: Students must complete twelve credit hours of courses numbered 700 or above in engineering (EGR) in addition to the twelve hours specified in requirement 3.

Students employed as teaching or research assistants through the School of Graduate Studies at any time during their degree candidacy must choose the thesis option.

TESOL/Teaching of English to Speakers of Other Languages

See English

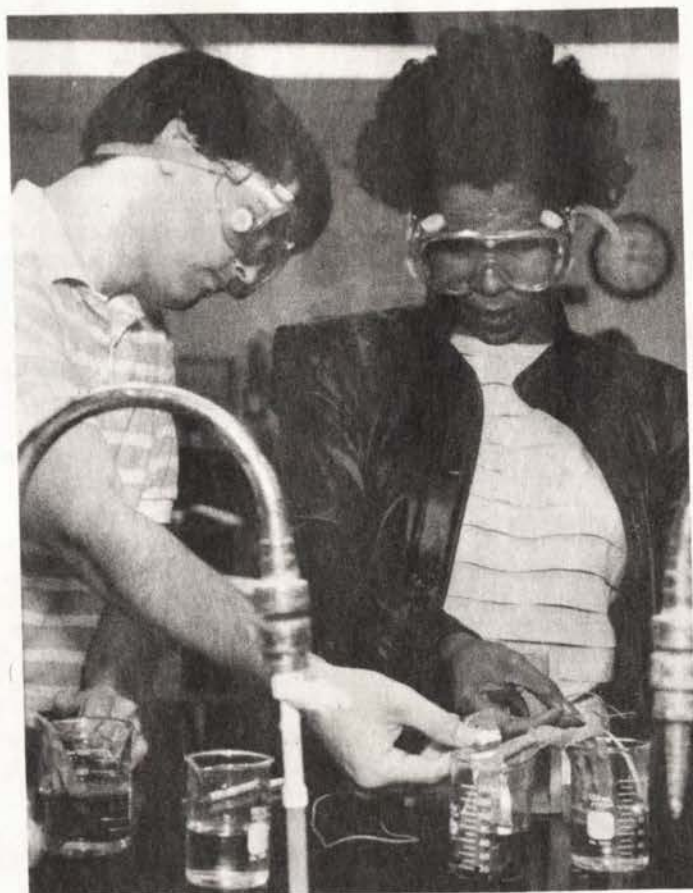
Urban Affairs

See Applied Behavioral Science

Urban Planning

Contact the Department of Geography for information about this certificate program.

Graduate Course Descriptions



The course descriptions listed in this catalog represent the range of graduate courses offered at Wright State by the Colleges of Business and Administration, Education and Human Services, Engineering and Computer Science, Liberal Arts, and Science and Mathematics, the School of Professional Psychology, the Wright State University-Miami Valley School of Nursing, and other graduate programs. For medical school courses see the *School of Medicine Catalog*, available in the medical school Office of Student Affairs/Admissions, 210 Medical Sciences. For undergraduate course descriptions see the *Undergraduate Catalog*, available in the Office of Undergraduate Admissions, 127 Student Services.

A list of course abbreviations and an explanation of the course numbering system can be found on page 39. Not all courses described in this document are offered every quarter or every year. For a listing of the specific courses offered in a particular quarter, and for an update of academic information concerning degree programs and courses, consult the Wright State class schedule published each fall, winter, spring, and summer quarter.

Accountancy/ACC

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

A survey course of basic accounting designed for persons having had no previous course work in accountancy. Prerequisite: for 622, ACC 621.

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. Not open to accountancy majors with previous courses in intermediate accounting without permission of adviser. Prerequisite: ACC 622 or equivalent.

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.

713-3 *Financial Accounting Concepts III*

Attention is given to a range of financial accounting topics which include business combinations, consolidated financial statements, accounting for foreign operations, reporting for segments of a business, and accounting for partnerships. Graduate standing required. Prerequisite: ACC 711, 712.

721-3 *Federal Income Tax Accounting*

A study of the federal income tax and its effect upon business decisions. Prerequisite: ACC 622.

722-3 *Auditing Theory*

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

723-3 *Accounting Systems*

Study of the fundamental concepts of information processing with specific emphasis on accounting systems. Coverage includes design, implementation, and operation of systems for both manual and EDP applications. Graduate standing and completion of computer technology requirement for M.B.A. required. Prerequisite: ACC 712, 741.

741-3 *Managerial Accounting*

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. Not open to accountancy majors without permission of adviser. Prerequisite: ACC 622.

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 711 or equivalent.

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*

Cases and studies in federal tax research with emphasis on tax planning. Prerequisite: ACC 721 or equivalent.

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.

780-6 Accounting Internship

One-quarter internship in a selected private or governmental organization under the direction of a faculty adviser and an employment supervisor. Details to be arranged by the department or college office. Enrollment in the M.B.A. program, completion of at least seven out of ten core courses, and departmental approval required.

781-3 Independent Studies

Permission of department chair required.

Administration/ADM**611-3 Graduate Survey of Law and the Legal Environment**

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 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 Department of Religion; see REL 619.) An investigation of the ethical responsibilities of business in light of political, moral, social, and religious considerations. Emphasis is placed on the analysis and evaluation of the changing framework of responsibilities facing both business organizations and their leaders. Permission of instructor required. Not offered on a regular basis.

710-3 The Corporation in the American Legal Environment

Relationship between the corporation and society: development of American corporations, legal aspects of corporate form of business, formation and operations, proposals for change of corporate governance, agency law, and security regulations. Not open to students with credit for ADM 351 or equivalent. Prerequisite: ADM 611 or equivalent.

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.

770-4 Law, Ethics, and Social Environment

Investigates the technical, governmental, and legal policy responsibilities of business in light of political, moral, social, and jurisprudential considerations. Presents certain fundamental issues concerning the nature of society and enables the student to better analyze and deal with these issues, both as a citizen and as an administrator.

781-1 to 3 Special Studies in Business

Topics vary from quarter to quarter. Permission of instructor required.

Administrative Information Systems/AIS**621-3 Introduction to Administrative Information Systems**

Introduces the student to the computer, its terminology, and its applications in administrative data processing, and requires the student to write and test programs.

740-3 Administrative Information Systems, Analysis, and Design

Teaches the student to analyze informational requirements, design systems that fulfill those requirements, and communicate the systems to others for implementation. Prerequisite: AIS 621.

Anatomy/ANT**520-5 Anatomy of Human Motion**

The skeletal, articular, nervous, cardiovascular, and respiratory systems as they pertain to the muscular system are presented. Basic muscle actions are described; sequential muscle actions and other concepts of kinesiology are not discussed. Permission of instructor required. Prerequisite: BIO 101, 103.

691-4 Fundamentals of Human Neurobiology

The development, structure, and function of the human nervous system as it relates to neuropathology, clinical neurology, and behavioral science. General biology and/or general psychology and permission of instructor required.

699-1 to 4 Special Problems in Anatomy

A maximum of 4 credit hours applicable to degree requirements. Departmental approval required.

700-2 Topics of Instruction in Human Anatomy

Overview of gross anatomy, histology, neuroanatomy, embryology, and educational theory which will enable students to be more effective in the teaching of undergraduate courses in anatomy. May be repeated once. Required of and limited to those who hold first-year graduate teaching assistantships in the department of anatomy.

701-1 to 5 Selected Topics in Anatomy

A course on a selected topic in anatomy. A maximum of 5 credit hours applicable to degree requirements. Departmental approval required.

711-8 Human Gross Anatomy

Lectures and dissection of human cadaver; includes introductory embryology. 3.5 hours lecture, 9 hours lab. Permission of instructor required.

715-2 Advanced Human Embryology

Classical and contemporary issues in human developmental biology. Each student is assigned a minimum of two oral presentations. Additional presentations are made by faculty and outside speakers. Permission of instructor required. Prerequisite: ANT 711.

721-6 Human Microanatomy

Detailed microanatomy of human cells, tissues, and organ systems. 3 hours lecture, 6 hours lab. Permission of instructor required.

731-5 Human Neurobiology

A detailed survey of the anatomy and physiology of the major fiber tracts and cell groups of the human central nervous system. 3 hours lecture, 4 hours lab. Permission 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. Permission of instructor required.

800-1 Graduate Seminar

See quarterly class schedule for sections and topics. Graded pass/unsatisfactory.

850-3 Scholarly Project I

Intensive analysis of scientific literature with emphasis on content and organization of anatomical journal articles. Course concludes with oral presentation of student's project involving a contemporary anatomical issue based on selected journal articles. Permission of instructor required.

851-4 Scholarly Project II

The project culminates in a paper on a contemporary anatomical issue in which the student integrates the primary objectives, results, and significance of selected journal articles and identifies areas for potential research. Departmental approval required. Prerequisite: ANT 850.

899-1 to 14 Graduate Research

Supervised thesis research.

900-1 Graduate Seminar

See quarterly class schedule for sections and topics.

Anthropology/ATH**546-4 Anthropology of Religion**

(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 12 Field School in Archaeology

Excavation training on prehistoric sites. May be repeated. Graduate standing and permission of instructor required. Prerequisite: ATH 368 or equivalent. Offered summer session only.

596-2 Careers for Anthropology Majors

(Listed jointly with Department of Sociology and Anthropology; see SOC 596.) A combination workshop and field study in which graduate students learn how to prepare a resume, how to find out about career possibilities, and how to meet people who are active practitioners.

599-1 to 4 Studies in Selected Subjects

Course of variable content dealing with problems, approaches, and topics in the field of anthropology.

600-4 Special Topics in Archaeology

Advanced study of various specialized aspects of archaeology. 12 credit hours of anthropology required.

610-4 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 placed on current trends influencing research in cultural anthropology. 12 credit hours of anthropology or undergraduate degree in other social science, graduate standing, and permission of instructor required.

646-4 Peoples and Cultures of South Asia

Survey and analysis of cultural diversity and unity in Southern Asia, particularly India, Pakistan, Bangladesh, and Sri Lanka. Graduate standing and permission of instructor required.

648-4 Development of Ethnological Thought

Surveys historical development of ethnological thought; emphasizes theories of social and cultural change. Graduate standing and permission of instructor required.

650-4 Political Institutions in Primitive Societies

(Listed jointly with Department of Political Science and Urban Affairs; see PLS 650.) Focuses on comparative studies of how primitive societies maintained law and order; on government as an organization that deals with maintenance of internal social order and regulation of external relations; and the presence or absence of state institutions.

692-2 to 4 Directed Studies in Anthropology

May be taken for letter grade or pass/unsatisfactory. Departmental approval required.

Applied Behavioral Science/ABS

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

703-4 *Human Service Delivery Systems*

Emphasis on the external environment and internal dynamics of human service delivery organizations.

721-4 *Applied Behavioral Science Designs and Methods II*

Emphasis on evaluation techniques, measuring program implementation, and identifying and measuring progress toward program objectives.

722-5 *Evaluation Research Statistics*

Analysis and interpretation of data in evaluation research, with emphasis on the appropriate statistical techniques.

731-4 *Applied Behavioral Science Designs and Methods I*

Emphasis on research designs, testing hypotheses, and techniques for collecting data such as questionnaire formation, sampling, surveys, scaling, interviewing, and analysis of documents and records.

741-4 *Life Stages and Life Changes*

Acquaints students with life stages, typical patterns, and problems from infancy to death. Students research a topic in one stage of the life cycle. Graduate standing required.

746-4 *Community Development and Planning*

Basic concepts and theories of community development and the planning practice. Evaluation of current developments in the field with special emphasis on implementation strategies. Graduate standing required.

751-4 *Organizational Training Development*

Organizational training is examined in the area of applied communication behavior as a procedure for human resource development. The training focus is on needs assessment procedures, instructional design, implementation, job performance analysis, and structured implementation of organizational feedback. Enrollment in Applied Behavioral Science program or permission of instructor required.

752-4 *Process Consultation*

Examined from an applied communication behavior framework. Discussed as a part of the consulting process. Focuses on stages of consulting, models for process consultation, process observation and intervention, and process consultation outcomes. Permission of instructor required. Prerequisite: ABS 751.

756-4 *Human Factors in the Systems Development Process*

The systems development process and human factors functions during this process are described. Both manual and computer-aided (e.g., SAINT) techniques are covered. Laboratory exercises require the use of selected techniques. Permission of instructor required.

761-4 *Seminar in Social Deviance*

(Listed jointly with Department of Sociology and Anthropology; see SOC 720.) Study of contemporary theories of deviant behavior from both an institutional and social-psychological perspective, with emphasis on the relationship between social change and social disorganization. Prerequisite: SOC 320 or 520 or permission of instructor.

766-4 *Work Motivation and Psychometric Assessment*

Description of research on human motivational processes and work activities. Research development and application of assessment and evaluation tests. Departmental permission required.

775-4 *Methods in Health Care Research and Evaluation*

Seminar in the designs and methods used in health care research and evaluation. Emphasis on current and future areas of health care research and evaluation. Focus is on skill development. Departmental permission required.

777-1 to 5 *Independent Research*

Independent laboratory or field research under the sponsorship of a faculty supervisor. Graded pass/unsatisfactory. Departmental permission required.

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. May be repeated to a maximum of 15 credit hours. Completion of core courses and permission of instructor required.

788-1 to 4 *Graduate Seminar in Applied Behavioral Science*

In-depth coverage of special topics in applied behavioral science. See quarterly class schedule for topics and sections. May be taken for a letter grade or pass/unsatisfactory. May be repeated to a maximum of 15 credit hours. Permission of instructor required.

799-2 to 6 *Graduate Thesis Research*

Research for the master's degree thesis. May be repeated to a maximum of 15 credit hours. Permission of instructor required.

- 853-4 *Workspace Design and Anthropometry***
Analyses of design parameters for effective use of a workplace. Includes seated and standing environments and considers hand-arm manipulation. Permission of instructor required.

Art and Art History/ART

- 600-1 to 4 *Studio Workshop***
A studio experience involving the student directly with a professional artist executing a special project. Covers a range of information from preliminary planning to final discussion on the project. Graduate standing and permission of instructor required.
- 601-1 to 4, 602-1 to 4, 603-1 to 4 *Independent Study in Art***
Special studies for qualified students of graduate standing. Intensive individually directed work in art with faculty consultation and supervision. Graduate standing and permission of adviser, department chair, and college dean required.
- 604-1 to 4 *Studies in 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.
- 605-1 to 4 *Studies in Art***
Courses provide opportunities to explore special problems and approaches to art and include cross-media and interdisciplinary studies. May be repeated with different titles. Graduate standing and permission of instructor required.
- 609-4 *Studies in Art Theory and Criticism***
Historical surveys and intensive studies in art theory and criticism. May be repeated with different titles. Graduate standing and permission of instructor required.
- 610-4 *Studies in American Art***
General surveys and intensive studies of periods, major movements, and artists in American art. May be repeated with different titles. Graduate standing and permission of instructor required.
- 611-4 *Studies in Ancient and Classical Art***
(Listed jointly with Department of Classics; see CLS 540.) General surveys and intensive studies of the period, major movements, and artists of the time. May be repeated with different titles.
- 612-4 *Studies in Medieval Art***
General surveys and intensive studies of the period, major movements, and artists of the time. May be repeated with different titles. Graduate standing and permission of instructor required.
- 613-4 *Studies in Renaissance Art***
General surveys and intensive studies of the period, major movements, and artists of the time. May be repeated with different titles. Graduate standing and permission of instructor required.
- 614-4 *Studies in Baroque Art***
General surveys and intensive studies of the period, major movements, and artists of the time. May be repeated with different titles. Graduate standing and permission of instructor required.
- 615-4 *Studies in Nineteenth-Century Art***
General surveys and intensive studies of the period, major movements, and artists of the time. May be repeated with different titles. Graduate standing and permission of instructor required.
- 616-4 *Studies in Twentieth-Century Art***
General surveys and intensive studies of the period, major movements, and artists of the time. May be repeated with different titles. Graduate standing and permission of instructor required.
- 627-4, 628-4, 629-4 *Drawing***
Exploration of the structure and interrelationships of visual form in drawing, painting, and sculpture. Principal historical modes of drawing are examined. Graduate standing and 12 credit hours of 400-level drawing or permission of instructor required.
- 637-4, 638-4, 639-4 *Film/Video***
The development of personalized concepts and individual aesthetic expression in film/video. Graduate standing and 12 credit hours of 400-level film/video or permission of instructor required.
- 647-4, 648-4, 649-4 *Painting***
Emphasis on pictorial organization with increased attention to the student's personal imagery. Graduate standing and 12 credit hours of 400-level painting or permission of instructor required.
- 657-4, 658-4, 659-4 *Photography***
Exploration of personal concepts and aesthetic expression in photography. Intensive individual work with faculty supervision. Graduate standing and 12 credit hours of 400-level photography or permission of instructor required.
- 667-4, 668-4, 669-4 *Printmaking***
The development of personalized concepts and individual aesthetic expression in printmaking. Graduate standing and 12 credit hours of 400-level printmaking or permission of instructor required.

677-4, 678-4, 679-4 Sculpture

The development of personal concepts and aesthetic expression in sculpture. Emphasis on individualized approach to sculptural problems using media selected by the students. Graduate standing and 12 credit hours of 400-level sculpture or permission of instructor required.

697-4 Museology and Gallery Management

Supervised independent field experience and practical work in all areas of art museum management in the university and greater Dayton area communities. Each student to be a tutorial intern. Graduate standing and 12 credit hours of 400-level museology and gallery management or permission of instructor required.

701-1 to 4, 702-1 to 4, 703-1 to 4 Independent Study in Art History

Special studies for qualified students of graduate standing. Intensive individually directed work in art history with faculty consultation and supervision. Graduate standing and permission of adviser, department chair, and college dean required.

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. Three quarters of design and 8 credit hours in advanced art education required.

620-4, 621-4, 622-4 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. Completion of 9 credit hours of design required.

623-4 Fibers and Fabrics

Introduction to fibers and fabrics as art forms. Basic techniques in various materials such as weaving, wrapping, twining, rya, batik, and other approaches to any school art program. Completion of 9 credit hours of design required.

624-4 Weaving

Use of loom and other hand techniques in weaving. Experimental approaches explored in the completion of original ideas. Completion of 9 credit hours of design required.

625-4 Textiles

Methods of silkscreen printing on fabrics; emphasis on silkscreen as it can be used in the public school program; analysis of textile design in contemporary living. Completion of 9 credit hours of design required.

626-4 Creative Stitchery

A study of the various methods and procedures to use in working with stitchery and applied forms; exploration of ways to work with flat and stitched fabrics that lead to wall hangings and other art forms. Completion of 9 credit hours of design required.

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. Completion of 16 credit hours of art education, 4 of which must be advanced, required.

629-1 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 schools. 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, and 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.

631-3 Art and the Child

Develops an understanding of child growth and development through creative expression. Emphasis on functions and procedures of art in the classroom, and experiences in drawing and painting.

632-3 Art and the Adolescent

Develops an understanding of individual differences, psychological sets, and various roles of the adolescent as related to art and creativity. Curriculum planning, comparative theories, in-field observations, and analysis of art class content included. Prerequisite: AED 431 or permission of instructor.

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 at least one medium and the development of proficiency in one or more craft areas. Completion of 16 credit hours of art education advanced crafts required.

639-4 Teaching Crafts in the Schools

Seminar for advanced students includes teaching methodology, safety factors, toxic substances, and an overview of crafts courses generally taught in public schools. Graduate standing and completion of 12 credit hours of graduate credit in art education required. Prerequisite: ED 438 or 638 or equivalent.

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. A bachelor's degree or equivalent required.

641-4 Art Appreciation and Criticism in the Schools

Understanding the influences and interaction of the creative arts in our present culture. Emphasis on the importance of developing appreciation in the public school; study of the processes inherent in aesthetic criticism and their relationship to teaching in the arts.

642-3 Advanced Problems in Art Education

Concentrated and advanced work with a specific art medium such as ceramics, metals, or fabrics. Emphasis on creative work and methods of teaching advanced procedures applicable to the public school art room. Previous work in area of studio concentration required.

643-4 Architectural and Environmental Awareness

A combination of seminar and studio work 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.

721-3 to 5 Graduate Study in Crafts

Individual problems in several craft areas to meet the needs of teachers of art. Completion of 16 credit hours of art or art education required.

731-4 Theories and Philosophies in Art Education

Critical evaluation of theories and philosophies in the field of art education in relation to the historical development of art education. Emphasis on translation and application to public school context. Bachelor's degree in art education, elementary or secondary education, or art, and permission of instructor required.

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. A bachelor's degree required.

734-3 Art Education and Personality

Human potentialities as related to the creative process are explored, with emphasis on human change resulting from creative expression and adjustment. A bachelor's degree in art education, elementary or secondary education, or art required. Completion of course in advanced educational psychology and graduate standing required.

741-1 to 3 Art with the Gifted and Talented Student

(Listed jointly with College of Education and Human Services; see ED 723.) An orientation using art both theoretically and practically with the student who is identified as being both extraordinarily gifted and talented in abilities.

752-4 Research in Art Education

Provides research techniques in art education from the initial planning stages to the completion of a thesis paper. Emphasis is given to the study of current and past research, to a review of current problems, and to the development of a problem utilizing appropriate research techniques. Completion of 20 credit hours of graduate work required. Prerequisite: ED 751.

770-1 to 3 Independent Study

Readings, project, participation/observation clinic experiences, or other appropriate study on an independent basis. Work is supervised by an art therapy faculty member. May be repeated to a maximum of 9 credit hours. Regular standing in the graduate school and 9 credit hours of graduate credit in education required.

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. May be repeated for credit in different areas. A major or minor in art education or art, beginning course or courses in the areas of specialization, graduate standing, and permission of instructor required.

831-4 Supervised Art in the Public Schools

Problems of teaching and supervising art in various types of communities and schools. Develops the ability to organize art materials and to interpret creative art methods. A bachelor's degree in art education, elementary or secondary education, or art required.

899-1 to 9 Thesis**Art Therapy/AT****629-1 to 6 Workshop in Art Therapy**

A workshop focusing on problems, processes, and techniques for the development of art therapy in special settings with diverse populations. Work in art media, assessment strategies, and treatment plans included. Implementation procedures with populations discussed.

644-3 Art and the Special Student

Theories and methods to help those who will work in the classroom or clinical setting with children who have emotional, motor, perceptual, or neurological problems. Philosophy, art media, and therapeutic procedures included. Developmental content and approaches with specific art media discussed. Prerequisite: AED 631 or equivalent, or permission of instructor.

648-1 to 3 Arts for the Disabled and Handicapped Person

A multidisciplinary, integrative approach to the various creative, expressive, and performing arts, and their applications to understanding of and working with persons with emotional, perceptual, neurological, and motor problems. Teaching/clinical strategies included. May be repeated. Prerequisite: AT 730 or permission of instructor.

723-3 Art Media in the Special Setting

Experiences with a variety of art media. Determination of strategies and media to use in expression, diagnostic evaluation, and remediation. Application of art media to various problems and settings. Prerequisite: AT 730 or permission of instructor.

730-3 Art Therapy

Study of the origin, historical development, and philosophy of the profession of art therapy. Comparative approaches to therapy and the application of the creative art process within the therapeutic framework. Undergraduate preparation leading to graduate-level study in art therapy required.

735-3 Art Therapy I: Theories and Methods

Theories and application of art therapy in the assessment and diagnosis of developmental, neurological, psychological, and multiple disabilities. Direct clinical application of the visual arts in designing objectives and implementation of individual and group therapy sessions. Demonstration of clinical sessions and participation in therapy in on-campus and community settings.

736-3 Art Therapy II: Theories and Methods

Art therapy procedures and media selection for diverse clinical populations, settings, and handicapping conditions. Emphasis on group and family therapy processes, supervision, clinical reporting, and staff presentations. Application of audiovisual instrumentation to facilitate art therapy. Demonstration of clinical sessions and participation in therapy. Prerequisite: AT 735 or permission of instructor.

738-3 Art Therapy III: Theories and Methods

Art psychotherapy theories and methods for working with children, adolescents, and adults diagnosed as having emotional and psychological problems. Case studies included. Prerequisite: AT 730 or permission of instructor.

739-3 Art Therapy IV: Theories and Methods

Advanced art psychotherapy theory and methods for working with children, adolescents, and adults diagnosed as having emotional and psychological problems. Understanding of symbolic structures and references to projective methods in art psychotherapy included. Prerequisite: AT 738 or permission of instructor.

743-1 to 3 Art with the Older Adult

An orientation using art with older populations in varied settings. Study of aspects of aging, life review, death and dying, and application of appropriate media adaptations. Observation and participation experiences. Prerequisite: AT 730 or permission of instructor.

744-1 to 3 Art with Exceptional Populations

An orientation using art with a specific population, e.g., learning disabled, mentally retarded, perceptually impaired, physically handicapped, culturally disadvantaged, multiple-handicapped, or persons in correctional institutions and prisons. May be repeated. Prerequisite: AT 730 or permission of instructor.

753-1 to 3 Research in Art Therapy

Emphasis is given to the qualitative/quantitative aspects of research in art therapy with focus on the case study method, observational and phenomenological procedures, and the longitudinal study in a clinical setting. Prerequisite: AT 730, ED 751, or permission of instructor.

766-1 to 5 Project in Art Therapy

Independent study intended for the graduate student who elects to complete the program in art therapy with a major project. May be repeated. Prerequisite: AT 753 or permission of instructor.

770-1 to 3 Independent Study in Art Therapy

Readings, project, observation, or other appropriate study on an independent basis. Work is supervised by an art therapy faculty member. May be repeated to a maximum of 9 credit hours. Regular standing in the graduate school and 12 credit hours of graduate credit in art therapy required. Prerequisite: AT 753 or permission of instructor.

771-1 to 3 Art Therapy Clinic I

On-campus clinical art therapy experience under the supervision of a registered art therapist. May be repeated. Permission of director of art therapy program required. Prerequisite: AT 735.

772-1 to 9 Art Therapy Clinic II

Off-campus art therapy internship. Student is assigned to a specific school, agency, hospital, or institution for art therapy clinical experience under the supervision of a registered art therapist. Permission of instructor required. Prerequisite: AT 771. Corequisite: AT 774.

773-1 to 5 Art Therapy Clinic III

Extended on-campus or off-campus clinical experiences intended for the student who elects to complete the degree with additional clinical hours. May be repeated. Prerequisite: AT 771, 772, or permission of instructor. Corequisite: AT 774.

774-1 to 3 Seminar in Art Therapy

Seminar for group discussion of student's clinical art therapy experience. Includes analysis of clinical case load assessment, therapy, and recommendations for patient or for client. Preparations for in-service presentation for clinical team members. May be repeated. Permission of instructor required. Prerequisite: AT 771. Corequisite: AT 772, 773.

899-1 to 9 Thesis**Biological Chemistry/BCH****510-5.5 Introductory Biochemistry**

Introduction to general principles of biochemistry, especially for students interested in the allied health sciences. Topics include the chemistry of biological molecules, cellular metabolism, and the mode of action of selected chemicals at the biochemical level. Not open to graduate students in the College of Science and Mathematics. Prerequisite: CHM 102 or 141.

621-4.5 Biochemistry I

The biochemistry of proteins, enzymes, and carbohydrates. Organic chemistry or permission of instructor required.

622-3 Laboratory for Biochemistry I

Quantitative techniques in biochemistry; chemical and instrumental methodology. Corequisite: BCH 621 (may be taken separately with permission of instructor).

623-4.5 Biochemistry II

The biochemistry of proteins, nucleic acids, and lipids. Prerequisite: BCH 621.

624-3 Laboratory for Biochemistry II

Properties of enzymes, enzyme-catalyzed reactions, and application of isotopes to the study of metabolism. Corequisite: BCH 623 (may be taken separately with permission of instructor).

627-4.5 Biochemistry III

Metabolism of hormones and amino acids, integration of metabolism, and aspects of human biochemistry including some metabolic disorders and nutrition. Prerequisite: BCH 623 or permission of instructor.

631-4.5 Clinical Biochemistry

Application of biochemical knowledge to a thorough understanding of disease states. Builds on material presented in BCH 621 and 623. Prerequisite: BCH 623 or permission of instructor required.

632-3 Plant Biochemistry

(Listed jointly with Department of Biological Sciences; see BIO 632.) Detailed study of the biochemistry of photosynthesis, respiration, and other metabolic and biosynthetic processes in plants. Prerequisite: BCH 621, 623, or permission of instructor.

651-3 Recent Developments in Biochemistry

Detailed consideration of major research developments in biochemistry within the past several months. Discussion deals not only with the appropriate research papers, but also with the background information such articles leave out. Prerequisite: BCH 621 and 623; or BMS 751 and BCH/BMS 752; or permission of instructor.

699-1 to 4 Special Problems in Biological Chemistry

Graded pass/unsatisfactory. A maximum of 4 credit hours applicable to degree requirements. Departmental approval required.

701-1 to 5 Selected Topics in Biological Chemistry

Department approval required.

702-2 Research Perspectives

Designed to acquaint new graduate students with the research being carried out by the faculty in the biochemistry program. Graduate standing in any science department required.

721-3 Biochemistry of Complex Carbohydrates

Includes the synthesis, degradation, structural features, and function of glycolipids, glycoproteins, peptidoglycans, and other complex polysaccharides. Graduate standing required. Prerequisite: BCH 621, 623, or equivalent.

726-3 Bioenergetics

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 776.) Structure of energy transducing membranes of mitochondria, chloroplasts, and bacteria. Particular emphasis is placed on mechanisms of energy transduction, thermodynamics of oxidation-reduction reactions, biophysical spectroscopic methods, and structure and surface topography of membrane proteins. Prerequisite: BCH 423 or 623 or BMS 752.

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. Recommended preparation: BCH 621, 623, or permission of instructor.

728-3 Photobiology

(Listed jointly with Department of Biological Sciences; see BIO 728.) Selected topics in photobiology. Recommended preparation: BCH 621, 623, or permission of instructor.

729-3 Biochemistry of Peptide Hormones

The synthesis, secretion, degradation, structure, assay, mechanism of action, and function of peptide hormones are presented. Emphasis is on insulin and other hormones (e.g., glucagon, somatotropin, somatostatin) involved in diabetes mellitus. Prerequisite: BCH 621, 623; or equivalent.

730-3 Biochemistry of Lipids

Examines the physical properties, metabolism, and several disease states of lipids in mammalian systems. All classes of lipids are discussed, including triglyceride, phospholipid, sphingolipid, prostaglandins, and steroids. Prerequisite: BCH 621, 623, or equivalent.

731-3 Biochemistry of Membranes

Examines the biochemistry of membranes and provides basic information on membrane composition and processes. Prerequisite: BCH 421/621, 423/623.

736-6 Recombinant DNA Methods

(Listed jointly with Department of Biological Sciences and Biomedical Sciences Ph.D. program; see BIO 737 and BMS 790.) Microbial and molecular techniques for producing, cloning, and characterizing recombinant DNA molecules; laboratory exercises in gene manipulation to give an understanding of principles of genetic engineering. Graded pass/unsatisfactory. Prerequisite: BMS 750, 752; BIO 654/BMS 791 and BIO 734/BMS 779; or permission of instructor.

737-4 Biochemical Instrumentation

Theory and use of techniques and instruments in biology. Topics include spectroscopy, ultracentrifugation, chromatography, and electrophoresis. Recommended preparation: BCH 621, 624; physical chemistry; or permission of instructor.

740-3 Biological Macromolecules

A structure-function analysis of biological macromolecules (particularly proteins and polynucleotides) based on their chemical and physical properties. Prerequisite: BCH 421 and 423, or equivalent.

743-2 Radioisotope Principles

(Listed jointly with Department of Biological Sciences; see BIO 743.) Principles of α , β , and γ radiation and methodology of counting, with application to physical and biological problems. Graduate standing or permission of instructor recommended.

750-5 Molecular Biochemistry I

A survey course emphasizing an experimental and problem-solving approach to buffers, protein structure, enzymes, and carbohydrate and lipid metabolism. Completion of organic chemistry course or permission of instructor required.

752-5 Molecular Biochemistry II

A survey course emphasizing an experimental and problem-solving approach to amino acid metabolism, nucleic acid function, and hormones. Prerequisite: BCH 750 or permission of instructor.

760-4 Magnetic Resonance in Living Systems

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 760.) Nuclear magnetic resonance (NMR) is presented as a method of studying the metabolism and function of living systems at the molecular level. Specific applications to cells, tissues, animals, and people are considered. Prerequisite: BCH 623 or 752 or permission of instructor.

761-4 Magnetic Resonance Imaging

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 761.) Magnetic resonance imaging (MRI) is presented as a noninvasive method for clinical diagnosis and biomedical research. Basic principles of MRI and specific applications of the technique are considered. Prerequisite: BCH 760 or permission 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 is made to microbial systems, emphasis is given to these processes as they occur in birds and mammals. Recommended preparation: BCH 621, 623, or permission of instructor.

800-1 Biochemistry Seminar

See quarterly class schedule for topics. Graded pass/unsatisfactory.

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 5 credit hours. Biochemistry and physiology or equivalent required.

845-3 Biochemistry of Natural Products

(Listed jointly with Department of Biological Sciences; see 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 is stressed. Recommended preparation: BCH 621, 622, 623, 624, or equivalent.

900-2 Seminar in Biological Chemistry

See quarterly class schedule for sections and topics. Prerequisite: BCH 621, 623, or equivalent; or permission of instructor.

Biological Sciences/BIO**521-3 Human Genetics for Health Professionals**

Describes mechanism of inheritance and genetic diseases so that health professionals can recognize possible genetic abnormalities and make appropriate referrals, participate in genetic counseling, and consider ethical and legal implications of the "new genetics." Biology majors may not take course for credit. Prerequisite: BIO 112 or equivalent or graduate standing.

603-3 Developmental Biology

Describes underlying processes that initiate, in plants and animals, the development of tissue and whole organisms. Recommended preparation: BIO 303 or equivalent, BIO 402.

606-3 Evolutionary Biology

Historical development and current understanding of the principles of evolution. Graduate standing required. Prerequisite: BIO 111, 112, 114, 302, or permission of instructor.

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. 3 hours lecture, 6 hours lab. Recommended preparation: BIO 306 or equivalent; or permission of instructor.

612-6 Aquatic Communities

An analysis of the functional relationships of organisms with the aquatic environment, with special emphasis on species interactions. 3 hours lecture, 6 hours lab, field trips. Recommended preparation: BIO 306 or equivalent.

613-5 Biological Problems of Water Pollution

An introduction to the biological aspects of water pollution. Lectures, discussions, laboratories, and field trips cover the various types of pollutants and their impact on aquatic life. 3 hours lecture, 4 hours lab, required field trips. Recommended preparation: BIO 411 or permission 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 acquaint students with various techniques used for ecological studies of population and community dynamics in natural environments. 3 hours lecture, 4 hours lab. A special travel fee may be applicable.

615-4 Environmental Toxicology

Covers toxicological problems encountered in the field of environmental health. Emphasis is on monitoring, control, and regulation of toxic substances in air and water, and in industrial environments. 3 hours lecture, 1 hour recitation. A course in physiology and organic chemistry required.

616-3 Principles of Ecotoxicology

Covers the various types of ecotoxicants and their impact on aquatic and terrestrial organisms. Emphasis is on types and sources of toxicants, their uptake, accumulation, excretion, and biological effect. A course in organic chemistry and physiology required. Recommended preparation: BIO 411, 415.

617-4 Evolution

(Taught jointly with Department of Religion; see REL 617.) An introduction to the biological, philosophical, theological, and ethical aspects of the concept of evolution. Permission of instructor required.

618-4 Methods in Environmental Toxicology

Study of methods used to study toxic effects of chemical and physical agents on living organisms. Emphasis is on those which affect populations and communities within natural ecosystems, but can be used to indicate potential toxicity for humans. Prerequisite: BIO 415/615 or 416/616.

620-3 Designing Biological Experiments

Principles of effective sampling design for biological experiments. Reconciling the peculiarities of biological data with the assumptions of statistical methods. Lectures and problem sets. Two biology courses at 300-level or above and one course in statistics required.

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.

626-4 Human Genetics

Nature of human genetic traits, methods of analysis of inheritance. Prerequisite: BIO 302, 402, or 403.

630-3 Radiation Biology

An introductory study of the nature of ionizing radiation, its biological effects, and its applications to biological problems. Prerequisite: BIO 403, CHM 213, MTH 131, PHY 113, or permission 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: BCH 621, 623, or permission of instructor.

654-3 Microbial Genetics

Basic concepts of production of microbial mutations, their detection and analysis. The use of microbial genetics in elucidating cellular functions. Construction of plasmids and their use in genetic engineering. Prerequisite: BCH 421 or 423 or BIO 402; BIO 202, 302; or permission of instructor.

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. Senior standing required. Prerequisite: BIO 204 or permission of instructor.

656-3 Microbial Genetics Laboratory

Familiarizes students with microbial genetics techniques. Corequisite: BIO 654.

664-3 Microbiology of Food

Principles of food microbiology, preservation, and handling. Major organisms of food poisoning and means of control are considered. Completion of a course in microbiology required.

666-3 Occupational Health and Safety

Introduction to accident recognition, evaluation, and control in the work environment; emphasis on methods of hazard recognition and control management. Prerequisite: CHM 141, MTH 130.

667-2 Occupational Health and Safety Laboratory

Introduction to accident recognition, evaluation, and control in the work environment by "hands on" type of equipment usage. Methods of inspection, accident investigation, and evaluation of accident programs are stressed. Prerequisite: CHM 141, MTH 130.

668-3 Industrial Hygiene I

Introduction to industrial hygiene. Emphasis placed on routes of entry into the human body and physiological effects of industrial pollutants. Prerequisite: CHM 141, 211, 215; MTH 130.

669-2 Industrial Hygiene I Laboratory

Introduction to industrial hygiene. Methods of measuring toxic effects and providing adequate protection are discussed and demonstrated. Prerequisite: CHM 141, 211, 215; MTH 130.

673-5 Biology of Selected Marine Environments

Biological aspects of marine environments. Sampling and observation of living marine specimens during a week-long trip to a marine laboratory. A special fee is applicable. Application during winter quarter and permission of instructor required. Completion of a course in invertebrate zoology recommended.

675-2 Microbiology of Food Laboratory

Methods for evaluating microbial quality of food. Includes investigation of major pathogens, techniques, and principles of processing food. Field trips required. Completion of a lab course in general microbiology required. Prerequisite: BIO 202 or M&I 220. Corequisite: BIO 664.

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 anthropology. Designed primarily for medical technologists, biology teachers, and environmental health students. Permission of instructor required.

677-3 Human Parasitology Laboratory

A laboratory course designed to examine and identify protozoan, helminthic, and arthropod parasites of man. Corequisite: BIO 676.

678-4 Animal Behavior

(Listed jointly with Department of Psychology; see PSY 678.) The physiology, phylogeny, and ontogeny of behavior. 3 hours lecture, 2 hours lab. Prerequisite: PSY 111, 112; or BIO 111, 112, 114, 305; and permission of instructor.

680-5 Biology of Fishes

An introduction to the evolution, ecology, and distribution of fresh water and marine fish. 3 hours lecture, 4 hours lab, and field trips. A special fee is applicable. Junior standing required. Prerequisite: BIO 206, 306, or permission of instructor.

684-3 Introduction to Biogeography

Introduction to the factors affecting the distribution of plants and animals. Prerequisite: BIO 111, 112, 306 or permission of instructor.

686-3 Industrial Hygiene II

Evaluation of the health effects of fumes, smoke, gases, dusts, and mists in the work place. Consideration of effects of radiation and noise. Prerequisite: BIO 668, 669; CHM 141, 211, 215; MTH 130.

687-2 Industrial Hygiene II Lab

Evaluation of the health effects of fumes, smoke, gases, dusts, and mists in the workplace. Methods of detection and control are emphasized. Prerequisite: BIO 668, 669; CHM 141, 211; MTH 130.

699-1 to 4 Special Problems in Biology

A maximum of 4 credit hours applicable to degree requirements. Departmental approval required.

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. Enrollment limited to graduate biology majors.

701-1 to 5 Selected Topics in Biology

A course on a selected topic in biology. Departmental approval required.

702-2 Introduction to Research

Different research problems under investigation by the faculty are described with respect to objectives, methodology, and progress as examples of scientific methods applied to biology. Enrollment limited to first-year graduate students.

720-5 Cell Biology

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 835.) A comprehensive course addressing both the known and theoretical aspects of cellular organization and function. Suitable as an introductory course for graduate study. Graduate standing required.

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 are treated. Recommended preparation: BIO 307, CHM 212.

728-3 Photobiology

Selected topics in photobiology. Recommended preparation: BCH 421/621, 423/623, or permission 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.

735-2 Advanced Seminar in Genetics

A review of current literature in molecular or human genetics subjects. Presentation of reviews to other students. Biochemistry required. Prerequisite: BIO 626 or 654.

736-3 Phytohormones

Hormonal regulation of plant growth and development. Permission of instructor required.

737-6 Recombinant DNA Methods

(Listed jointly with Department of Biological Chemistry and Biomedical Sciences Ph.D. program; see BCH 736 and BMS 790.) Microbial and molecular techniques for producing, cloning, and characterizing recombinant DNA molecules; laboratory exercises in gene manipulation to give an understanding of principles of genetic engineering. Graded pass/unsatisfactory. Prerequisite: BMS 750, 752; BIO 654/BMS 791 and BIO 734/BMS 779; or permission of instructor.

738-3 Behavior Genetics

Behavior is considered as a population phenomenon and as an adaptive process. Evolutionary theory is used to integrate the disparate aspects of behavioral phenomena. Prerequisite: BIO 302.

740-6 Electron Microscopy for Life Sciences

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 834.) Introduction to theoretical and practical aspects of transmission electron microscopy. Emphasis on interpretation and evaluation of electron micrographs. 3 hours lecture, 6 hours lab; additional lab time is required. Completion of course in histology or cell biology is required.

743-2 Radioisotope Principles

Principles of α , β , and γ radiation and methodology of counting, with applications to physical and biological problems. Graduate standing or permission of instructor recommended.

745-4 Microinstrumentation

Equipment and technique used for the microscopic examination of biological structure and ultrastructure. 2 hours lecture, 4 hours lab.

800-1 Graduate Seminar

See quarterly class schedule for sections and topics.

828-4.5 Microbial Physiology

(Listed jointly with Department of Microbiology and Immunology; see M&I 721.) Emphasizes the physiological, morphological, and biochemical activities of microorganisms. Nutrition, survival, culture variation, and action of antimicrobial agents will be related to structure and function. Graduate standing and permission of instructor required.

829-4.5 Microbial Physiology Laboratory

Emphasizes physiological, morphological, and biochemical activities of microorganisms in a laboratory situation. Nutrition, survival, culture variation, and action of antimicrobial agents will be related to structure and function in microbial model systems. Corequisite: BIO 828.

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 roles in chemotherapy of infectious disease and in the elucidation of basic biochemical reactions are stressed. Recommended preparation: BCH 621, 622, 623, 624, or equivalent.

899-2 to 18 Graduate Research

Supervised thesis research.

900-1 Graduate Seminar

See quarterly class schedule for sections and topics.

Biomedical Sciences/BMS

655-5 *Matrix Algebra*

(Listed jointly with Department of Mathematics and Statistics; see MTH 655.) Matrices, systems of equations, vector spaces, inner products, linear transformations, determinants, eigenvalues, eigenvectors, quadratic forms, and symmetric matrices. Prerequisite: BMS 664, 698.

664-4 *Biostatistics*

Review of the principles underlying statistical methodology and techniques available for analyzing biomedical data. Emphasis is on the necessity for careful design of experiments and the structure of data. Enrollment in Biomedical Sciences Ph.D. program required. (Previously listed as BMS 666.)

668-2 *Introduction to SAS*

An introduction to the use of the statistical analysis system (SAS), a statistical computing package widely used in industry, government, and academia. Prerequisite: BMS 664 or equivalent.

674-3 *Mathematical Modeling of Biosystems*

A basic introduction to the use of quantitative methods to model biological phenomena. Problem examples are drawn from the molecular, cellular, and system levels of biological organization. Graded pass/unsatisfactory. Admission to Biomedical Sciences Ph.D. program required.

698-3 *Biomedical Computer Science*

Introduction to programs such as SYMVU, CSMP, and ORTEP which create plotted output. FORTRAN is also introduced. Problems and data used are from the life sciences. Graded pass/unsatisfactory. Enrollment in Biomedical Sciences Ph.D. program required. Prerequisite: BMS 664.

701-4 *Advanced Biomedical Computers*

(Listed jointly with Department of Engineering; see EGR 766.) Digital computer (hardware) applications in the health care field. Topics include hospital, operating room, clinical laboratory, rehabilitation engineering, and medical research laboratory computer systems. 3 hours lecture, 1 hour lab. Prerequisite: EGR 641.

702-4.5 *Control Systems I*

(Listed jointly with Department of Engineering; see EGR 625.) Introduction to control systems using state variables and classical analysis. Closed loop system representation, block diagrams, time response, and frequency response are treated. 3 hours lecture, 3 hours lab. Prerequisite: BMS 664, 698.

703-4.5 *Control Systems II*

(Listed jointly with Department of Engineering; see EGR 626.) System stability and closed loop response are analyzed using Routh-Herwitz, Nyquist, and root locus techniques. System specifications and compensation are realized using state variables and classical analysis. 3 hours lecture, 3 hours lab. Prerequisite: BMS 702.

705-3 *Linear Systems I*

(Listed jointly with Department of Engineering; see EGR 701.) Includes signal representation, orthonormal families of signals, and generalized Fourier series; generalized functions, the impulse function, and 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, and uncertainty principle. Prerequisite: BMS 664, 698.

706-3 *Linear Systems II*

(Listed jointly with Department of Engineering; see EGR 702.) 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. Prerequisite: BMS 705.

708-3 *Digital Signal Processing*

(Listed jointly with Department of Engineering; see EGR 710.) Theory and applications of digital signal processing including 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; and digital filtering and modeling. Prerequisite: BMS 706.

712-3 *Biodynamics*

Includes the mechanical structure and function of biological systems and the interaction of the systems with external force and pressure environments. Bachelor of Science degree in life or physical sciences required.

713-3 *Advanced Biomechanics and Biofluids*

(Listed jointly with Department of Engineering; see EGR 728.) Application of solid and fluid mechanics and thermodynamics toward describing biological systems. Students review primary references in their selected areas. Prerequisite: BMS 850, 851.

714-3 Advanced Engineering Biophysics

(Listed jointly with Department of Engineering; see EGR 722.) Application of mathematical and engineering techniques toward describing biological systems. Students review primary references in their selected areas. Prerequisite: BMS 698, 850, 851; EGR 522.

717-4 Advanced Bioinstrumentation

(Listed jointly with Department of Engineering; see EGR 764.) Principles of design and analysis of electronic instrumentation for biological applications. Students review primary references in their selected areas. Prerequisite: BMS Core.

721-4 Biomedical Electronics

(Listed jointly with Department of Engineering; see EGR 777.) Introduction to electronics for life scientists. Topics include DC/AC circuits, semiconductor and operational amplifier theory, digital devices and microprocessors, computer applications, biological transducers, and bioinstrumentation. 3 hours lecture, 2 hours lab. Bachelor of Science degree in life or physical sciences required.

725-3 Introduction to Polymer Science I

(Listed jointly with Department of Chemistry; see CHM 665.) Introduction to the structural and physical aspects of macromolecules; emphasis on the relationship of polymer structure to physical and mechanical properties. Prerequisite: CHM 213 or 561.

726-3 Introduction to Polymer Science II

(Listed jointly with Department of Chemistry; see CHM 666.) Step-growth and chain-growth polymerization in homogeneous and heterogeneous media; properties of commercial polymers. Prerequisite: CHM 213 or 561.

727-1 to 2 Introduction to Polymer Science Laboratory I

(Listed jointly with Department of Chemistry; see CHM 667.) Laboratory illustrations of BMS 725 lecture material and techniques of polymer science. Prerequisite: CHM 213 or 561.

728-1 to 2 Introduction to Polymer Science Laboratory II

(Listed jointly with Department of Chemistry; see CHM 668.) Laboratory illustrations of BMS 726 lecture material and techniques of polymer science. Prerequisite: CHM 213 or 561.

733-3 Advanced Inorganic Chemistry I

(Listed jointly with Department of Chemistry; see CHM 720.) Study of atomic structure, modern theories of chemical bonding, and structural concepts of inorganic chemistry and their relationships to reactivity, acids and bases in aqueous and nonaqueous systems, and energetics of reactions. Permission of instructor required.

734-3 Advanced Inorganic Chemistry II

(Listed jointly with Department of Chemistry; see CHM 721.) A thorough examination of coordination chemistry of the metals stressing transition elements, crystal and ligand field approaches and molecular orbital theory as applied to organometallic systems, mechanisms of inorganic reactions, and the role of metal ions in biological systems. Prerequisite: BMS 733 or permission of instructor.

735-3 Advanced Inorganic Chemistry III

(Listed jointly with Department of Chemistry; see CHM 722.) Survey of the applications of physical methods in the examination and characterization of inorganic compounds. Emphasis is on methods applied to transition metal complexes. Prerequisite: BMS 734.

736-3 Chemical Kinetics

(Listed jointly with Department of Chemistry; see CHM 751.) Characterization of simple kinetic systems, experimental methods, energy distributions in molecules, the transition state method, and chain reactions in solution. Graduate standing required. Prerequisite: CHM 453 or equivalent, permission of instructor.

737-3 Chemical Thermodynamics

(Listed jointly with Department of Chemistry; see CHM 752.) Fundamentals; first, second, and third laws; and application to solutions. Graduate standing required. Prerequisite: CHM 453 or equivalent, or permission of instructor.

738-3 Selected Topics in Physical Chemistry

(Listed jointly with Department of Chemistry; see CHM 855.) Selected topics in the field of physical chemistry, such as molecular spectroscopy, advanced molecular structure, magnetic resonance, X rays and crystal structure, statistical mechanics, or precise physical-chemical measurements. Graduate standing and permission of instructor required.

740-5 Advanced Bioanalytical Chemistry

An in-depth presentation of analytical, chemical, and biochemical techniques for determining pollutants, drugs, and toxins encountered in solving biomedical problems. Prerequisite: BMS Core or equivalent.

750-5 to 10 Molecular Biology Lecture

A basic course in the structural, chemical, and physiological properties of cells. Subject areas include the chemistry of biological systems, concepts of metabolism and bioenergetics, the organization of and transport through biological membranes, and the ultrastructure of cellular organelles. Enrollment in Biomedical Sciences Ph.D. program required.

751-3 Molecular Biology Laboratory

Laboratory course illustrating major techniques used in the study of the chemistry of biological systems. Enrollment in Biomedical Sciences Ph.D. program required.

752-5 to 10 Molecular Biology II

Survey course emphasizing an experimental and problem-solving approach to amino acid metabolism, nucleic acid function, and hormones. Prerequisite: BMS 750 or permission of instructor.

754-3 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 are considered. Prerequisite: BMS 752, 835; or equivalent.

760-4 Magnetic Resonance in Living Systems

(Listed jointly with Department of Biological Chemistry; see BCH 760.) Nuclear magnetic resonance (NMR) is presented as a method of studying the metabolism and function of living systems at the molecular level. Specific applications to cells, tissues, animals, and people are considered. Prerequisite: BMS 750 and 752 or permission of instructor required.

761-4 Magnetic Resonance Imaging

(Listed jointly with Department of Biological Chemistry; see BCH 761.) Magnetic resonance imaging (MRI) is presented as a noninvasive method for clinical diagnosis and biomedical research. Basic principles of MRI and specific applications of the techniques are considered. Prerequisite: BMS 760 or permission of instructor.

767-3 Enzymes

(Listed jointly with Department of Biological Chemistry; see BCH 727.) The mechanism of enzyme catalysis, including such topics as structure, kinetics, energetics, allosterism, coenzymes, and control of enzymes and multienzyme systems. Prerequisite: BMS 752, 835; or equivalent.

768-3 Biochemistry of Peptide Hormones

(Listed jointly with Department of Biological Chemistry; see BCH 729.) The synthesis, secretion, degradation, structure assay, mechanism of action, and function of peptide hormones are presented. Emphasis is on insulin and other hormones involved in diabetes mellitus. Prerequisite: BMS 752, 835; or equivalent.

769-3 Biochemistry of Membranes

(Listed jointly with Department of Biological Chemistry; see BCH 731.) Examines the biochemistry of membranes and provides basic information on membrane composition and processes. Prerequisite: BMS 752, 835; or equivalent.

770-3 Biological Macromolecules

(Listed jointly with Department of Biological Chemistry; see BCH 740.) A structure-function analysis of biological macromolecules (particularly proteins and polynucleotides) based on chemical and physical properties. Prerequisites: BMS 752, 835; or equivalent.

771-2 Radioisotope Principles

(Listed jointly with Department of Biological Chemistry; see BCH 743.) Principles of α , β , and γ radiation and methodology of counting with application to physical and biological problems. Enrollment in Biomedical Sciences Ph.D. program required.

772-4 Heritable Metabolic Diseases in Man

(Listed jointly with Department of Biological Chemistry; see BCH 826.) Biochemical mechanisms of inherited diseases and organ metabolism to genetic change and to physiological responses in man. Prerequisite: BMS Core.

773-3 Biochemical Regulation

Regulatory mechanisms of gene expression, including enzyme synthesis and hormonal regulation. Prerequisite: BMS 752, 835; or equivalent.

774-3 Biochemistry of Connective Tissue

Chemistry and metabolism of fibrous proteins and glycosamino-glycans, and the functional significance of these extracellular substances. Prerequisite: BMS Core or equivalent or permission of instructor.

775-3 Photobiology

(Listed jointly with Departments of Biological Chemistry and Biological Sciences; see BCH 728 and BIO 728.) Selected topics in photobiology. Prerequisite: BMS 752, 835; or equivalent.

776-3 Bioenergetics

(Listed jointly with Department of Biological Chemistry; see BCH 726.) Structure of energy-transducing membranes of mitochondria, chloroplasts, and bacteria. Particular emphasis is placed on mechanisms of energy transduction, thermodynamics of oxidation-reduction reactions, biophysical spectroscopic methods, and structure and surface topography of membrane proteins. Prerequisite: BMS 752.

779-3 Molecular Genetics

(Listed jointly with Department of Biological Sciences; see BIO 734.) Study of the replication, organization, and function of nucleic acids with emphasis on the role of nucleic acids in protein synthesis.

780-4 Human Genetics

(Listed jointly with Department of Biological Sciences; see BIO 626.) Nature of human genetic traits, methods of analysis of inheritance, principles of counseling, and therapy. Prerequisite: BMS 752, 835.

785-2 Advanced Seminar in Genetics

(Listed jointly with Department of Biological Sciences; see BIO 735.) A review of current literature in molecular or human genetics subjects. Presentation of reviews to other students. Prerequisite: BMS 780.

786-3 Behavior Genetics

(Listed jointly with Department of Biological Sciences; see BIO 738.) Behavior is considered as a population phenomenon and as an adaptive process. Evolutionary theory is used to integrate the disparate aspects of behavioral phenomena. Prerequisite: BMS 780.

790-6 Recombinant DNA Methods

(Listed jointly with Departments of Biological Chemistry and Biological Sciences; see BCH 736 and BIO 737.) Microbial and molecular techniques for producing, cloning, and characterizing recombinant DNA molecules; laboratory exercises in gene manipulation to give an understanding of principles of genetic engineering. Graded pass/unsatisfactory. Prerequisite: BMS 750, 752; BIO 654/BMS 791 and BIO 734/BMS 779; or permission of instructor.

791-3 Microbial Genetics

(Listed jointly with Department of Biological Sciences; see BIO 654.) Basic concepts of production of microbial mutations, and their detection and analysis, the use of microbial genetics in elucidating cellular functions, the construction of plasmids and their use in genetic engineering. Prerequisite: BMS 752, 835; or equivalent.

792-3 Microbial Genetics Laboratory

(Listed jointly with Department of Biological Sciences; see BIO 656.) Familiarizes students with microbial genetics techniques. Prerequisite: BMS 791.

793-5 Microbial Ecology

(Listed jointly with Department of Biological Sciences; see BIO 625.) 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. Permission of instructor required.

795-4.5 Microbial Physiology

Emphasizes the diverse biological and biochemical activities of microorganisms as they relate to cell structure and function. The relationship of nutrition, growth, environment, survival, and inhibitors to cell activity is related to current topics in microbiology. Graduate standing required.

796-2 Microbial Physiology Laboratory

Study of the physiological and biochemical processes unique to microorganisms. Prerequisite: BMS 795.

799-2 Human Parasitology

(Listed jointly with Department of Biological Sciences; see BIO 676.) 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, helminthology, and anthropology. Permission of instructor required.

801-4 Principles of Host-Parasite Interaction

(Listed jointly with Department of Microbiology and Immunology; see M&I 822.) Study of infection and resistance, the result of which may be the production of infectious disease. The effect of microbial virulence factors, mode of entry of microorganisms into the body, their spread through tissue, and the role of the host immune responses are studied. Prerequisite: BIO 402, M&I 726; or equivalent.

802-3 Pathogenic Microbiology

(Listed jointly with Department of Microbiology and Immunology; see M&I 726.) Study of microorganisms pathogenic for man and animals, and mechanisms of microbial pathogenesis. Emphasis on independent study. Prerequisite: BMS 752, 835; or equivalent.

804-4 Medical Mycology

Study of medically important fungi and their pathogenesis in man and animals. Emphasis on proper isolation and identification procedures. Prerequisite: BMS 752, 835; or equivalent.

808-3 Molecular Virology

(Listed jointly with Department of Microbiology and Immunology; see M&I 831.) Structure, infectious process, replication, maturation, release, and genetics at the molecular level of the major groups of animal viruses. Prerequisite: BMS 752, 835.

809-3 Viral Oncology

(Listed jointly with Department of Microbiology and Immunology; see M&I 833.) Understanding the process involved in cell transformation by oncogenic viruses. Prerequisite: BMS 752, 835.

812-5 Immunobiology

(Listed jointly with Department of Microbiology and Immunology; see M&I 745.) Study of the biology of the immune system, as well as its function in health and disease. Specific diseases will be used as models for immunologically mediated conditions. Prerequisite: BMS 752, 835; or equivalent.

813-2 to 8 Special Topics in Immunology

(Listed jointly with Department of Microbiology and Immunology; see M&I 840.) Students select, present, and analyze information from the current literature in immunobiology. Prerequisite: BMS 752, 835.

818-3 Infection and Immunity Seminar

(Listed jointly with Department of Microbiology and Immunology; see M&I 846.) Deals with the effects of microbial and metazoan parasites upon both host resistance and immunologically mediated disease processes. Prerequisite: BMS 752, 835.

834-6 Electron Microscopy for Life Sciences

(Listed jointly with Department of Biological Sciences; see BIO 740.) Introduction to theoretical and practical aspects of transmission electron microscopy. Emphasis on interpretation and evaluation of electron micrographs. 3 hours lecture, 6 hours lab; additional lab time is required. Completion of course in histology or cell biology required.

835-4 to 10 Cell Biology

Interdisciplinary survey of cellular functions, including location of molecular events and functional compartmentation within cell, recognition of structural and functional elements of cell, and interaction of cells in specialized tissues. Enrollment in Biomedical Sciences Ph.D. program required.

836-2 Cell Biology Laboratory

Integration and application of the concepts of cell biology in the laboratory, including electron microscopy, nucleic acids, cytogenetics, membrane/organelle ultrastructure, epithelial/connective tissue, nerve-muscle, and *in vitro* culture laboratories. Enrollment in Biomedical Sciences Ph.D. program required. Prerequisite: BMS 700, 701.

837-8 Human Gross Anatomy

(Listed jointly with Department of Anatomy; see ANT 711.) Lectures and dissection of human cadaver. Enrollment in Biomedical Sciences Ph.D. program required. Departmental approval required. Offered fall quarter only.

838-6 Microanatomy

Introduction to basic cell structure, including membranes, nucleus, and cytoplasmic organelles. Emphasis on the detailed histological anatomy of the four basic tissues, and major organs and systems of the body. Permission of instructor required. Prerequisite: BMS 751, 752, 835. Offered winter quarter.

839-3 Developmental Biology

(Listed jointly with Department of Biological Sciences; see BIO 603.) Describes underlying processes that initiate the development of tissue and whole organisms in plants and animals. Recommended preparation: BIO 303, 402, or equivalent.

840-2 Reproductive Anatomy and Physiology

Reproductive cycles and gametogenesis; intercourse and conception; events of pregnancy and parturition; contraception, sterility, and dysfunction. Prerequisite: BMS Core.

842-3 Experimental Teratology

Examination of development and the periods therein when the organism is most susceptible to physiological insult. Emphasis is given to birds and mammals. Permission of instructor required. Prerequisite: BMS Core.

843-3 Experimental Teratology Laboratory

The effects of experimental procedures and abnormal environments on the development of avian and mammalian embryos. Permission of instructor required. Prerequisite: BMS Core. Corequisite: BMS 842.

850-4 to 10 Biological Systems I

Basic course in structure, function, and interactions of human organ systems. Subject areas include musculoskeletal, neurological, cardiovascular, and respiratory systems. Enrollment in Biomedical Sciences Ph.D. program or permission of instructor required. First in a two-quarter sequence. Prerequisite: BMS 752, 835, or permission of instructor.

851-4 to 10 Biological Systems II

Basic course in structure, function, and interactions of human organ systems. Subject areas include endocrine, gastrointestinal, urinary, and reproductive systems. Enrollment in Biomedical Sciences Ph.D. program or permission of instructor required. Second in a two-quarter sequence. Prerequisite: BMS 850 or permission of instructor.

- 855-3 Control Mechanisms of the Cardiovascular System**
(Listed jointly with Department of Physiology; see PHS 732.) Autonomic nervous system control of heart and vessels including cranial and spinal control, responses to stress, and pathology of the control system. Prerequisite: BMS 850, 851.
- 856-3 Cardiac Dynamics**
(Listed jointly with Department of Physiology; see PHS 733.) The basic principles of cardiac function from the viewpoint of several disciplines. The heart is described as a muscle as well as a pump, with special reference to physiological, clinical, and mathematical considerations. Prerequisite: BMS 850, 851.
- 857-3 Pulmonary Physiology**
(Listed jointly with Department of Physiology; see PHS 741.) Survey of the respiratory system. Main aspects covered include functional anatomy, pulmonary ventilation, mechanics of respiration, pulmonary circulation, gas exchange and transport in the blood, ventilation/perfusion relationships, and control of ventilation. Prerequisite: PHS 850, 851; or permission of instructor.
- 858-3 Renal Function**
(Listed jointly with Department of Physiology; see PHS 751.) In-depth study of the mechanisms of renal function with special emphasis on the regulation of water and electrolyte excretion in mammals. Prerequisite: BMS 850, 851.
- 859-3 Gastrointestinal Physiology**
(Listed jointly with Department of Physiology; see PHS 761.) Survey of gastrointestinal physiology emphasizing integrative mechanisms of motility, secretion, and absorption. Prerequisite: BMS 850, 851.
- 860-3 General Endocrinology**
(Listed jointly with Department of Physiology; see PHS 771.) Survey of endocrinological mechanisms and their role in integration of body function. Prerequisite: BMS 850, 851.
- 861-2 General Endocrinology Laboratory**
(Listed jointly with Department of Physiology; see PHS 772.) Exercises reinforce principles described in BMS 860. Prerequisite: BMS 860.
- 862-3 Physiological Control Mechanisms**
(Listed jointly with Department of Physiology; see PHS 781.) Integrative course in physiology emphasizing applications of control theory. Prerequisite: BMS 850, 851.
- 863-1 Physiological Control Mechanisms Laboratory**
(Listed jointly with Department of Physiology; see PHS 782.) Exercises reinforce principles described in BMS 862. Prerequisite: BMS 862.
- 864-5 Physiological Aspects of Exercise**
(Listed jointly with Department of Physiology; see PHS 783.) Integration of physiological mechanisms involved in exercise. Cellular, neuromuscular, cardiovascular, and respiratory changes are discussed with relationship to exercise performance. Second-year standing in Biomedical Sciences Ph.D. program required.
- 879-5 General Pharmacology I**
(Listed jointly with Department of Pharmacology; see PHA 879.) Introduces students to drug-receptor interactions, dose-response relationships, physio-chemical principles of drug action and distribution, pharmacokinetics, and mechanisms of action plus uses of drugs affecting both autonomic and central nervous system functions. Prerequisite: BMS Core or equivalent.
- 880-4 General Pharmacology II**
(Listed jointly with Department of Pharmacology; see PHA 880.) Extends the principles and theoretical considerations learned in BMS 879 and applies them to the action of drugs on the cardiovascular, respiratory, endocrine, gastrointestinal, and genito-urinary systems. Special attention is given to antibiotics, chemotherapy of infectious diseases, antineoplasia, and immunosuppressants. An introduction to toxicology is provided. Prerequisite: BMS 879.
- 886-6 General Pathology**
Introduces the student to basic principles of abnormal biological processes in the human and subhuman vertebrate organisms. Deals with tissue injury and degeneration, abnormal growth, infection and host defense, selected metabolic and congenital disorders, and forensic problems. Complies with the Toxicology Society's recommended requirements for the professional toxicologist. Enrollment in Biomedical Sciences Ph.D. program or equivalent required. Prerequisite: BMS Core, anatomy sequence; or equivalent.
- 887-4 General Toxicology I**
(Listed jointly with Department of Pharmacology; see PHA 751.) An introduction to general toxicology covering the principles of intoxication and detoxication, classification of poisons, exposure characteristics, biotransformation and biokinetics of poisons, systemic toxicology including CNS, splanchnic organs, cardiovascular, hematopoietic, respiratory, reproductive, and skeletal systems. Prerequisite: BMS 879, 880.

888-4 General Toxicology II

(Listed jointly with Department of Pharmacology; see PHA 752.) Designed as an introduction to general toxicology. Particular toxic agents are studied, including teratogens, mutagens, oncogens, heavy metals, and other environmental contaminants and toxins. Clinical, forensic, industrial, and agricultural toxicology are addressed along with regulations that apply to the field. Prerequisite: BMS 887.

890-3 Biotransformation and Kinetics

(Listed jointly with Department of Pharmacology; see PHA 750.) Topics covered on the general basis of toxicology and therapeutics; pharmacokinetics, xenobiotic metabolism, and their effects on determination of the dose-response-time relationship. Enrollment in Biomedical Sciences Ph.D. program and permission of instructor and program director required. Prerequisite: BMS Core or equivalent.

893-4 Methods in Environmental Toxicology

(Listed jointly with Department of Biological Sciences; see BIO 618.) A study of methods used to study toxic effects of chemical and physical agents on living organisms. Emphasis is on those agents which affect populations and communities within natural ecosystems, but can be used to indicate potential toxicity for humans. 6 hours lab, 1 hour recitation. Prerequisite: BMS 887, BIO 615, 616, or PHA 751.

898-3 Neuropharmacology

In-depth treatment of the anatomy, biochemistry, and physiology of the nervous system and the effect of drugs on the nervous system. Graduate standing required. Prerequisite: BMS Core or equivalent.

902-3 Neurophysiology

(Listed jointly with Department of Physiology; see PHS 720.) Survey of neurophysiology with emphasis on somatic and autonomic control of body function. Prerequisite: BMS Core or permission of instructor.

903-5 Human Neuroanatomy

(Listed jointly with Department of Anatomy; see ANT 731.) Detailed survey of the anatomy and physiology of the major fiber tracts and cell groups of the human central nervous system. Prerequisite: BMS Core or permission of instructor.

904-3 Cellular Neuroanatomy

(Listed jointly with Department of Anatomy; see ANT 732.) The correlated structure, chemistry, and physiology of vertebrate neurons, neuroglia, and synapses under normal conditions and during development, degeneration, and regeneration. Prerequisite: BMS Core or permission of instructor.

905-4 Information Processing

(Listed jointly with Department of Psychology; see PSY 665.) Survey of experimental findings in animal and human memory with emphasis on their implications for current theories of memory. Permission of instructor required. Prerequisite: BMS Core or equivalent.

909-4 Sensory Processes

(Listed jointly with Department of Psychology; see PSY 773.) Survey of the physiology and psychology of the senses. Emphasis is placed on receptor mechanisms and neural encoding processes. Permission of instructor required. Prerequisite: BMS Core or equivalent.

911-4 Neuropsychology/Neuroethology

Survey of biological bases of motivation and emotion, learning and memory, and cognition and language. Graduate standing required. Prerequisite: BMS Core or equivalent.

912-4 Experimental Methods in Neuroscience

Survey of current experimental methods in neuroscience, with emphasis on electrical recording techniques and chemical and electrical stimulation. Permission of instructor required. Prerequisite: BMS Core or equivalent.

913-4 Fundamentals of Human Neurobiology

(Listed jointly with Department of Anatomy; see ANT 691.) Development, structure, and function of the human nervous system as it relates to neuropathology, clinical neurology, and behavioral science. Enrollment in Biomedical Sciences Ph.D. program, completion of general biology and/or general psychology, and permission of instructor required.

931-3 Protein and Vitamin Nutrition

(Listed jointly with Department of Biological Chemistry; see BCH 771.) Examination of the utilization and function of proteins, amino acids, and vitamins in the nutrition of the organism. Reference is made to microbial systems, but emphasis is given to these processes as they occur in birds and mammals. Prerequisite: BMS Core.

990-1 to 3 Biomedical Sciences Seminar

Convention of student body and faculty in biomedical sciences to learn, discuss, and critique the basic and clinical biomedical literature as presented by an active and reputable scientific investigator. Presentations are required of the students as they matriculate through the program. Enrollment in Biomedical Sciences Ph.D. program required.

991-1 to 15 Special Topics in Biomedical Sciences

Covers selected topics in biomedical sciences. Enrollment in Biomedical Sciences Ph.D. program required.

995-1 to 15 Nondissertation Research

Supervised research other than laboratory rotations or dissertation research. Enrollment in Biomedical Sciences Ph.D. program and approval of program director required.

996-1 to 15 Laboratory Rotation I

Independent study designed to develop student proficiency in technology, instrumentation, research design, and data analysis in area of concentration (advanced curriculum) different from the student's specialization. Enrollment in Biomedical Sciences Ph.D. program and permission of instructor required.

997-1 to 15 Laboratory Rotation II

Independent study designed to develop student proficiency in technology, instrumentation, research design, and data analysis in area of concentration (advanced curriculum) different from the student's specialization. Enrollment in Biomedical Sciences Ph.D. program and permission of instructor required.

998-1 to 15 Laboratory Rotation III

Independent study designed to develop student proficiency in technology, instrumentation, research design, and data analysis in area of concentration (advanced curriculum) different from the student's specialization. Enrollment in Biomedical Sciences Ph.D. program and permission of instructor required.

999-1 to 15 Dissertation Research

Planning and execution of scholarly original research of a quality that is publishable in a referred, scientific journal. Research must be communicated to the supervisory committee in written form and defended by public, oral examination. Prerequisite determined by supervisor and supervisory committee.

Chemistry/CHM**511-7.5 Qualitative Organic Analysis**

Systematic classification and identification of organic compounds by chemical and instrumental methods. 3 hours lecture, 9 hours 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. Prerequisite: CHM 141. Corequisite: 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. Prerequisite: CHM 452, 512. Corequisite: CHM 515.

514-4.5 Quantitative Analysis Laboratory

Experimental methods of analysis. Practical applications of the lecture material presented in CHM 512. Prerequisite: CHM 141. Corequisite: 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. Prerequisite: CHM 452, 512. Corequisite: CHM 513.

520-3, 521-3 Advanced Inorganic Chemistry

The principles and concepts of inorganic chemistry, including the periodic table, atomic structure, bonding, coordination compounds, and an introduction to group theory. Must be taken in sequence. Prerequisite: CHM 453 or permission of instructor.

551-3, 552-3, 553-3 Physical Chemistry

The theoretical aspects of chemistry including thermodynamics, chemical kinetics, molecular structure and spectra, and the structure of solids and liquids. Must be taken in sequence. Prerequisite: CHM 141, PHY 242, or permission of instructor.

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. One year each of college chemistry and physics and two quarters of calculus required.

557-2 Physical Chemistry Laboratory I

Experimental methods of physical chemistry. Corequisite: CHM 552.

558-2 Physical Chemistry Laboratory II

Experimental methods of physical chemistry. Corequisite: CHM 553.

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. Not open to students with credit for CHM 212. Prerequisite: CHM 122.

588-1 to 3 Independent Reading

Departmental approval required.

599-1 to 5 Special Problems in Chemistry

Graduate standing and departmental approval 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. Includes classroom, laboratory, and field training in the principles and practice of monitoring for the common atmospheric pollutants. 2 hours lecture, 3 hours lab or field project. Prerequisite: CHM 213, 312; or corequisite 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 on 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 hours lecture, 3 hours lab or field project. Prerequisite: CHM 213, 312; or corequisite 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 hours lecture, 3 hours lab or field project. Prerequisite: CHM 213, 312; or corequisite 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. Not open to students with credit for CHM 213 and 312 or equivalent. Prerequisite: CHM 122. Corequisite: for 614, CHM 610; for 615, CHM 611; for 616, CHM 612.

625-3 Inorganic Preparations

Preparation of representative inorganic compounds. Prerequisite: CHM 421.

640-3, 641-3 Synthetic Medicinal Chemistry I, II

A two-quarter course concerned with various chemical aspects of drugs including the synthetic design, mode of action, and uses of various pharmaceuticals. Topics include cardiovascular agents, antibiotics, anti-tumor agents, and central nervous system drugs. Prerequisite: CHM 213.

643-3, 644-3 Chemical Toxicology I, II

A study of the basic principles of chemical toxicology. Chemicals which have the greatest incidence of abuse are discussed in more detail with regard to their chemical-biological interactions, symptomatology of toxicity, clinical chemistry tests, and treatment. Prerequisite: CHM 213, 312.

646-3, 647-3 Clinical Chemistry I, II

A study of the basic principles of the chemistry of blood and urine. Analytical procedures and clinical significance of the various test procedures are discussed with regard to aiding diagnosis of disease states. Prerequisite: CHM 213, 312.

665-3 Introduction to Polymer Science I

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 725.) Introduction to the structural and physical aspects of macromolecules; emphasis on the relationship of polymer structure to physical and mechanical properties. Prerequisite: CHM 213 or 561. Corequisite: CHM 667.

666-3 Introduction to Polymer Science II

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 726.) Step-growth and chain-growth polymerization in homogeneous and heterogeneous media; properties of commercial polymers. Prerequisite: CHM 213 or 561. Corequisite: CHM 668.

667-1 to 2 Introduction to Polymer Science Laboratory I

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 727.) Laboratory illustrations of CHM 665 lecture materials and techniques of polymer science. Corequisite: CHM 665.

668-1 to 2 Introduction to Polymer Science Laboratory II

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 728.) Laboratory illustrations of CHM 666 lecture material and techniques of polymer science. Corequisite: CHM 666.

669-4 Engineering Plastics: Materials, Processes, and Design

(Listed jointly with Department of Engineering; see EGR 689.) Properties and manufacturing processes of engineering plastics and the effect of these factors on plastics design. Illustrative laboratory projects are included. 2 hours lecture, 4 hours lab. Prerequisite: CHM 665.

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 hours lecture, 3 hours lab. Permission of instructor required.

679-4 Materials Corrosion

(Listed jointly with Department of Engineering; see EGR 679.) Survey of the principles of corrosion processes with application to metallic and nonmetallic materials. Principles of electrochemistry are included. Prerequisite: EGR 315, 370; or corequisite CHM 453; or permission of instructor.

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. Enrollment 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. Prerequisite: CHM 453 or equivalent, or permission of instructor.

721-3 Advanced Inorganic Chemistry II

A thorough examination of the chemistry of metals, stressing the transition elements, ligand field theory, and mechanisms of inorganic reactions. Prerequisite: CHM 720 or equivalent, or permission of instructor.

722-3 Advanced Inorganic Chemistry III

A survey of the applications of physical methods in the examination of inorganic compounds. Prerequisite: CHM 721 or equivalent, or permission of instructor.

725-3 Inorganic Preparations

A laboratory course demonstrating the techniques of preparation, separation, and characterization of representative inorganic compounds. Prerequisite: CHM 421 or equivalent, or permission of instructor.

728-3 Photobiology

Selected topics in photobiology. Prerequisite: BCH 421/621, 423/623, or permission 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. Prerequisite: CHM 453, 512, or equivalent; or permission 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. Prerequisite: CHM 453, 512 or equivalent; or permission of instructor. Corequisite: 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. May be repeated for credit with permission of adviser.

740-3 Elements of Organic Reactions

A discussion of the more important organic reactions including their scope, limitations, and mechanisms. Prerequisite: CHM 213 or equivalent, or permission 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 are stressed. Prerequisite: CHM 740 or equivalent, or permission 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. Prerequisite: CHM 741 or equivalent, or permission 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 or equivalent, or permission of instructor.

750-3 Introduction to Quantum Chemistry

An introduction to the ideas and mathematical techniques of quantum theory, including applications to some simple chemical systems. Prerequisite: CHM 453 or equivalent, or permission of instructor.

751-3 Chemical Kinetics

Characterization of simple kinetic systems, experimental methods, energy distributions in molecules, the transition state method, and chain reactions in solution. Prerequisite: CHM 453 or equivalent, or permission of instructor.

752-3 Thermodynamics

Chemical thermodynamics, fundamentals; first, second, and third laws; applications to solutions. Prerequisite: CHM 453 or equivalent, or permission 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 include strong and weak acids and bases, polyprotic and monoprotic acids and bases, precipitation complex formation, and oxidation-reduction equilibria. Prerequisite: CHM 512, 514; or permission 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. Prerequisite: CHM 513 or permission of instructor.

800-0 to 1 Seminar

Weekly discussions of recent topics and problems in chemistry.

820-3 Radiochemistry

Nuclear structure, radioactivity, nuclear reactions, and the application of radioactive isotopes to chemical problems. Prerequisite: CHM 453 or equivalent, or permission 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. May be repeated for credit with permission of adviser. Permission of instructor required.

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. Permission of instructor required.

840-3 Theoretical Organic Chemistry

An advanced treatment of the influence of structure on the properties of organic molecules. Prerequisite: CHM 740 or equivalent, or permission 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. Prerequisite: CHM 740 or equivalent, or permission 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. Prerequisite: CHM 740 or equivalent, or permission 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, and the chemistry of natural products. May be repeated for credit with permission of adviser. Permission of instructor required.

850-3 Quantum Chemistry

Principles and applications of quantum theory to chemical problems. Electronic structure of molecules and correlation of that structure with the chemical and physical properties of substances. Prerequisite: CHM 750 or equivalent, or permission 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. Prerequisite: CHM 752 or equivalent, or permission of instructor.

852-3 Theory of Solutions

Survey of modern theories of solutions and the liquid state. Prerequisite: CHM 752.

853-3 Group Theory

An introduction to group theory stressing application in the areas of hybridization schemes, molecular orbitals, ligand field theory, and spectroscopy. Prerequisite: CHM 750 or equivalent, or permission 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. May be repeated for credit with permission of adviser. Permission of instructor required.

899-1 to 18 Research

Research for the thesis. Permission of instructor required.

Classics/CLS**510-4 Studies in Ancient Literature**

Course offers a variety of topics including drama, epic, and lyric poetry; prose; selected themes in ancient literature; and literary criticism. Contact department for scheduled topic. May be repeated for credit by number, but not by content. Graduate standing required.

520-4 Studies in Ancient Mythology

Greek and Roman mythology; aspects and approaches to the study of myth; archaeological and nonliterary sources. Graduate standing required.

530-4 Studies in Ancient Law and Government

Political problems of the ancient world; law and legal systems, government and administration. Contact department for scheduled topic. May be repeated for credit by number, but not by content. Graduate standing required.

- 540-4 *Studies in Ancient Art and Archaeology*
(Listed jointly with Department of Art and Art History; see ART 611.) Greece in the Bronze Age; classical Greece and Rome; selected areas of Greek and Roman art and archaeology. Graduate standing required.
- 550-4 *Aspects of Ancient Culture and Society*
Greek and Roman civilization, with evidence from art, literature, archaeology, law, and other sources. Contact department for scheduled topic. May be repeated for credit by number, but not by content. Graduate standing required.

Communication/COM

- 621-4 *Language Development*
The development of speech and language in the preschool years.
- 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.
- 632-4 *Female/Male Communication*
A comparison and contrast of the communicative modes of women and men with a study of how to improve these transactions.
- 639-4 *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.
- 641-4 *Advanced Interpersonal Communication*
An in-depth view of interpersonal communication skills: presenting, receiving, and challenging. A group context is used to promote self-directed changes in interpersonal style. Prerequisite: COM 102 or 203, or permission of instructor.
- 643-4 *Interviewing*
Through a matrix organizational structure, students experience theory in selection, survey, journalistic, performance appraisal, persuasion, and counseling interviewing situations. Prerequisite: COM 203 or permission of instructor.
- 645-4 *Conference Leadership*
A simulation that focuses on the creation, development, and execution of a professional conference through assessment of participants' needs. Experiences include completing group tasks through assigned roles developed from current leadership theories. Prerequisite: COM 203 or permission of instructor.
- 647-4 *Organizational Communication*
A simulation that focuses on the creation of an organizational product, philosophy, and environment within a designated organizational structure. Experiences include development of communication channels, networks, roles, and climate, based on current communication theory. Prerequisite: COM 203 or permission of instructor.
- 649-4 *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.
- 651-4 *Communication Consulting and Training*
By means of a matrix structure, consulting and training theories are experienced in communication programs and processes as a methodology for human resource development. Prerequisite: COM 203, 447, or permission of instructor.
- 653-4 *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.
- 654-4 *Feature Story Writing*
Course work includes finding, writing, polishing, and marketing feature material.
- 655-4 *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.
- 658-4 *Editing for the Media*
Editing of copy for mass media with special emphasis on newspaper format, headline writing, rewriting, and general copy desk.
- 662-4 *Mass Media Law and Regulation*
Course includes the study of laws and regulations affecting mass media.
- 664-4 *Broadcast Criticism*
Analysis of contemporary programming and production practices including the development of critical standards for evaluation.
- 671-4 *Topics in 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.

689-4 Communicating with the Elderly

Analysis of the unique communication behaviors of the elderly and the physical, social, and emotional changes that cause them. Development of interpersonal, interviewing, and reporting skills by direct interaction with this age group. 3 hours lecture, 1 hour off-campus interviewing. Graduate students only.

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. May be repeated to a maximum of 3 credit hours. Permission of instructor required.

741-4 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. Also focuses on the possible consequences of the diffusion of communication innovations within the business, educational, and governmental institutions of American society.

781-1 to 4 Independent Research

Supervised independent research on a specific subject. Permission of instructor required.

Community Medicine/CME**601-3 Biostatistics I**

Presents basic statistical measures with emphasis on biomedical problems. Includes sampling techniques, making valid inferences and estimations, and testing hypotheses. Practice in use of calculations and preparation of data for machine analysis.

602-3 Biostatistics II

Studies advanced statistical methods for analysis of variance, multiple regression, survey methods, design of experimental investigations, vital statistics, bioassays, and sequential analysis. Prerequisite: CME 601.

621-3 Epidemiology I

Nature of epidemiological studies, descriptive epidemiology, experimental and observational investigations, cross-sections, prospective and retrospective studies, mortality and morbidity measurements and factors affecting comparison, life tables, introduction to demographic measurements. Some knowledge of statistics required.

622-3 Epidemiology II

Advanced techniques of epidemiological investigation. Epidemiology of specific chronic diseases such as cancer, diabetes, and cardiovascular and mental disorders. Introduction to environmental and occupational epidemiology. Students will prepare research protocol on a given specific problem. Prerequisite: CME 621.

641-3 Environmental Medicine I

Interaction of man with special environments. Section one is an intensive study of respiration, the cardiovascular system, and the physics and physiology of gaseous environments. Human physiology and biochemistry required.

642-3 Environmental Medicine II

Interaction of man with special environments. Section two covers mineral, chemical, and drug metabolism, function of sensory systems, and the physics and physiological stresses of heat and cold, sound, and electromagnetic and ionizing radiation. Human physiology and biochemistry required.

643-3 Environmental Medicine III

Interaction of man with special environments. Section three studies effects of dynamic forces, biomechanics of the body, physiology of physical exercises, and engineering machines to improve human performance.

650-3 Aerospace Medicine Industrial Hygiene Principles

Surveys the history of aerospace medicine; outlines the role of the specialty as practiced in government agencies, aerospace industries, the airlines and general aviation; covers the current and future status of the specialty.

651-2 Aerospace Medicine I

General review, discussions of research projects, guest presentations, and selected advanced topics dealing with aerospace medicine, occupational medicine, and public health. Presentation and discussion of problem clinical cases related to aerospace medicine. Enrollment in Aerospace Medicine Residency program or departmental approval required.

652-2 Aerospace Medicine II

Civil pilot medical case histories are covered including presentation of the medical condition that the pilot experienced, the implications by medical certification, and the proper steps in denying or certifying the pilot. May be taken for letter grade or pass/unsatisfactory. M.D. degree required. Prerequisite: CME 651.

653-3 Clinical Aerospace Medicine and Physiological Training

Principles of physical examination and diagnosis are applied to selection and health maintenance of the flyer. Includes familiarization with flight environments and aerospace ground activities. Physiological training/altitude indoctrination are also incorporated into this course. Enrollment in Aerospace Medicine Residency program or departmental approval required.

655-3 Introduction to Hyperbaric Medicine

Covers mechanisms of hyperbaric oxygen therapy, equipment, safety considerations, and limitations. Those conditions particularly amenable to this therapy are explored: decompression sickness, air embolism, gas gangrene, CO poisoning, and elective indications. May be taken for letter grade or pass/unsatisfactory. Enrollment in Aerospace Medicine Residency program required.

671-3 Principles of Occupational Health

Presents the medical department in industry: its role, functions, administration, physical facilities, personnel, equipment, records, costs, benefits, intramural relationships and extramural relationships with professional societies, official agencies, organized labor, and paramedical occupations. M.D. or O.D. required.

672-3 Clinical Occupational Health

Principles of physical examination and diagnosis are applied to selection, placement, and return to work of industrial employees. Surveys of a variety of work environments are conducted with emphasis on potential health hazards. Course includes field experience. M.D. or O.D. required.

701-3 Special Topics in Community Medicine (Aerospace)

(Listed jointly with Department of Physiology; see PHS 800.) Provides the philosophy underlying each major aerospace medicine standard. Also explores the aerospace medical factors that convert safe flight into hazardous flight. M.D. degree and departmental approval required.

731-3 to 5 Health Services Administration

(Listed jointly with Department of Management; see MGT 755.) Overview of total health care system including public and private institutions and agencies, federal and state regulations, and methods of financing. Directed study of major contemporary forces affecting the health care delivery system. Class includes seminars and on-site experiences. Prerequisite: MGT 621.

899-3 Aerospace Medical Research

Under supervision of an adviser, student chooses a research problem, prepares bibliographical search, plans experimental protocol, and conducts experimentation. A full report, constituting a thesis, will be written and defended before a graduate committee. Enrollment in Aerospace Medicine Residency program or departmental approval required.

Computer Engineering/CEG**520-4 Computer Organization**

Provides computer scientists, engineers, and other computer users with terminology and understanding of functional organizations and sequential operation of a digital computer. Introduction to program structure, machine and assembly language, stored programs, computer arithmetic, input/output, peripherals, and interfaces. Computer description using a register transfer computer design language. 3 hours lecture, 2 hours lab. Prerequisite: CEG 260, CS 146.

560-4 Digital System Design

Design of digital systems. Topics include flip-flops, timers, registers, digital arithmetic, register-level design, memory devices and their logic, controller and processor design, computer logic design, and microcomputer system design. Students must show competency in the design of digital systems. 3 hours lecture, 2 hours lab. Prerequisite: CEG 260.

591-4 Introduction to Data Communications

Principles of digital communication are discussed from a conceptual point of view with an elementary survey of theoretical aspects. Trends are analyzed in the context of competing technologies, changing needs, and emerging new technologies. 3 hours lecture, 2 hours lab. May be taken for letter grade or pass/unsatisfactory. Computer science majors may not take course for credit.

592-4 Use of Microprocessors

An introduction to the design and development of software and computer interfacing hardware for effective utilization of microprocessors in process control, data collecting, and other special purpose computing systems. Software topic loaders, assembly language programming, input/output, interrupts, and timing problems. 3 hours lecture, 2 hours lab. May be taken for letter grade or pass/unsatisfactory. Computer science majors may not take course for credit.

602-4 Introduction to Computer Communication Design

Survey of modern digital communications techniques. Specific focus is on serial transmission over public communication 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 analyses. Students must design both hardware and software components of computer communications systems. 3 hours lecture, 2 hours lab. Knowledge of a higher order language required. Prerequisite: CEG 560.

621-4 Microcomputer Design Projects

An in-depth study of the design and use of microcomputer systems. The computer organization and interface facilities are examined. Hardware/software projects are required to develop techniques for hardware and software design of open-ended projects. 3 hours lecture, 2 hours lab. Prerequisite: CEG 560, 630.

630-4 Assembly Language Programming

The use of an operating system: use of its file structure, utilities, editor, assemblers, and linker to construct programs. Assembler topics include addressing, stacks and argument passing, arithmetic operations, input/output, traps, and macros. 3 hours lecture, 2 hours lab. Prerequisite: CEG 520, CS 600.

631-4 Real-Time Software Design

Concurrent programming, concurrency, processes, synchronization. Concepts are used together with interrupts to construct the kernel of an operating system and concurrent processes for input/output and user programs. Students must show competency in the design of real-time multitasking software. 3 hours lecture, 2 hours lab. Prerequisite: CEG 630.

653-4 Design of 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. 3 hours lecture, 2 hours lab. Prerequisite: CEG 560, 630.

654-4 VLSI Design

(Listed jointly with Department of Engineering; see EGR 654.) Introduction to VLSI System Design. Topics include NMOS devices and circuit design techniques, basic building blocks for NMOS design, fabrication processing and design rules, chip planning and layout, system timing and power dissipation, simulation for VLSI design, and signal processing with VLSI. Prerequisite: CEG 560, EGR 641.

656-4 Introduction to Robotics

(Listed jointly with Department of Engineering; see EGR 656.) Introduction to the mathematics, programming, and control of robots. Topics presented include coordinate systems and transformations, kinematic equations, trajectory planning, dynamics, control, programming, and computer vision. Senior standing in computer science, computer engineering, or engineering, and permission of instructor required. Prerequisite: MTH 233.

676-4 Computer Graphics

Principles of computer graphics: representation of two- and three-dimensional space on a display. Data compression. Hidden surface problems: displays, input, graphic software packages, real-time applications. Students must show ability to apply the concepts in the design of graphics software. 3 hours lecture, 2 hours lab. Prerequisite: CS 600, MTH 253.

677-4 Computer Graphics II

Covers selected topics in detail, including hidden line and surface removal, shading models, curved surface generation, and color models. Students are expected to understand and implement sophisticated algorithms in these areas. Projects are individualized and creative. Selected papers are used for in-depth material. Emphasis is on the design of graphics systems. 3 hours lecture, 2 hours lab. Prerequisite: CEG 676.

699-1 to 5 Selected Topics

Selected topics in computer engineering. Topics vary from quarter to quarter. May be taken for letter grade or pass/unsatisfactory. Graduate standing and permission of instructor required.

700-3 Principles of Instruction in Computer Engineering

A survey of available instructional materials and discussions of educational theory and techniques leading to more effective instruction. Required of and enrollment limited to those who hold graduate teaching assistantships.

720-4 Computer Architecture

A study of constructing highly specific and individual computers from basic building blocks such as memories, arithmetic units, and busses. Topics are stack mechanism, parallel computers, pipeline processing, processors based on programming languages, multiprocessing computers, and computer network. 3 hours lecture, 2 hours lab. Prerequisite: CEG 560, 631.

721-4 Computer Architecture II

A continuation of CEG 720 with more detailed study of lecture and lab topics. 3 hours lecture, 2 hours lab. Prerequisite: CEG 720.

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 hours lecture, 2 hours lab. Prerequisite: CEG 653.

751-4 Microprocessors II

Interaction of microprocessors and the outside world. Data acquisition and real time control. Bus interfacing and direct memory access. Multiple processor environment and distributed processing. Small real time operating systems. Project management. 3 hours lecture, 2 hours lab. Prerequisite: CEG 750.

752-4 VLSI

(Listed jointly with Department of Engineering; see EGR 752.) Introduction to the techniques, limitations, and problems in the design of VLSI. Topics include NMOS, CMOS technologies, design rules, chip planning, layout, testability, and simulation. Prerequisite: CEG 560, CEG 720 or EGR 710.

753-4 VLSI II

(Listed jointly with Department of Engineering; see EGR 753.) A continuation of CEG 752 with a more detailed study of lecture topics and testing and evaluation of chips implemented in CEG 752. Prerequisite: CEG 752.

756-4 Robotics

(Listed jointly with Department of Engineering; see EGR 756.) Detailed study of the dynamics and control of robotic systems. Material covered includes trajectory planning, rigid-body dynamics, rotating coordinate systems, and computer implementation of various adaptive and optimal control schemes. Prerequisite: CEG 631, 656; EGR 627 or 720.

757-4 Robotics II

(Listed jointly with Department of Engineering; see EGR 757.) Study of programming and vision techniques applicable to the control of robotic systems. Material covered includes robot languages, teach mode, image processing, scene analysis, and pattern recognition. Prerequisite: CEG 756.

760-4 Software Engineering I

An introduction to software engineering. Fundamentals of problem specification, program design, verification, and evaluation are explored. Students participate in team projects to apply the methods introduced. Prerequisite: CS 666, 680, or 784.

761-4 Software Engineering II

A continuation of CEG 760. Selected topics introduced in CEG 760 are explored in greater depth. Student projects from CEG 760 are used as subjects for detailed analysis and evaluation. Prerequisite: CEG 760.

790-4 Selected Topics in Computer Engineering

Lectures on and study of selected topics in current research and recent developments in computer engineering. May be taken for letter grade or pass/unsatisfactory. Graduate standing and permission of instructor required.

795-1 to 4 Independent Study

Special problems in advanced engineering topics. May be taken for letter grade or pass/unsatisfactory. Graduate standing and permission of instructor required.

799-1 to 8 Thesis

Permission of adviser required.

Computer Science/CS

Computer Science 516, 517, 600, and 633, and Computer Engineering 520, 560, 630, and 631 are considered background for entering students and thus are not counted in the 45 credit hours required for the degree.

516-4, 517-4 Numerical Methods for Digital Computers

(Listed jointly with Department of Mathematics and Statistics; see MTH 516, 517.) An introduction to numerical methods used in the sciences. Includes methods of interpolation, data smoothing, functional approximation, integration, solutions of systems of equations, and solutions of ordinary differential equations. 3 hours lecture, 2 hours lab. Prerequisite: for 516, CS 142 or 210, MTH 231, MTH 253 or 355 or permission of instructor; for 517, CS 516, MTH 233.

600-4 Data Structures and Software Design

Study of the implementation of data structures and control structures in professional computer programs. Introduction to the fundamentals of complexity and analysis. Study of common standard problems and solutions, e.g., transitive closure and critical paths. Emphasis is on high-level language software design. 3 hours lecture, 2 hours lab. Prerequisite: CS 146, MTH 253, 257.

605-4 Introduction of Data Base Management Systems

Survey of logical and physical aspects of data base management systems. Hierarchical, network, and relational models of a data base are presented. Physical implementation methods are discussed. Students are given experience creating and manipulating a data base. Students must show ability to apply the concepts to the design of data base systems. 3 hours lecture, 2 hours lab. Prerequisite: CS 600.

607-3 Optimization Techniques

(Listed jointly with Department of Engineering and Department of Mathematics and Statistics; see EGR 607, MTH 607.) Concepts of minima and maxima; linear programming; simplex method, densitivity and duality, transportation and assignment problems, and dynamic programming. Prerequisite: MTH 233, 253 or 355.

610-4 Theoretical Foundations of Computing

(Listed jointly with Department of Mathematics and Statistics; see MTH 610.) Examines the limitations of algorithmic processes in problem solving. The following approaches to this issue are presented: Turing machines, Markov algorithms, recursive functions, and the methods of Kleene and Post. Other topics include Church's hypothesis as well as the halting problem and related decision problems. 3 hours lecture, 2 hours lab. Prerequisite: successful completion of at least one 300-level math or statistics course and CS 600; or a 400-level math course and CS 142; or CS 633 and CEG 520.

633-4 Operating Systems

The role of resource allocation in general computer systems. The problems, techniques, and concepts that arise in multiaccess, multiprogram, and multiprocess systems are emphasized. Students must show ability to apply the concepts to the design of operating systems. 3 hours lecture, 2 hours lab. Prerequisite: CEG 631.

658-3 Applied Graph Theory

(Listed jointly with Department of Mathematics and Statistics; see MTH 658.) Introduction to methods, results, and algorithms from graph theory. Emphasis on graphs as mathematical models applicable to organizational and industrial situations. Prerequisite: CS 142, MTH 231.

666-4 Introduction to Formal Languages

Introduction to the theory and application of formal languages. Emphasis is on those classes of languages commonly encountered by computer sciences (e.g., regular and context-free languages). 3 hours lecture, 2 hours lab. Prerequisite: MTH 257, CS 600; or MTH 257 and completion of a 600-level math or statistics course.

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. Students must show ability to solve problems using simulation techniques. 3 hours lecture, 2 hours lab. Prerequisite: CS 600, STT 560.

680-4 Comparative Languages

Basic concepts and special purpose facilities in programming languages, examined through several representative languages. 3 hours lecture, 2 hours lab. Prerequisite: CS 600.

699-1 to 5 Selected Topics

A study of selected topics in computer science. May be taken for a letter grade or pass/unsatisfactory. May be repeated. Permission of instructor required.

700-3 Principles of Instruction in Computer Science

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 graduate teaching assistantships in the Department of Computer Science.

701-4 Information Retrieval System Design

Introduction to basic goals and techniques in the design and implementation of information retrieval systems. Input, file organization, search strategies, output, language design, and evaluation techniques are covered. 3 hours lecture, 2 hours lab. Prerequisite: CS 605.

702-4 Information Retrieval System Design II

Continuation of CS 701. Emphasis on relational data bases and distributed systems. Current literature is reviewed. Includes at least one programming project to bridge the gap from theory to practice. Prerequisite: CS 701.

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, and survey of a number of AI projects. 3 hours lecture, 2 hours lab. Prerequisite: CS 600, CEG 631.

711-4 Artificial Intelligence II

Follow-up course to CS 710. Covers recent artificial intelligence projects in a variety of areas. Material is taken from reports and journal articles, and presented by students as well as by the instructor. 3 hours lecture, 2 hours lab. Prerequisite: CS 710.

712-4 Artificial Intelligence III

Artificial intelligence programming techniques. Topics covered include knowledge representation via frames, productions, and predicate calculus. Also included are AI program control structures and techniques relevant to expert system design. 3 hours lecture, 2 hours lab. Prerequisite: CS 340 or LISP programming experience; CS 710, 711.

716-4 Numerical Analysis I

(Listed jointly with Department of Mathematics and Statistics; see MTH 716.) Mathematical analysis of numerical methods used in the sciences. Includes selections from the following topics: matrix and iterative methods of solving systems of equations; computation of eigenvalues and eigenvectors; polynomial approximation; interpolation; integration; ordinary differential equations; boundary value problems; partial differential equations. Knowledge of FORTRAN programming language or permission of instructor required. Prerequisite: MTH 233, 333, 355, 432; or equivalent.

717-4 Numerical Analysis II

(Listed jointly with Department of Mathematics and Statistics; see MTH 717.) Continuation of CS 716. Prerequisite: CS 716.

718-4 Numerical Analysis III

(Listed jointly with Department of Mathematics and Statistics; see MTH 718.) Continuation of CS 717. Prerequisite: CS 717.

730-4 Systems Programming

A study of multiprocess operating systems. Current literature in models for distributed process computation. 3 hours lecture, 2 hours lab. Prerequisite: CS 633, CEG 631.

731-4 Systems Programming II

Continuation of CS 730. In-depth study of a few systems and a major project. 3 hours lecture, 2 hours 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 hours lecture, 2 hours lab. One course in statistics required. Prerequisite: CS 633, 670.

740-4 Introduction to the Theory and Analysis of Algorithms I

Language generation and machine computation models; recursive and partially recursive functions; undecidability; Church's thesis; equivalence of computing paradigms. 3 hours lecture, 2 hours lab. Prerequisite: CS 666.

741-4 Introduction to the Theory and Analysis of Algorithms II

Continuation of CS 740. Emphasis on analysis of the complexity of problems and algorithms. Prerequisite: CS 740.

760-4 Software Principles I

Fundamentals of algorithms, data structures, and programming languages are applied to abstract problem solutions and concrete realizations of those solutions. 3 hours lecture, 2 hours lab.

771-4 Natural Language Processing I

Survey of computational and linguistic topics pertaining to natural language processing. Emphasis on syntactic issues and parsing. Topics include phrase structure grammars, transformational grammars, transition networks, and function grammars. Prerequisite: CS 666.

772-4 Natural Language Processing II

Continuation of CS 771. Computational methods for dealing with natural language semantics are introduced. Topics include semantic networks, conceptual dependency graphs, and formal logic as a semantic model. Prerequisite: CS 771.

774-4 Logic Programming

An in-depth look at logic programming and logic programming languages. Both application and implementation issues are examined. Prerequisite: CS 680.

776-4 Functional Programming

An in-depth look at functional programming techniques, and functional languages and their implementation. Prerequisite: CS 680.

780-4 Compiler Design and Construction

A complete compiler for a small programming language is discussed. Topics covered are scanning, syntax analysis, and code generation. 3 hours lecture, 2 hours lab. Prerequisite: CS 666, 680.

781-4 Compiler Design and Construction II

Continuation of CS 780. Topics are covered in more depth. Project is required. 3 hours lecture, 2 hours lab. Prerequisite: CS 780.

782-4 Compiler Design and Construction III

Continuation of CS 781. Concentration on major design project. 3 hours lecture, 2 hours lab. Prerequisite: CS 781.

784-4 Programming Languages I

A rigorous examination of the fundamental principles of programming languages. Examples are drawn from a variety of modern languages, including Ada, Prolog, LISP, and Smalltalk. Prerequisite: CEG 631.

785-4 Programming Languages II

Continuation of CS 784. Particular emphasis is given to formal methods for specifying and defining both the syntax and the semantics of programming languages. Prerequisite: CS 784.

790-4 Selected Topics in Computer Science

Lectures on and study of selected topics in current research and recent developments in computer science. 3 hours lecture, 2 hours lab. Permission of instructor required.

795-1 to 4 Independent Study

Special problems in advanced computer science topics. May be taken for letter grade or pass/unsatisfactory. May be repeated. Permission of instructor required.

799-1 to 8 Thesis

Permission of adviser required.

Counseling/CNL**661-4 Principles of Counseling**

Overview of major counseling theories and techniques and review of historical foundations of the mental health movement. Social, psychological, and philosophical influences are considered.

662-4 Problems in Student Personality and Development

Considers physical, psychological, and personality development of students 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.

663-4 Mental Health I

Factors influencing the behavior of individuals; methods a counselor may use in observing, analyzing, and improving attitudes and behavior. Graduate standing in education required.

664-1 to 4 Crisis Intervention Counseling

Introduces the student to the background, theory, practice, and needs of crisis intervention within the helping professions. A variety of crisis intervention models are explored, as are the various community resources available to the crisis intervention worker. Graduate standing required. Prerequisite: CNL 461 or RHB 701 or permission of instructor.

667-4 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 are considered. Topics vary according to participant needs and interests. Specific subtitles to be added with individual workshops.

761-4 Psychometrics

Surveys psychological tests and measurements with particular emphasis on attitude, interest, and personality tests. Understanding of basic principles and their application to counseling are stressed. Prerequisite: ED 751.

762-4 Career Development and Information Services

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.

763-4 Theories of Counseling

An investigation of the theoretical models that are basic to counseling function and practice as applied to the therapeutic situation. Graduate standing required.

765-4 Pupil Personnel Services in the School and Community Resources

Presents theoretical aspects concerning the organization and administration of guidance services; practical application of principles to schools and other organizations. 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. (Previously listed as ED 765.)

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; and the use of occupational data in career counseling. Graduate standing required. (Previously listed as ED 766.)

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 focuses on understanding of individual and group behavior as they relate to the individuals taking the course. Evaluation and research of group processes are also 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 and actual on-the-site visitation. Voids in services and areas of unmet human needs are outlined, and the methods of social action essential to changing old agencies are developed. Graduate standing required.

769-4 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, and treatment methodology (including play therapy, family counseling, and teacher collaboration). Prerequisite: RHB 701.

770-1 to 3 Independent Study/Minor Problems

Planned reading and/or project under the guidance of a counselor education program faculty member. May be repeated to a maximum of 9 credit hours. Regular standing in graduate school, 9 credit hours in education, and approval of the instructor and Office of the Dean of Education and Human Services required.

773-4 Mental Health II

Acquaints the student with preventive mental health, advocacy roles, legal and ethical issues, and interdisciplinary approaches to community mental health.

778-4 Techniques of Play Therapy

An investigation of the techniques of play therapy for children ages three to twelve. An advanced seminar for students interested in individual and group play and its therapeutic implications for schools and agencies. Prerequisite: CNL 863 or permission of instructor.

779-4 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: RHB 701.

860-1 to 6 Advanced Seminar in Counseling

Provides an opportunity for advanced students to work on problems of their own selection under faculty supervision. Permission of instructor required.

861-3 Individual Intelligence Testing I

Focuses on 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: RHB 705.

862-3 Individual Intelligence Testing II

Focuses on 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.

863-4 Techniques of Counseling

Laboratory practice in individual counseling techniques; focuses on the development of basic skills and procedures. Completion of preadmission procedures and permission of program coordinator required. Prerequisite or corequisite: RHB 701.

864-1 to 4 Practicum I: Individual

Provides an experience in counseling and guidance in which the student, under supervision, actually counsels individuals in educational, vocational, and personal areas. Permission of adviser through application and departmental approval required. Prerequisite: CNL 863.

865-4 Individual Practicum

Provides an experience in counseling and guidance in which the student, under supervision, actually counsels individuals in educational, vocational, and personal areas. Permission of adviser through application required. Prerequisite: CNL 863.

866-4 Advanced Individual and Group Practicum

Provides an experience in counseling and guidance in which the student, under supervision, actually counsels individuals and groups in educational, vocational, and personal areas. Permission of adviser through application required. Prerequisite: CNL 863.

960-1 to 4 Advanced Institute for Human Services Personnel

Individual and group study of current problems and issues for counselors. Also provides a focus on the development of new skills related to counseling interventions. Possible topics include professional ethics and responsibilities, crisis intervention, human sexuality. Topics vary from quarter to quarter. May be repeated. Graduate standing required.

961-3 Counseling the Gifted

Overviews the special social/emotional needs of gifted children and youth. Major focus is on techniques to help gifted children experience their emotions, and to develop awareness and understanding of themselves. Prerequisite: ED 722 or permission of instructor.

971-4 Counseling for the Life-Span Development
Developmental factors influencing the behavior of individuals across the life span and the unique counseling strategies that are employed with clients in the human services at different points on the life-span continuum. Prerequisite: CNL 863, ED 751, RHB 701.

972-4 Legal, Professional, and Ethical Issues in the Human Services
Surveys the various legal, professional, and ethical concerns most often encountered by human service providers. Prerequisite: CNL 773, 863; RHB 701.

973-4 Social and Cultural Foundations in Counseling
Focuses on studies of change, ethnic groups, subcultures, changing roles of women, sexism, urban and rural populations, and differing life patterns. Involves experiential and didactic material and looks at individual attitudes and beliefs. Prerequisite: CNL 663, 773, 863; RHB 701.

Economic Education, Center for/ECO

Courses offered through the Center for Economic Education do not apply toward the M.B.A. or M.S. degree in social and applied economics.

500-3 Consumer Economics for K-12 Teachers
An examination of consumers as they participate in the economy. Special emphasis is placed on those householder roles (consumer/producer/citizen) which are teachable in the K-12 classroom. May be taken for letter grade or pass/unsatisfactory. Permission of director of the Center for Economic Education required.

511-3 Principles of Economics for Teachers—I
Survey of basic microeconomic principles for K-12 teachers. Participants study the tools of analysis and operations of the parts of the economy. May be taken for letter grade or pass/unsatisfactory. Permission of director of the Center for Economic Education required.

512-3 Principles of Economics for Teachers—II
Survey of basic macroeconomic principles for K-12 teachers. Participants study the tools of analysis and operations of the whole economy. May be taken for letter grade or pass/unsatisfactory. Permission of director of the Center for Economic Education required.

513-3 Principles of Economics for Teachers—III
Survey of advanced micro- and macroeconomic principles for K-12 teachers. Participants study the tools of analysis and operations of the parts and the whole of the economy. May be taken for letter grade or pass/unsatisfactory. Permission of director of the Center for Economic Education required.

514-3 Economic Studies for Teachers: Economics in Action

Selected economic issues and topics for teachers, presented in dialogue with visiting resource persons. May be taken for letter grade or pass/unsatisfactory. Prerequisite: ECO 511, 512, or equivalent; or permission of director of the Center for Economic Education.

515-3 Economic Studies for Teachers: Materials/Methods

Study of economic education materials and methods for the K-12 classroom. May be taken for letter grade or pass/unsatisfactory. Prerequisite: ECO 511, 512, or equivalent; or permission of director of the Center for Economic Education.

516-1 to 6 Economic Studies for Teachers

Study of selected economic issues and topics and techniques for teaching them in the K-12 classroom. May be taken for letter grade or pass/unsatisfactory. Prerequisite: ECO 511, 512, or equivalent; or permission of director of the Center for Economic Education.

523-3 Family Financial Security

Study of financial planning and the family, with emphasis on aspects teachable in the K-12 classroom. May be taken for letter grade or pass/unsatisfactory. Permission of director of the Center for Economic Education required.

728-3 Curriculum and Materials in Economic Education

Analysis of teaching materials available in economic education, with emphasis on curriculum and teaching-unit development. May be taken for letter grade or pass/unsatisfactory. Permission of director of the Center for Economic Education required.

Economics/EC

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.

Economics 621 and 622 are prerequisite for the following courses. Any additional requirements are indicated for each course.

601-3 Managerial Economics

Application of economic analysis to management decision making. Practical methods and problems are stressed.

602-3 Monetary Economics

Analysis of monetary policy development and the theory of money market behavior. Emphasizes the relationship between money and national economic conditions.

- 609-3 Applied Econometrics**
Application of statistics and economic theory to measurement, forecasting, and other economic problems. College algebra and statistics or equivalent required.
- 610-3 Introduction to Mathematical Economics**
Application of mathematical tools in the formulation of economic theory. Methods used in model construction. College algebra or equivalent required.
- 612-3 Forecasting Economic Activities**
Techniques and theories used in forecasting. Practical methods and problems are stressed. Prerequisite: EC 621 and 622 or equivalent.
- 631-3 Federal Finance and the Economy**
Analysis of federal government expenditures and taxation policies and the impact on economic conditions. Techniques for policy evaluation are discussed.
- 632-3 State and Local Finance and the Economy**
Analysis of different taxation policies of state and local governments. Efficient methods of producing public goods such as education and public health services.
- 641-4 International Trade and the Economy**
Economic reasons for international trade. Impact of trade and trade restrictions on economic aggregates.
- 642-3 International Monetary Theory and Problems**
Study of international monetary relations and problems. Focus is on the institutions and arrangements used to finance international trade. Topics discussed include balance of payments, the dollar and foreign exchange markets, Eurocurrencies, Petrodollars and OPEC, and multinational corporations.
- 644-3 Economic Development and World Poverty**
Economic development in less developed countries as it relates to population growth, cultural change, and industrialization.
- 654-3 Economics of Collective Bargaining**
Development of collective bargaining in the United States; economic cost of labor-management relations.
- 715-3 Advanced Price Theory**
Examination of the general principles and analytical tools of microeconomic analysis at the graduate level. Principles of micro- and macroeconomics required. Prerequisite: EC 621, 622, and QBA 620 or equivalent.
- 717-3 Advanced National Income Analysis**
Examination of the general principles and analytic tools of macroeconomic analysis at the graduate level. Principles of micro- and macroeconomics required. Prerequisite: EC 621, 622, and QBA 620 or equivalent.
- 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 permission of instructor.
- 730-3 Regional and Urban Economics**
Analysis of the basic forces that shape the economic, social, and physical environment of urban and nonurban regions. Emphasis is 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, QBA 723, or permission of instructor.
- 755-3 The Economics of Health and Health Policy**
(Listed jointly with Department of Community Medicine; see CME 731.) Teaches students how alternative incentive systems and resource allocations affect the health services sector. Emphasis is on current institutional arrangements, empirical studies, and policy alternatives. Graduate standing and knowledge of microeconomics principles required. Prerequisite: EC 621.
- 760-12 Internship**
Titles vary from quarter to quarter. 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. Graded pass/unsatisfactory.

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. Intermediate microeconomics and intermediate statistics or departmental approval required.

777-3 Economic Studies

An examination of special issues. Permission of instructor required.

780-3 Economic Problems Seminars

Titles vary from quarter to quarter. Six credit 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. Introductory statistics or 600-level survey course equivalent required. Prerequisite or corequisite: EC 715, 717, or permission of instructor.

781-2 to 4, 782-2 to 4, 783-2 to 4 Research in Economics

Titles vary from quarter to quarter. Intensive reading or research in selected fields of advanced economics. Permission of instructor required.

Education/ED**601-3 Human Relations in Education**

Designed to acquaint students with the effect of their own input in communication-interpersonal transaction situations with the objective of developing self-directed behavior and the ability to facilitate self-expression in others. Small groups are used as learning laboratories for this purpose.

603-3 to 4 Child Development

Factors which influence growth and development.

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.

605-1 to 4 Current Tendencies in Education

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 12 credit 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. An overview with emphasis on coordinating techniques applicable in high school, post-high school, and adult training areas. Graduate standing required. Prerequisite: ED 633 or equivalent.

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. Graduate standing required. Prerequisite: ED 633 or equivalent.

609-4 Early Childhood Curriculum and Materials: Sociocultural

Historical, philosophical, and sociological aspects of early childhood education. Emphasis on the development of race awareness in young children and the development of self-concept. Graduate standing required.

611-4 Early Childhood Education

History and development of early childhood education and introduction to early childhood professions. Focus on job opportunities, professional organizations, and the needs and developmental levels of the young child. Basic information about skills and competencies necessary for teaching young children. Participation required.

612-4 Kindergarten: Curriculum and Materials

Various types of early childhood programs in the United States. Research in their historical backgrounds. Review of basic human growth and learning principles significant for understanding young children, prenatal through age eight. Focus on planning effective preschool and early learning programs. Participation required.

613-3 Elementary School Geometry: Curriculum and Materials

Prepares elementary school teachers to teach geometrical concepts included in today's K-6 mathematics program. Emphasis is on an informal approach to teaching the use of experimentation, intuition, and guided discovery. Prerequisite: ED 704.

- 614-4 *Early Childhood Education Curriculum and Materials: Language***
Basic emphasis is on the study of existing commercial materials for preschool language development, evaluation of these materials, and design and presentation of supplementary and basic teacher-made materials. Participation required. Prerequisite: ED 403/603, COM 421/621.
- 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. Graduate standing required.
- 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. Completion of 8 credit hours in science required.
- 617-3 to 4 *Elementary School Social Studies: Curriculum and Materials***
Objectives, principles, and trends in elementary social studies education. Participation required. Prerequisite: ED 704 or permission of instructor.
- 618-3 to 4 *Improving Mathematics Instruction in the Elementary School***
For teachers or supervisors who desire study in improvement in instruction. Prerequisite: ED 437 or equivalent.
- 620-2 to 4 *Studies in English Education***
Focuses on theoretical issues and practical problems of the teaching of English at all levels to meet the needs of teachers of English to speakers of other languages (TESOL). Includes theory and evaluation procedures for TESOL. May be taken for letter grade or pass/unsatisfactory.
- 623-3 *Secondary School English: Curriculum and Materials***
Curriculum, methods, and materials for the language arts in the secondary schools; current trends in the teaching of English. Field/clinical experiences required. Departmental approval required. Prerequisite: ED 663 or equivalent.
- 624-3 *Secondary Speech and Drama: Curriculum and Materials***
Curriculum and materials for those preparing to teach speech and drama in secondary schools. Covers teaching methods, class organization, production of plays, and cocurricular activities. Field/clinical experiences required. Departmental approval required. Prerequisite: ED 663 or equivalent.
- 625-3 *Modern Foreign Languages: Curriculum and Materials***
The modern language curriculum in the public schools: purposes, methods, materials. Field/clinical experiences required. Departmental approval required. Prerequisite: ED 663 or equivalent.
- 626-2 to 4 *Outdoor Education***
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. Ecological relationships are emphasized.
- 630-3 *Teaching About Religion in the Public Schools***
(Taught jointly with 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 schools, 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 clinical experiences, approaches to teaching, the professional literature, resources and facilities, and curricular trends in science education. Participation required. Prerequisite: ED 704 or permission of instructor.
- 632-3 *Improving Reading in Secondary Schools***
A survey course covering the teaching of reading in American secondary schools including the skills necessary to teach reading in the content subjects. Enrollment limited to teacher certification candidates. Not open to reading majors. Graduate standing required.
- 633-4 *Business Education: Curriculum and Materials in Basic Business Subjects***
Acquaints the student with business education philosophy, objectives, and curricula on the secondary level of instruction. Curriculum and materials in basic business subjects, bookkeeping, data processing, and sales communication. Field/clinical experiences required. Prerequisite: ED 211 through 217 or equivalent. Corequisite: ED 327.
- 634-3 *Business Education Curriculum and Materials: Typewriting, Keyboarding, and Office Procedures***
Curriculum, methods, and materials in typewriting, keyboarding, and office procedures in the secondary school; current trends in teaching typewriting, keyboarding, and office procedures in the vocational program. Field/clinical experiences required. Prerequisite: ED 433, OA 213.

- 635-4 Business Education Curriculum and Materials: Shorthand, Transcription, Word Processing, and Secretarial Procedures**
Curriculum, methods, and materials in teaching shorthand, transcription, word processing, and secretarial procedures. Field/clinical experiences required. Prerequisite or co-requisite: ED 322; OA 213, 320. Corequisite: ED 327.
- 637-3 Elementary School Mathematics: Curriculum and Materials**
Instructional materials and methods of meaningful explanations of mathematics in the elementary school based upon structural properties of number and numeration system studies at this level. Field/clinical experiences required. Must have teacher certification. Prerequisite: MTH 343.
- 638-3 Secondary School Mathematics: Curriculum and Materials**
Curriculum, methods, and materials in mathematics for grades 7-12. Field/clinical experiences required. Completion of a minimum of 30 hours in mathematics required. Prerequisite: ED 701, 704, 710, 802, or equivalent.
- 639-3 Secondary School Social Studies: Curriculum and Materials**
Objectives, principles, and trends in secondary social studies education. One half-day per week participation experience required during enrollment in course. Prerequisite: ED 704.
- 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; ED 603, 701, or equivalent.
- 642-4 Curriculum Development and Materials for Exceptional Individuals**
Practices and procedures in developing curricula for exceptional individuals, including preparation, selection, and adaptation of instructional materials. Emphasis on a persisting life-problems approach, including social studies and science content. Participation required. Guided observation in special education. Corequisite: ED 641, 655.
- 645-3 Career Education and Occupational Training for Exceptional Individuals**
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, 642, 655; or departmental approval.
- 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.
- 648-3 Improvement of Social Studies Instruction**
An in-depth analysis of new social studies resource materials and curriculum modes with an emphasis toward improving instruction. Graduate standing and completion of a social studies methods course required.
- 651-3 Introduction to Multiply Impaired Individuals**
A review of etiological aspects, educational and training programs, concerns, and issues related to multiply impaired people, including those who are trainable retarded, autistic, and severely and profoundly physically and mentally handicapped. Observation in local facilities required. Prerequisite: ED 641, teaching experience, or permission of instructor.
- 652-3 Education of Individuals with Physical, Sensory, and Communication Disorders**
An overview of the etiology and educational implications of physical disabilities, sensory deficits, and communication disorders. Emphasis is placed on psychoeducational and physical needs of these children and youth, including the adaptation of methods and materials. Participation required. Prerequisite: ED 641 or permission of instructor.
- 653-3 Education and Training of Multiply Impaired Individuals**
Review of organizations, methods, and techniques for educating and training multiply impaired children, youth, and adults. Surveys opportunities available for recreation, leisure time, and work habilitation. Participation required. Prerequisite: ED 641, 651, or permission of instructor.
- 654-3 Administration and Interpretation of Educational Data**
Aids students in learning to administer and interpret formal and informal educational assessment instruments and to communicate assessment data to parents and colleagues. Prerequisite: ED 603, 641, 655 (ED 641 and 655 may be taken concurrently).
- 655-2 Education of Individuals with Learning Disabilities/Disorders**
Overview of specific problems and major remedial approaches to individuals with learning disabilities and behavior disorders. Major emphasis is on classroom management techniques. Prerequisite: ED 603, 641, 704 (ED 641 may be taken concurrently).

656-3 to 5 *Clinical Practice in Remediation*

Supervised clinical practice in the diagnostic teaching of exceptional individuals. Emphasis on assessment, reading, and math curriculum and materials. Prerequisite: ED 437; ED 615 or 632; ED 641, 642, 654, 655.

658-1 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. Variable titles. At least 6 credit hours of professional education at Wright State and permission of instructor required.

659-3 *Techniques for Counseling Parents of Exceptional Individuals*

An overview of the exceptional individual's effects on the family unit and the concerns and feelings of the family about the person. Techniques in counseling parents of these special children. Prerequisite: ED 441/641 or permission of instructor; ED 455/655.

660-1 to 4 *Practicum in English Education*

Students are assigned to an instructional class which focuses on the teaching of English to speakers of other languages (TESOL) for a supervised practicum experience. Graded pass/unsatisfactory. Prerequisite: ED 620.

661-6 *Studies in the Social Foundations of Education*

The interrelationships of social forces and education. Introduction to the multicultural/pluralistic makeup of schools, the theoretical bases of social issues in contemporary society, and their application to the educational process and schooling. Graduate standing and departmental approval required.

662-6 *Studies in the Psychological Foundations of Education*

An understanding of those psychological theories, principles, and processes that affect teaching and learning. Focuses on learning theory, teaching behavior, student needs, and the skills necessary to maintain an optimum learning environment. Graduate standing and departmental approval required.

663-3 *Teaching Skills and Strategies*

Explores the use of basic skills in planning, motivation, and questioning, as well as the use of audiovisual equipment and production, alternative instructional strategies, and management techniques that help facilitate instruction. Thirty hours of participation in a classroom required. Graduate standing and departmental approval required.

664-3 to 4 *Evaluation*

Evaluation of learning, including selected forms of measurement and interpretation of data: sociometric techniques, anecdotal records, and testing. Graduate standing and departmental approval required.

665-6 to 15 *Supervised Teaching: Elementary*

Students are assigned to a public school full time for teaching under the direct supervision of an experienced classroom teacher. Includes weekly seminar. Graded pass/unsatisfactory. Open only to students in special programs. Graduate standing and completion of thirty hours in approved program required.

666-3 *Introduction to Schooling*

An understanding of the organization and function of schools, legal and financial aspects of schooling, and the rights and responsibilities of those involved in the educational process. Thirty hours of participation in a classroom required. Graduate standing and departmental approval required.

667-6 to 15 *Supervised Teaching: Secondary*

Students are assigned to a public school full time for teaching under the direct supervision of an experienced classroom teacher. Includes weekly seminar. Graded pass/unsatisfactory. Open only to students in special programs. Graduate standing and completion of thirty hours in approved program required.

670-1 to 6 *Curriculum and Instruction Workshop*

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. Specific subtitles to be added with individual workshops. Graduate standing in education or permission of instructor required.

700-3 *Graduate Assistant Seminar*

Orientation of graduate assistants to the organization and responsibility of the College of Education and Human Services. Selected topics related to specific programs, services, and procedures in the college are considered. Required of and limited to those holding first-year graduate assistantships in the College of Education and Human Services.

701-3 *Advanced Educational Psychology*

Investigates selected theories of learning and examines the relationship between the theories and instructional practice. Completion of graduate core required.

702-3 *Social Foundations of Education*

Relationship between public education in a democracy and the critical social issues and social forces. Graduate standing required.

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. Graduate standing required.

704-4 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. Admission to the graduate education core program required.

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. One half-day per week field experience required during enrollment in course. 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, enables 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 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. Graduate standing and completion of graduate core required.

708-3 Comparative Education

An analysis of educational systems as they relate to the values and cultures of selected countries. Graduate standing and completion of graduate core required.

709-4 Applied Psychological Learning Theory

Investigates selected theories of learning and analyzes their value to instructional practices. Primary emphasis is given to the relationships among learning theories, learner characteristics, motivational theories, and instructional practices. Graduate standing required.

710-4 Classroom Strategies for Atypical Populations

Focuses on curricula, materials, strategies, and techniques for instructing learners with cultural, social, economic, and intellectual differences. Postbaccalaureate standing required.

711-3 Foundations of International Education

Develops a broad understanding of factors influencing educational systems and practices throughout the world. Graduate standing required.

713-3 Working with Parents of Young Children

Study and practicum in homebound, early-intervention, and parent-involvement programs. Graduate standing required. Prerequisite: ED 611 or permission of instructor.

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. Graduate standing required. Prerequisite: ED 611 or permission of instructor.

715-3 Role of Administrator in Early Childhood Education

Planning, implementation, coordination, supervision, and direction of early childhood programs. Graduate standing required. Prerequisite: ED 611 or 612 or permission of instructor.

716-4 Advanced Reading Instruction

Development of effective reading instruction based on children's language acquisition and development. Graduate standing required. Completion of core or permission of instructor required.

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. Graduate standing required. Prerequisite: ED 611, 612, or permission of instructor.

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

Designed for in-service 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.

720-3 Creative Problem Solving in Classrooms

An introduction to creative problem-solving models and approaches that can be used by classroom teachers to involve students in the solutions of problems. Graduate standing required.

721-4 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. Application of research and criticism ideas; exploration of internationalism in children's literature. Completion of core or permission of instructor required.

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. Teaching certification required.

723-1 to 3 Teaching the Gifted

Direct experience in the teaching of gifted children and youth. Subject content varies according to the specific subtitle. Participation required. Prerequisite: ED 722.

724-3 Foundations of Business Education

Philosophy and objectives of the business education and vocational business and office education curricula on the secondary and postsecondary levels of instruction. Guidance, selection, and placement of students and contemporary influences on business education and vocational business and office education are included. Graduate standing in education required.

725-3 Administration and Supervision in Vocational Business and Office Education

Organization of vocational business and office education in the United States, especially in Ohio. Examination of evaluative criteria for departments of vocational business and office education, teacher selection and supervision, human relations, and the impact of federal legislation. Graduate standing in education required.

726-3 Adult Programs in Vocational Business and Office Education

Investigation of business and office 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 in education required.

727-3 Teaching Strategies and Curriculum Trends in Nonskilled Business Education Subjects

Study of recent developments in the teaching of basic business subjects including vocational programs and the development of appropriate teaching strategies.

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 Teaching Strategies and Curriculum Trends in Accounting and Data Processing

An analysis of the curriculum of business education and vocational business and office education in accounting and data processing, and the development of appropriate teaching strategies for these areas.

730-3 Teaching Strategies and Curriculum Trends in the Skilled Business Education Subjects

An analysis of the trends, application of new teaching media, and the development of teaching strategies in typewriting, shorthand, transcription, word processing, office procedures, and office machines.

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 are viewed in relation to this philosophy.

733-3 Improvement of Teaching

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. Completion of core courses required.

734-3 to 4 Analysis of Teaching

A focus on teaching methods and skills and on classroom climate, including such activities as microteaching, interaction analysis, and collection of student feedback.

736-3 History of Books for Children and Young People

This survey of the history of literature for children and young people covers international literature, primarily from the eighteenth century to the twentieth century. Graduate standing required.

737-3 Survey of World Literature for Children and Young People

Students apply the knowledge of international literature and the skills of teaching to the curricula of schools and libraries. Graduate standing, permission of instructor, and completion of core courses required.

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. A minimum of 30 credit hours of upper-level mathematics required.

739-3 Cultural Studies in Literature for Children and Young People

Students investigate the literature for children and young people of a particular culture, and study its effect within the broad context of world literature. Course subtitles vary. Graduate standing and completion of core courses required.

740-3 Education of Children with Severe Emotional Problems

An introduction to the emotionally disturbed child and problems in the classroom. An overview of the major intervention and prevention strategies. Prerequisite: ED 641 or permission of instructor.

741-4 Instructional Design

Management and leadership skills as related to organizational patterns, staffing, utilization of space, time, and facilities at the building level. Completion of core and general requirements required.

742-3 to 4 Curriculum Designing for the Teacher

Focuses on management and leadership skills as related to the development and organization of curriculum and materials and implementation of the learning program with students. Completion of core and general requirements required.

745-3 Genre Studies in International Literature for Children and Young People

Students do an in-depth study of a single genre of literature for children and young people focusing on literature of international significance. Permission of instructor and completion of core courses required.

747-4 Leadership for School Improvement

Focuses 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. Completion of core required.

748-3 Teaching Literature to Children and Young People

Students apply the knowledge of international literature and the skills of teaching to the curricula of schools and libraries. Graduate standing, permission of instructor, and completion of core courses required.

751-5 Educational Statistics and Research

Introduction to educational statistics, research terminology and methodology.

752-4 Statistical Analysis and Research Design

The computation and interpretation of inferential statistics as they relate to the design of educational research. Critical study of research techniques and reporting methods. Prerequisite: ED 751.

753-4 Advanced Educational Statistics

Covers selection, computation, and interpretation of nonparametric statistical techniques for 1 to k samples, either independent or related. Multivariate analysis including analysis of variance-factorial designs, analysis of covariance, and multiple regression. Prerequisite: ED 752.

754-4 Applied Research and Educational Statistics

An introduction to educational statistics and research methodology with particular emphasis on identification of a problem to be researched in participant's own setting. Enrollment limited to participants in the Teacher Leader program.

755-1 to 5 Research Projects

Conference course; individual research to satisfy requirements of research study for the Master of Education degree. Prerequisite: ED 752 or permission of adviser.

757-4 Student Appraisal Methods

An intensive study of methods constructed by and/or used by teachers for appraisal of student progress and adjustment. Includes selection, use, and interpretation of standardized instruments. Prerequisite: ED 751 or equivalent.

759-4 Research on Teaching

Emphasis on the content of research on teaching effectiveness, culminating in the writing of an actual research proposal to be carried out during the second year of the Teacher Leader program. Enrollment limited to participants in the Teacher Leader program.

761-4 Applied Curriculum Theory

Overview of past, present, and future curriculum trends and development processes. Students analyze and evaluate an existing curriculum after developing a specific set of criteria.

762-4 Foundations of Teaching Models

Focuses on five different models of teaching: concept; attainment; synectics; social inquiry; contingency management; and one model in terms of the model outcomes, assessment of students, and teaching/learning activities. Graduate standing in the College of Education and Human Services required.

763-4 Instructional Management and Evaluation

Provides opportunities for studying the management and evaluation of instruction. Emphasizes uses of systematic management and evaluation models by classroom teachers, and the impact of nonclassroom components of school/society on the teacher's management and evaluation of instruction. Graduate standing in the College of Education and Human Services required.

770-1 to 3 Independent Reading and Minor Problems

Planned reading and/or project under the guidance of a College of Education and Human Services faculty member. May be repeated to a maximum of 9 credit hours. Regular standing in the graduate school, 9 graduate credit hours in education, and approval of the instructor and Office of the Dean of Education and Human Services required.

771-3 Educational Leadership Behavior

Focuses on the development of a strong theoretical base to build skills in leadership, communication, decision making, problem solving, and conflict management processes. Change theory and process are also covered. Graduate standing required. Completion of core courses recommended.

772-3 Educational Administrative Behavior

Principles of educational administrative processes, formal school structures and organization, and an introduction to school administration task areas are the primary focus. Principles of democratic school administration are also studied. Prerequisite: ED 771.

773-3 Curriculum Theory and Practice

Focus is on developing an understanding about the bases of curriculum, the purposes and organization of curriculum, and curriculum planning. Roles and responsibilities of curriculum planners/developers are covered. Graduate standing required.

774-3 Curriculum Organization

Focus is on developing an understanding of goals, pupil performance objectives, components of curriculum design and organization. Emphasis is on language arts, mathematics, science, and social studies curriculum structure and organization. Prerequisite: ED 773.

775-3 Leadership for Instructional Improvement

Focus is on an understanding of teaching from research and methodological viewpoints. Emphasis is on examining various bases of teaching and improving instruction techniques. Graduate standing required.

776-3 Supervision of Instruction and Personnel

Emphasis is on general supervision practices, personnel management, and staff performance evaluation. Prerequisite: ED 775.

777-1 to 3 Practicum: Role and Function of Educational Leaders

Focus is on the roles performed by practicing educational leaders. Students observe, interact, and draw conclusions from field experience. Class sessions integrate the field experience with knowledge and skills studied in prerequisite courses. Prerequisite: ED 771 through 776.

780-3 Public Relations and Politics in Education

Focus is on developing an understanding of potential structures and effective principles of school/community relations. Concepts of power, potential networks, pressure groups, and lobbying are examined. Characteristics of effective communication, advisory bodies, and public relation programs are covered. Prerequisite: ED 777.

781-3 School Finance and Economics

The financing of public education and the economics of education are the primary emphasis of this course. Guiding principles for developing financial programs and management procedures are covered. Prerequisite: ED 777.

782-3 School Law

Provides an examination of the legal framework within which all school personnel function. Equal emphasis is given to both legal precedents and statutory provisions. Graduate standing required. Prerequisite: ED 777.

783-4 School Law and Finance for Educational Leaders

An examination of the legal and fiscal framework which emphasizes the legal precedents as well as the statutory provisions for the public schools as they apply to school districts; administrative government and offices; pupils (admission, attendance, and discipline); teachers, principals, and superintendents; school property and buildings; school funds; and tort liability. Graduate standing or permission of instructor required.

784-4 Legal and Professional Issues

The legal framework of compulsion in education, the civil liberties of teachers, curriculum content, and academic freedom. Teachers' rights, duties, and responsibilities to the educative profession. Graduate standing required.

785-3 Introduction to Community Education

History, implementation, progress, publications, role of personnel, and current status of community education. Graduate standing required.

786-3 Community School

Introduction to and exploration of the community school concept. Graduate standing required.

787-3 School and Community

Development of an understanding of home and community factors and their relationship to the educational process. Graduate standing required.

790-1 to 3 Practicum in Instructional Leadership

Provides educational leadership degree candidates an opportunity to apply concepts and skills to educational practice, and to evaluate their own leadership effectiveness. Completion of educational administration and/or curriculum/supervision concentration and departmental approval required.

791-4 Curriculum Design and Evaluation

To provide curriculum and supervision students with knowledge and skills necessary to perform curriculum and instruction designing and evaluation functions. Prerequisite: ED 777.

- 792-4 Models of Supervision and Staff Development**
Focus is on understanding self and others, and models of supervision and staff development. Emphasis is on skill acquisition in the areas of personality data; consultation processes; and designing, implementing, and evaluating staff development programs. Prerequisite: ED 777
- 793-3 Computer Application for Educational Leaders**
Introduction to the world of computers and their applications for educational leaders. An investigation of potential uses of the computer for student learning and school management and administration. Review and evaluation of specific hardware. (Previously listed as ED 996.)
- 796-4 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.
- 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. Intervention strategies are developed for selected behaviors. Participation required. Prerequisite: ED 701 or PSY 637.
- 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 Teaching Children to Write**
Designed for advanced study in current research theories and process of teaching writing in the elementary schools. Prerequisite: ED 316 or equivalent or permission of instructor.
- 816-3 Learner-Centered Reading and Writing**
Provides experience and background in theories and practices of reading and writing that focus attention on the learner. Prerequisite: ED 716, 721, or LCS 663, 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. Permission of adviser required. Prerequisite: ED 615 or 632.
- 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 organize and administer mathematics diagnostic inventories, administer standardized diagnostic tests, interpret the results, and design appropriate remedial activities. Completion of a curriculum and materials course in mathematics or permission of instructor required.
- 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. Permission of adviser required.
- 824-3 Curriculum Development for Vocational Business and Office Education**
A comprehensive study of curriculum designs, including occupational task analysis, innovations, sequential structuring, preparation and development of teaching units, evaluation, and change in the vocational business and office education programs. Graduate standing and courses necessary for comprehensive business education certificate required.
- 825-3 Facilities and Management of Vocational Business and Office Education**
Planning, evaluation, and management of vocational business and office education laboratories and related areas. Graduate standing and courses necessary for comprehensive business education certificate required.
- 826-3 Coordination Techniques for Vocational Business and Office Education**
Overview of coordination techniques used in a vocational program, including development of appropriate integration and simulations, behavior modification studies, guidance, selection, and placing of students in job situations, and processes used in program. Graduate standing and courses necessary for comprehensive business education certificate required.
- 827-3 Evaluation of Vocational Business and Office Education**
Developing procedures and involvement in the use of instruments for conducting evaluations for programs including teachers, students, facilities and equipment, and curriculum. Graduate standing and courses necessary for comprehensive business education certificate required.

- 828-3 *Teaching Strategies and Equipment Adaptations for Disadvantaged and Handicapped Students in Business and Office Education***
A study to develop teaching strategies and equipment adaptations for disadvantaged and handicapped students in business and office education. Graduate standing and courses necessary for comprehensive business education certificate 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.
- 831-3 *Reading Instruction in Junior High and Middle Schools***
Strategies for assessing students and materials as a basis for planning reading instruction in content areas in the middle schools. Graduate standing, educational psychology or equivalent, and completion of core courses or permission of instructor required.
- 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 704.
- 835-3 *Supervised Field Experience***
A supervised field experience in which students apply knowledge and skills gained through the program. Completion of required courses in Teacher Leader program required. (This course does not meet state requirements for certification in supervision.)
- 850-3 *Seminar in Special Education***
Individual and group study of the problems of exceptional children. May be repeated once. 9 credit hours in special education courses or permission of instructor required.
- 851-3 *Advanced Seminar in Educational Research Design and Analysis***
Individual and group study of ongoing applied educational research. Prerequisite: ED 752.
- 854-4 *Intellectual Assessment for School Psychologists***
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 instructor required.
- 855-1 to 5 *Individual Assessment of Exceptional Children and Youth***
Supervised clinical practice in the administration of standardized and criterion-referenced tests used in the assessment of various exceptional populations, birth to adulthood. For school psychology students. Prerequisite: ED 854 or permission of instructor.
- 856-4 *Individual Assessment of Behavior and Personality Disorders***
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. Permission of instructor required. Prerequisite: ED 854.
- 857-4 *Consultation in the Schools***
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. One other measurement course or permission of instructor required. Prerequisite: ED 751.
- 865-3 *Advanced Educational Assessment and Clinical Practices***
Provides experienced teachers with knowledge, skills, and attitudes needed for diagnosis, program planning, and consultation. Field experience included. A bachelor's degree, teaching certification, a minimum of two years' teaching experience in a classroom or tutorial setting, and permission of instructor required. Registration in fall quarter with a grade of S until completion of the course in spring quarter.
- 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. Permission of instructor required.
- 868-1 to 4 *The Role and Function of the School Psychologist***
An overview of the school psychologist's role and function. Considers the professional problems that psychologists face in a school setting: collaboration with other school personnel, work with parents and community agencies; diagnostic and therapeutic roles; and 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. May be repeated to a maximum of 4 credit hours.

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.

871-3 Management of the School

Focus is on the day-to-day operation of a school building and a school system. State requirements are emphasized in relation to operational procedures in all aspects of managing a school and a school system. Acceptance into Educational Specialist degree program or permission of instructor required.

872-3 Staff Personnel Administration

Hypotheses, concepts, principles, and practices for dealing with school personnel. Areas of recruitment selection, induction, appraisal, development, compensation, and motivation are covered. Legal aspects of personnel management are also covered. Acceptance into Educational Specialist degree program or permission of instructor required.

873-3 Pupil Personnel Administration

Emphasis is on the development of understanding and procedures of administering pupil personnel aspects of school operation. Student accounting and attendance, guidance and counseling functions, classroom management (discipline), and extracurricular/cocurricular activities are covered. Acceptance into Educational Specialist degree program or permission of instructor required.

874-3 School Business Management and Facilities

Guiding principles for developing adequate financial programs; detailed studies of sources of local, state, and federal revenue; and procedures for management of school funds with reference to budgeting, accounting, and auditing. Operation and management of effective school plant receives equal emphasis. Acceptance into Educational Specialist degree program or permission of instructor required.

890-1 to 3 Practicum in School Administration

Provides an experience in school administration in which the student actually performs administrative tasks under supervision. This field experience is planned jointly by the student and the practicum supervisor, and includes activities in all administrative task areas. Graduate standing, master's degree, completion of all course work necessary for certification, and departmental approval required.

899-1 to 9 Thesis

Research for thesis in education. Prerequisite: ED 752 or permission of adviser.

The following courses can be used either to obtain additional certification or to upgrade current certification requirements, and usually require a master's degree as a prerequisite. Some of these courses may be applicable to post-master's degree work.

930-1 to 3 Advanced Seminar for Classroom Teachers: Variable Topics

Study of the problems related to instruction and to the teacher as a professional. Topics vary. May be repeated twice. Master's degree or permission of instructor required.

933-3 Instructional Leadership

Provides the specialist an opportunity to explore the topic of instruction in depth and to apply knowledge and strategies to the process of instructional improvement. Master's degree required. Enrollment in Educational Specialist degree program or permission of instructor required.

941-3 Planning Educational Futures

A study of the future of education; rationale and methodology for such a study. Analysis is on forecasting the probable social, political, economic, and intellectual factors. Master's degree required. Enrollment in Educational Specialist degree program or permission of instructor required.

960-3 to 12 Advanced Seminar in School Psychology

Intensive study of current issues in school psychology. Certification in school psychology or permission of instructor required.

971-3 Superintendent/Staff/Board Relationships

Emphasis is on goals, purposes, organizational policy formation, climate and culture of a school system, organizational politics, and roles and function of the superintendent, staff, and board of education. Acceptance into Educational Specialist degree program or permission of instructor required.

972-3 Ideas in Education

Draws on original sources and examines the impact of both professional and nonprofessional educational thinkers on American education. The impact of social trends on education is also examined. Acceptance into Educational Specialist degree program or permission of instructor required.

973-3 Research in Educational Leadership

Focus is on research on schools as organizations, research on educational leadership, and research related to educational content and practice. Acceptance into Educational Specialist degree program or permission of instructor required.

974-3 Seminar in Educational Leadership

Emphasis is on issues in educational leadership and curriculum leadership. Program development and administrative practice serve as bases for emerging study issues. Acceptance into Educational Specialist degree program or permission of instructor required.

985-3 Interpersonal Dynamics: Individual and Organizational

Focuses on the following concepts applicable to the educational institution: individual and organizational communications, group processes, conflict management, valuing, and giving and receiving feedback. The concepts listed will be used to help participants conceptualize the interpersonal nature of organizations. Participants acquire the skills necessary to function effectively in interpersonal dimensions within educational settings. Master's degree and acceptance into Educational Specialist degree program required.

986-4 Organizations as Social Systems

Focuses on role theory, leadership theory and style, and decision-making theory and practice relative to the institution of education. The main emphasis is on analyzing organizations and the educational institution in particular through a social systems orientation. Participants are provided with a historical analysis of organizations, the future directions of organizations, and an analysis of current and future educational institutions. Master's degree and acceptance into Educational Specialist degree program required.

987-3 Administrative Leadership Skills

Focuses on the development of leadership skills in relation to individual and organizational communications, group processes, conflict management, decision making, and problem solving. Participants study and practice the principles of change. Master's degree and acceptance into Educational Specialist degree program required.

988-3 Research and the Educational Leader

Focuses on the practical applications and issues in research as it relates to educational leadership. Participants focus on research design and methodology, sampling techniques, instrument development, proposal writing, and the application of these skills through a research project to be implemented within a public school setting. Master's degree and acceptance into Educational Specialist degree program required.

989-3 Politics of Educational Leadership

Introduces the concepts and languages of power and politics to the educator. Practical problems are discussed from an interdisciplinary viewpoint. Concepts of power, politics, decision making, institutional racism and sexism, and change are course topics. Master's degree required. Enrollment in Educational Specialist degree program or permission of instructor required.

991-1 to 4 Advanced Seminar in Educational Leadership

The seminar has three basic topics: (1) Teacher Evaluation and Staff Development offered fall quarter, (2) Issues in Leadership and Management offered winter quarter, and (3) Innovations in Education offered spring quarter. May be repeated to a maximum of 9 credit hours. Master's degree in school administration or curriculum and supervision required.

992-3 School/Community Relations

Designed to assist superintendents and principals in their relations with the public. Acceptance into Educational Specialist degree program required.

993-3 School Business Management

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. Acceptance into Educational Specialist degree program required. Prerequisite: ED 793 or equivalent.

994-3 Advanced Seminar for Educational Specialists

A capstone course which synthesizes the concepts, skills, and information of the total Educational Specialist program. Reporting each candidate's research project is a part of this course. An integration of the basic purposes of the program with the concentration, cognate, and common curriculum. Acceptance into Educational Specialist degree program and completion of Educational Specialist common curriculum required.

995-3 Advanced Institute for Educational Leaders

Individual and group study of current problems and new skill development for educational leaders. Topics require multifaceted approaches and investigations. Typical topics might include personnel management related to negotiations, human rights, or decision making. Topics vary from quarter to quarter. May be repeated as needed. Master's degree or permission of instructor required.

Engineering/EGR

500-4 *Technology and Society*

(Taught jointly with Department of Religion; see REL 500.) 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.

506-4 *Engineering Psychology*

(Listed jointly with Department of Psychology; see PSY 506.) Introduction to the study of human factors in the design and operation of machine systems. Prerequisite: PSY 111, 112.

513-4 *Strength of Materials*

Axial and shear stresses and strains; biaxial loading; torsion of circular shafts; shear and bending moment diagrams; deflection of beams; column theory. 3 hours lecture, 2 hours 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 objective is to provide a background in the fundamental concepts of thermodynamics. Introduction to the laws of thermodynamics and their application in defining and solving engineering problems. Undergraduate physics sequence required.

517-4 *Fluid Dynamics*

Study of fluid properties, fluid statics, one-dimensional compressible and incompressible flow, flow of real fluids, and flow measurements. 3 hours lecture, 2 hours lab. Prerequisite: EGR 515.

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 hours lecture, 2 hours lab. Prerequisite: EGR 517.

520-5 *Direct and Alternating Circuit Analysis*

Major topics for this basic circuit theory course include component laws, network topology, node and mesh analysis, computer solution techniques, and sinusoidal steady-state analysis. Emphasis is placed on linearity and on the interrelationship between the frequency and time domains. 4 hours lecture, 2 hours lab. Prerequisite: CS 142 or 210, MTH 233, and PHY 242.

521-4 *Linear Systems I*

Considers systems in a broad context including linear, nonlinear; variant, invariant; analog and discrete. The various approaches to system and signal modeling are also discussed with special attention to the Fourier transform technique. Prerequisite: EGR 520.

522-3 *Linear Systems II*

Extends techniques of EGR 521. Introduces convolution and emphasizes the relationship between convolution, the system function, and the differential equation description. Develops the Laplace and Z-transform techniques and provides an introduction to digital filter theory. Prerequisite: EGR 521 or permission of instructor.

523-4.5 *Discrete Systems*

Extends the techniques of EGR 521 and 522 to discrete time systems. Systems description using difference equations, transfer functions, singularity function response, and pole zero locations. System response using classical difference equation solutions, discrete convolution and Z-transform methods; stability. Frequency response, discrete and fast Fourier transforms, digital filter synthesis. 3 hours lecture, 3 hours lab. Prerequisite: EGR 322/522.

527-3.5 *Introduction to Analog Systems*

Electrical and mechanical analog computing components, time and amplitude scaling, simulation techniques. 2 hours lecture, 3 hours 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 hours lecture, 3 hours lab. Prerequisite: EGR 520.

545-4 *Electromagnetics*

Developments in the basic concepts of vector calculus and their application to electromagnetics, electrostatics, and magnetism; induced electromotive force; Maxwell's equations and their physical interpretation and application. Prerequisite: EGR 520, MTH 232.

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.

551-4 Switching Theory and Circuits

Switching algebra and switching functions. logical design of combinational and sequential switching circuits using integrated circuits. 3 hours lecture, 2 hours lab. Departmental approval required.

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, PHY 242.

560-4 Mechanical Vibrations

The modeling and analysis of single and multi-degree freedom systems under free and forced vibration and impact; Lagrangian and matrix formulations; energy methods; introduction to random vibrations. Prerequisite: EGR 522.

570-4 Materials Engineering Science

Introduction to engineering materials including metals, ceramics, polymers, and composites. Emphasizes the relationships among atomic structure, microstructure, material properties, failure modes, processing, and fabrication. Applications to materials selection. Undergraduate physics and chemistry sequences required.

575-3 Physical Metallurgy I: Metallurgical Thermodynamics

Application of classical thermodynamics to metals and alloys. Free energy concepts; thermodynamic fundamentals of phase equilibria; single phase and multiphase alloy systems. Prerequisite: EGR 570. Prerequisite or corequisite: EGR 515.

576-3 Physical Metallurgy II: Transformations in Metals

Fundamentals of phase transformations in metals and alloys. Applications to recovery and recrystallization, solidification, heat treatment of steel, and precipitation hardening. Prerequisite: EGR 575.

585-2 Metallography Laboratory

Preparation of metallographic specimens; use of the metallurgical microscope including the preparation of photomicrographs. Prerequisite: EGR 570.

586-2 Materials Testing Laboratory

Fundamentals of mechanical testing instrumentation and techniques, including the tensile test, hardness tests, effect of heat-treatment on strength, and correlation of microstructure, composition, and properties. Prerequisite: EGR 575, 585.

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 hours lecture, 3 hours lab. Prerequisite: EGR 522.

605-5 Applied Electronics

Study of application of modern electronic fundamentals for use in instrumentation and data handling, principally using integrated circuits. Sequence of topics: useful circuit laws, transistor switches, flip-flops, ideal linear voltage amplifiers, operational amplifiers, feedback amplifiers, and measuring instruments. 3 hours lecture or independent study, 4 hours lab. Credit will not be granted to students with credit for EGR 541. Permission of instructor required. Prerequisite: EGR 520.

607-3 Optimization Techniques

Concepts of minima and maxima. Linear programming: simplex method, sensitivity, and duality. Transportation and assignment problems. Dynamic programming. Matrix algebra, differential equations, or permission of instructor required.

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.

612-4 Introduction to Finite Element Analysis

Finite element formulations for line, surface, bending, torsion, and three-dimensional elements. Numerical methods and application of FEM programs in structural design and solid mechanics. Prerequisite: EGR 313/515, CS 210, MTH 233.

614-4 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 instructor.

615-3 Advanced Thermodynamics

Power and refrigeration cycles, thermodynamic relations, mixtures and solutions, chemical reactions, phase and chemical equilibrium. Prerequisite: EGR 515.

616-4 Advanced Mechanics of Solids

Topics in advanced strength of materials. Energy techniques in stress analysis. Introduction to the theory of elasticity and finite element method. Prerequisite: EGR 513.

617-3 Mechanics of Viscous Fluids

Fundamental equations of viscous flow for laminar and turbulent flows. Boundary layer analysis. Analytical and numerical solutions of the equation of motion. Prerequisite: EGR 517.

618-3 Heat Conduction in Solids

Analytical and numerical techniques for heat conduction problems in one, two, and three dimensions for steady and transient cases. Phase-change problems. Prerequisite: EGR 518.

619-3 Biomedical Engineering Systems I

Application of engineering and mathematical techniques in the derivation of the basic laws underlying biophysical systems. Topics include transport theory and electrical properties of cell membranes, and control theory applied to regulation of body functions. Prerequisite: EGR 213, MTH 233, PHS 702.

620-3 Biomedical Engineering Systems II

Application of the mechanics of fluids and solids together with thermodynamic principles in formulating the basic equations governing cardiovascular and pulmonary functions. Topics include rheology, hemodynamics, lung aerodynamics, cardiac mechanics, and system interactions. Prerequisite: EGR 619, PHS 703.

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 are studied. Prerequisite: EGR 515.

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 hours lecture, 3 hours 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 hours lecture, 3 hours lab. Prerequisite: EGR 625.

627-4 Digital Control Systems

Sampled spectra and aliasing, design of digital control systems using transform techniques and state-space methods, discrete equivalents to continuous transfer functions, and quantization effects. 3 hours lecture, 2 hours lab. Prerequisite: EGR 626.

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 322, MTH 232.

632-3 Introduction to Flight Control Systems

Development of the equations for general aircraft motion. Perturbed state equations. Basic aerodynamic characteristics, control surface effectiveness, stability and control derivatives. Dynamic stability and control of the airplane. Automatic flight control. Prerequisite: EGR 625.

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 Network Synthesis and Design

Active and passive network analysis; network functions and their realizability; introductory filter concepts and the approximation problem; passive network synthesis; basics of active filter synthesis. Prerequisite: EGR 522, 621.

641-4.5 Electronic Circuits

Theory and application to basic engineering electronics developed for discrete and integrated circuits. Topics include bipolar and field effect transistor amplifier analysis and design, frequency response, multistage and feedback amplifiers. 3 hours lecture, 3 hours lab. Prerequisite: EGR 541.

644-4 Linear Integrated Circuits

Theory and applications of linear integrated circuits. Major topics are ideal and real operational amplifiers, frequency response and compensation, active filters, comparators and waveform generators. 3 hours lecture, 2 hours lab. 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 hours lecture, 3 hours lab. Prerequisite: EGR 641.

651-4 Digital Systems Design

(Listed jointly with Department of Computer Engineering; see CEG 560.) Design of digital systems. Topics include digital arithmetic, register-level design, memory devices and their logic, controller and processor design. 3 hours lecture, 2 hours lab. Prerequisite: EGR 551.

654-4 VLSI Design

(Listed jointly with Department of Computer Engineering; see CEG 654.) Introduction to VLSI System Design. Topics include NMOS devices and circuit design techniques, basic building blocks for NMOS design, fabrication processing and design rules, chip planning and layout, system timing and power dissipation, simulation for VLSI design, and signal processing with VLSI. Prerequisite: EGR 641, 651.

656-4 Introduction to Robotics

(Listed jointly with Department of Computer Engineering; see CEG 656.) Introduction to the mathematics, programming, and control of robots. Topics presented include coordinate systems and transformations, kinematic equations, trajectory planning, dynamics, control, programming, and computer vision. Senior standing in computer science, computer engineering, or engineering, and permission of instructor required. Prerequisite: MTH 233.

660-3 Design and Analysis of Engineering Experiments

An introduction to the planning and analysis of engineering experiments. 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. Permission of instructor required.

670-4 Communication Systems Design

Introduction to communication systems design. Topics include source characterization and encoding, choice of modems and the tradeoffs involved, choice of received configuration. The techniques developed will be applied in the design of a deep space communication system. Prerequisite: EGR 522, 621, or permission of instructor.

671-4 Systems Models in Human Factors Engineering

A study of quantitative means of analyzing and predicting human performance, particularly for human-machine interactions. Major topics include estimation theory, control theory, queueing theory, and fuzzy set theory. Prerequisite: EGR 425, PSY 400, or STT 363. Corequisite: EGR 626.

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.

677-4 Mechanical Behavior of Materials

Crystal plasticity and single crystal behavior. Introduction to dislocation theory. Strengthening mechanisms and polycrystalline behavior. Introduction to viscoelasticity. Fracture, fatigue, and creep of materials. Prerequisite: EGR 513, 570.

678-3 X-Ray Spectral Analysis

Electron microprobe and x-ray fluorescence for analysis of alloys and other materials are explained and demonstrated on examples. 2 hours lecture, 1 hour lab. Prerequisite: EGR 682 or permission of instructor.

679-4 Materials Corrosion

(Listed jointly with Department of Chemistry; see CHM 679.) Survey of the principles of corrosion processes with application to metallic and nonmetallic materials. Principles of electrochemistry are included. Prerequisite: EGR 315/515 and 370/570; or corequisite CHM 453/553; or permission of instructor.

681-3 Nondestructive Testing

Survey of the principal techniques used to detect and evaluate flaws in material components such as castings, weldments, and composites. Includes liquid penetrant, ultrasonic, radiographic, eddy current, and magnetic test methods. Prerequisite: EGR 570.

682-4 X-Ray Methods in Materials Science

Introduction to the theory and practice of diffraction methods in the study of alloys, refractory materials, and polymers. 2 hours lecture, 4 hours lab. Prerequisite: EGR 376/576 or permission of instructor.

683-3 Ceramics and Refractories

Introduction to ceramic materials, including descriptions of ceramic raw materials, glasses, solid state chemistry, microstructures, elasticity and strength, and thermal stresses. Prerequisite: EGR 575.

685-4 Solidification Processing

Fundamentals of melt solidification, application to metals casting technology, and an introduction to powder metallurgy. 3 hours lecture, 2 hours lab. Prerequisite: EGR 575.

686-4 Deformation Processing

Fundamentals of principal deformation processing systems including forging, extrusion, rolling, and sheet forming; material response and formability; mechanics and analysis of selected processes. 3 hours lecture, 2 hours lab. Prerequisite: EGR 513, 570.

687-5 Machining

Fundamentals of machining with an emphasis on engineering models of machinability, chip formation, cutting forces and power, lubrication. Introduction to numerical control machining. 3 hours lecture, 2 hours lab. Prerequisite: EGR 570.

688-4 Powder Processing

Production, characterization, and processing of powder metals and ceramics. Mechanisms of sintering and hot compaction. Hot forming of powder compacts. Prerequisite: EGR 575.

689-4 Engineering Plastics: Materials, Processes, and Design

(Listed jointly with Department of Chemistry; see CHM 669.) Properties and manufacturing processes of engineering plastics and the effect of these factors on plastics design. Illustrative laboratory projects are included. 2 hours lecture, 4 hours lab. Prerequisite: CHM 665.

699-1 to 5 Special Problems in Engineering

Special problems in advanced engineering topics. Course subtitles vary from quarter to quarter. Departmental approval 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 students holding 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

Difference equations and solutions; Z, discrete Fourier, and fast Fourier transforms; system stability, frequency response, and signal flow graph realizations; simulation of continuous systems and FIR/IIR digital filter design; high speed correlation, convolution, and spectral estimation methods. Prerequisite: EGR 701.

711-3 Multidimensional Digital Signal Processing

Topics of EGR 710 extended to multidimensional systems and signals. Provides the theoretical and applied basis for analysis and synthesis of discrete systems and operations used in digitally processing images, outputs of transducer arrays, and other multidimensional signals. Prerequisite: EGR 710.

712-4 Finite Element Method Applications

Concepts of dynamic analysis using the finite element method (FEM). Application of various computational techniques to dynamic structures and thermal systems including vehicle dynamics. 3 hours lecture, 2 hours lab. Prerequisite: EGR 612.

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. Graduate standing required. Prerequisite: EGR 702 or permission of instructor.

720-3 Sampled-Data Control Systems

Frequency analysis of hybrid systems; multirate sampled-data control systems; sampled-data system with nonsynchronized sampler; stability criteria; conventional analysis and design of sampled-data control systems. Prerequisite: EGR 523 or 702.

722-3 Advanced Engineering Biophysics

Application of mathematical and engineering techniques toward describing biological systems. Students review primary references in the selected areas. Systems engineering majors may not take course for graduate credit. Prerequisite: EGR 522, PHS 703.

724-3 Foundations of Optimization Theory

Theory of minima and maxima, calculus of variations, optimum-seeking search techniques, dynamic programming, and maximum principle. Prerequisite: EGR 702.

725-3 Principles of Modern Control Theory

The calculus of variations for continuous processes. Euler-Lagrange equations and the use of Lagrange multipliers; Pontryagin's maximum principle, Hamilton-Jacobi theory; application to control examples. Prerequisite: EGR 426 and 702. (EGR 702 may be taken concurrently.)

726-3 Computational Techniques of Modern Control Theory

Continuation of EGR 725. Emphasizes search techniques, state estimation, and the Linear-Quadratic-Gaussian problem. Prerequisite: EGR 725.

728-3 Advanced Biomechanics and Biofluids

Application of solid and fluid mechanics and thermodynamics toward describing biological systems. Students review primary references in their selected areas. Systems engineering majors may not take course for graduate credit. Prerequisite: EGR 522, PHS 703.

733-4 Modern Radar Theory

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. Probability theory, linear systems, or permission of instructor required.

734-4 Computational Fluid Dynamics

Introduction to modern computational fluid dynamic (CFD) methods. Survey of current numerical procedures to solve fluid dynamic problems from incompressible to hypersonic flows. 3 hours lecture, 2 hours lab. Knowledge of FORTRAN programming required. Prerequisite: EGR 617.

736-3 Convective Heat and Mass Transfer

Heat and mass transfer analysis within conductors and over submerged objects for laminar and turbulent flows. Film condensation and boiling. Prerequisite: EGR 518.

738-3 Radiation Heat Transfer

Fundamentals and application of radiation heat transfer; radiation between gray and nongray bodies; network techniques; radiation through absorbing media; radiation between gases and surrounding surfaces. Finite difference solution for radiation problem. Prerequisite: EGR 518.

740-4 Information and Coding Theory

Development of communicational 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 is also considered. Basic linear systems and probability theory or permission of instructor required.

745-4 Synchronous Communication Theory

Investigation of various digital modems; consideration of TDMA, FDMA, and CDMA multiple access techniques; coherent and differential transmission techniques; carrier, frame, and bit synchronization techniques; convolution codes and the Viterbi decoder; baseband encoding techniques. Introduction to spread spectrum. Basic linear system theory and probability or permission of instructor required.

750-3 Switching and Finite Automata Theory I

Analysis and synthesis of finite state systems including 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 551.

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.

752-4 VLSI

(Listed jointly with Department of Computer Engineering; see CEG 752.) Introduction to the techniques, limitations, and problems in the design of VLSI. Topics include NMOS, CMOS technologies, design rules, chip planning, layout, testability, and simulation. Prerequisite: EGR 451; EGR 710 or CEG 720.

753-4 VLSI II

(Listed jointly with Department of Computer Engineering; see CEG 753.) A continuation of EGR 752 with a more detailed study of lecture topics and testing and evaluation of chips implemented in EGR 752. Prerequisite: EGR 752.

756-4 Robotics

(Listed jointly with Department of Computer Engineering; see CEG 756.) This course is a detailed study of the dynamics and control of robotic systems. Material covered includes trajectory planning, rigid-body dynamics, rotating coordinate systems, and computer implementation of various adaptive and optimal control schemes. Prerequisite: EGR 656, CEG 592; EGR 627 or 720.

757-4 Robotics II

(Listed jointly with Department of Computer Engineering; see CEG 757.) This course is a study of programming and vision techniques applicable to the control of robotic systems. Material covered includes robot languages, teach mode, image processing, scene analysis, and pattern recognition. Prerequisite: EGR 756.

761-3 Analytical Techniques of Stochastic Analysis

Topics of engineering relevance from probability and statistics; introduction to discrete and continuous random processes; Markov modeling of physical systems; real-time estimation of power spectral density and covariance functions; input/output relationships for discrete and continuous linear stochastic systems. Discussion of maximum likelihood estimation with application to the single and multiple parameter case. Basic linear systems required.

762-3 Estimation, Identification, and Optimal Filter Theory

Definition of the linear minimum mean-squared estimator. Derivation of the discrete Kalman filter equations; stability of the Kalman filter; Kalman filter configurations when employed as a fixed point and fixed lag smoother, predictor, and S/N enhancer; modification of the Kalman filter equations to provide system parameter identification. Nonlinear filtering and the extended Kalman filter. Introduction of the innovations representation and its extension to the adaptive Kalman filter. Development of the continuous Kalman filter and a detailed comparison with the Levinson and Weiner stationary filters. Prerequisite: EGR 761.

763-3 Applications of Estimation, Identification, and Filter Theory

System model errors; filter divergence and data saturation; the information filter sequential processing, and square root filtering; suboptimal filter design and sensitivity analysis; computer implementation considerations. Selected problems from control theory, communications, navigation, and image processing. Prerequisite: EGR 762.

764-4 Advanced Bioinstrumentation

Principles of design and analysis of electronic instrumentation for biological applications. Students review primary references in their selected areas. 3 hours lecture, 2 hours lab. Systems engineering majors may not take course for graduate credit. Prerequisite: EGR 641.

766-4 Advanced Biomedical Computers

Digital computer (hardware) applications in the health care field. Topics include hospital, operating room, clinical lab, medical research lab, and rehabilitation engineering computer systems. Preparation of a research paper required. 3 hours lecture, 2 hours lab. Prerequisite: EGR 641.

777-4 Biomedical Electronics

Introduction to electronics for life scientists. Topics include DC/AC circuits, semi-conductor and operational amplifier theory, digital devices and microprocessors, computer applications, biological transducers and bioinstrumentation. 3 hours lecture, 2 hours lab. Systems engineering majors may not take course for graduate credit. Bachelor's degree in life sciences or physical sciences required.

780-3 Applied Plasticity

Yield criteria and flow rules for isotropic and anisotropic materials. Mechanics of plastic deformation including slab, upper-bound, slip-line field, and finite-element methods. Applications to metal forming. Prerequisite: EGR 616 or 686.

782-3 Processing of Engineering Materials

In-depth study of processing-microstructure-property relationships for selected engineering materials. May be repeated for credit with permission of adviser. Departmental approval required.

830-3 Nonlinear Systems

Nonlinear elements and their effects in physical systems, phase plan, linearization techniques, describing functions, Liapunov stability, absolute stability, and Popov's theorem.

880-3 Selected Topics in Systems Engineering

Lectures on and study of selected topics in current research and recent developments in systems theory and engineering. Departmental approval required.

890-1 to 5 Special Problems

Special problems in advanced engineering topics. Course subtitles vary from quarter to quarter. Graduate standing and departmental approval required.

899-1 to 5 Thesis

Departmental approval required.

English/ENG**530-3 Business Writing**

Techniques in business writing with special attention to improving mechanical skills, reviewing forms of business writing, and analyzing business and technical prose.

533-4 Fundamentals of Technical Writing

Basics of technical writing with emphasis on descriptive techniques, audience analysis, and report writing.

- 543-4 *Advanced Composition***
Refinement of style. Emphasis on sophisticated techniques of expository writing.
- 544-4 *Research Writing***
Instruction in organization, documentation, and writing of research papers. Research projects based not only on primary and secondary sources but also on experiment and investigation.
- 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. Course subtitles vary from quarter to quarter.
- 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 generalizations about literary periods and movements. Course subtitles vary from quarter to quarter.
- 630-4 *Studies in Major English Writers***
Courses offered under this number provide intensive study of the work of a single major English author—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. Course subtitles vary from quarter to quarter.
- 640-4 *Studies in Major American Writers***
Courses offered under this number provide intensive study of the work of a single major American author—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. Course subtitles vary from quarter to quarter.
- 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. Course subtitles vary from quarter to quarter.
- 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. Course subtitles vary from quarter to quarter.
- 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. Course subtitles vary from quarter to quarter.
- 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.
- 678-4 *Introduction to Linguistics***
Survey of major branches of English linguistics; present-day phonology, morphology, and syntax and their historical development; social and psychological approaches to language. (Previously listed as ENG 697.)
- 679-4 *History of the English Language***
Study of the ancestry and early growth of English, the history of English sounds and inflections, the development of the English vocabulary, and variations in pronunciation and usage in Modern British and American English. Prerequisite: ENG 111, 112.
- 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. Prerequisite: ENG 478.
- 694-4 *Creative Writing Seminar***
Writing fiction and/or poetry, group discussion of manuscripts, and special assignments in technique, related criticism, and contemporary professional writing. Students must submit a sample of their work before registering. May be repeated once. Graduate standing and permission of instructor required.
- 700-1 *Seminar in Teaching College Composition***
In-service training in teaching college-level composition. Includes instruction, discussion, observation, and evaluation. May be repeated. Required of and limited to first-year graduate assistants in the Department of English. Cannot be applied toward the 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.

702-4 History of Literary Criticism

A survey of major critical documents from ancient times to the present. Required of all candidates for the M.A. degree.

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. Includes 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. Includes such topics as rhetoric, usage, stylistics, and the analysis and evaluation of student writing.

718-4 The Study of Professional Writing

Current approaches to the study of technical, business, and other specialized writing. Critical and historical analyses are supplemented by assignments in writing the studied forms.

720-4 Women's Studies Through Literature

Current approaches to the study of literature by and about women. Includes introduction to feminist criticism and examples of its application to texts.

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.

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.

750-4 Seminar in Cultural Periods

Reading, research, reports, and discussion of 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.

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.

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 680 or 707, 701.

791-1 to 4 Independent Study

Faculty-directed independent study in literature or language usually requiring reports and conferences with the instructor. To be arranged with the director of graduate studies. May not be repeated. Permission of instructor required.

795-4 to 8 Internship and Apprenticeship

Supervised college-level teaching, archival work, or professional writing. 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 work.

799-4 to 8 Thesis

To be arranged with the director of graduate studies. A maximum of 8 hours of thesis credit applicable to degree requirements.

Environmental Studies/ENV**620-1 to 6 Workshop in Environmental Studies**

An intensive study of a selected aspect of environmental issues designed to meet the particular needs of participants according to advance announcements. Specific subtitles to be added with individual workshops. Permission of instructor required.

Finance/FIN**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. 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

Deals 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.
Prerequisite: FIN 621.

722-3 Risk Management and Insurance

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 who have had no previous work in risk and insurance.
Prerequisite: FIN 621 or equivalent.

731-3 Real Estate Investment Analysis

Deals with the theory and practice of investing in real property. Topics include cash flow, valuation, risk and return analysis, taxes, and real estate financing. Extensive use of cases.
Prerequisite: FIN 621 or equivalent.

741-3 Financial Management I

Designed both for nonfinance 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. Prerequisite: FIN 741 or permission of 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.
Prerequisite: FIN 741 or permission of instructor.

750-3 Financial Management of Health Service Organizations

An overview of the financial management function in health care organizations. Topics include budgeting, control, capital expenditure analysis, and rate settings. Emphasis on extensive use of cases and problems. Graduate standing required. Prerequisite: FIN 621.

780-6 Finance Internship

One-quarter internship in a selected private or governmental organization under the direction of a faculty adviser and employment supervisor. Details to be arranged by the department or college office. Enrollment in the M.B.A. program, completion of at least seven out of ten core courses, and departmental approval required.

781-1 to 3 Special Studies in Finance

Intensive reading or research in a selected field of advanced finance. Permission 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.

799-1 to 9 Thesis

To be arranged.

French/FR**603-4 Advanced Studies: Language/Civilization**

Variable content. Topic chosen by instructor. Conducted in French. Graduate standing and permission of instructor required.

622-4 Villon to Chénier

Three centuries of French poetry: Villon, Scève, Marot, du Bellay, Ronsard, d'Aubigné, Malherbe, La Fontaine, Boileau, Voltaire, Chénier. Graduate standing and permission of instructor required.

641-4 Libertines and Moralists: Rabelais to Voltaire

Currents of skepticism and humanism in the intellectual history of France. Major authors: Rabelais, Montaigne, Cyrano de Bergerac, Saint-Evremond, La Bruyère, La Rochefoucauld, Bayle, Fontenelle, Diderot, Voltaire. Graduate standing, language competence, and permission of instructor required.

642-4 Seventeenth- and Eighteenth-Century Theatre

Works of Corneille, Molière, Racine, Marivaux, Diderot, Voltaire, Beaumarchais. Graduate standing and permission of instructor required.

643-4 *The Enlightenment*

History of political and social ideas in eighteenth-century France. Based principally on works of Montesquieu, Diderot, Voltaire, and Rousseau. Graduate standing and permission of instructor required.

650-1 to 4 *Independent Graduate Research*

Course subtitles vary from quarter to quarter. Language competence, graduate standing, and permission of instructor required.

651-4 *French Romanticism*

From Rousseau to Hugo. Includes Bernardin de Saint-Pierre, Chateaubriand, Mme de Staël, Nodier, Lamartine, Vigny, Musset, Nerval. Graduate standing and permission of instructor required.

652-4 *The Nineteenth-Century Novel*

Chateaubriand, Constant, Stendhal, Balzac, Flaubert, Zola, France. Graduate standing and permission of instructor required.

653-4 *Poetry from Baudelaire to Breton*

Symbolists, Decadents, and Surrealists. Graduate standing and permission of instructor required.

662-4 *Twentieth-Century Literature*

The novel. Graduate standing and permission of instructor required.

663-4 *Twentieth-Century Literature: Drama*

Study of modern French theatre, including Cocteau, Giraudoux, Anouilh, Beckett, and Ionesco. Graduate standing, language competency, and permission of instructor required.

665-4 *Problems in French Literature*

Examination of selected topics in French literature to investigate various themes, myths, genres, literary movements, or characters. May be repeated with different subtitles. Graduate standing and permission of instructor required.

681-4, 682-4 *Independent Reading for Graduate Students*

Course subtitles vary from quarter to quarter. Language competence, graduate standing, and permission of instructor required.

Geography/GEO**503-4 *Space and Faith: Topics in Religion and Geography***

(Taught jointly with Department of Religion; see REL 503.) The interrelation of religious and geographical factors in selected cultures of East and South Asia. May be repeated with 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.

534-4 *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.

560-4 *Systematic Geography*

Analysis of various geographic factors. Specific topic or field of concentration announced each time course is offered. May be repeated to a maximum of 15 credit hours.

570-3 *Regional Geography*

Physical and cultural analysis of major and minor world regions. Specific region for study announced each time course is offered. May be repeated to a maximum of 15 credit hours.

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 513.

645-5 *Intermediate Cartography and Map Interpretation*

Study and practice of compilation processes for the development of maps and models utilizing remotely sensed data sources. 4 hours lecture, 1 hour lab.

646-4 *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.

655-4 *Geography of Transportation*

Analysis of spatial aspects and structural characteristics of transport networks, the movement of goods, and their relationship to regional structures.

658-4 *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.

662-4 *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.

663-4 Geographic Applications for Remotely Sensed Data

Application of geographic methodology to problems employing photographic and machine-processed multispectral scanner data that are in contemporary use in academic research, environmental analysis, and planning. Prerequisite: GEO 662 or permission of instructor.

665-5 Cartography

Principles of map projections, their construction and use in illustrating geographic relationships. Includes methods of design, compilation, and graphic representation of data. 4 hours lecture, 1 hour lab.

666-4 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.

676-4 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.

677-4 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 676 or permission of instructor.

678-4 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. Course subtitles vary from quarter to quarter.

684-3 to 4 Biogeography

(Taught jointly with Department of Biological Sciences; see BIO 684.) Introduction to factors affecting the geographical distribution of plants and animals. Students registering for GEO 684 for 3 credit hours attend lectures only; registration for GEO 684 for 4 credit hours requires an additional laboratory section. Graduate standing required.

Geological Sciences/GL**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. 3 hours lecture, 3 hours lab. Recommended preparation: GL 102; CHM 101, 102.

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 effects of these operations on the origin, history, and evolution of the earth. 3 hours lecture, 3 hours lab.

509-4 Environmental Geology

The impact and interrelationship of geologic processes on the quality of life and the works of man. 3 hours lecture, 2 hours lab.

510-6 Mineralogy

Lecture/discussion of the chemistry and physics of minerals. Lab includes the identification of minerals by microscopic, macroscopic, and x-ray techniques. 3 hours lecture, 6 hours lab. Recommended preparation: GL 301.

511-4.5 Structural Geology

The geometry of the structural features of rocks, their geographic distribution and possible causes. 3 hours lecture, 3 hours lab.

513-3 Field Survey Techniques

Mapping of small areas and location of points within them to demonstrate the techniques and instruments of field surveys.

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. 3 hours lecture, 3 hours lab.

530-4.5 Paleontology I

The morphology, geologic record, and geographic distribution of major invertebrate groups characterized by significant fossil representation. 3 hours lecture, 3 hours lab.

531-4.5 Paleontology II

The morphology, geologic record, and geographic distribution of major vertebrate and plant groups characterized by significant fossil representation. 3 hours lecture, 3 hours 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 permission of instructor.

560-4 Geological Analysis

The nature of geological data, their sources, sampling, collecting, processing, analysis, and interpretation. Practical problems are solved in the laboratory. 3 hours lecture, 2 hours lab. Graduate standing or permission of instructor required.

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.

599-1 to 6 Special Problems

Research and problems designed for specific needs and talents of the student. Graduate standing required.

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.

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. 3 hours lecture, 6 hours 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. 3 hours lecture, 4 hours lab. Recommended preparation: CHM 141 or equivalent.

614-3 Volcanology

Study of volcanic processes and of features found in volcanic areas.

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. 3 hours lecture, 3 hours 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. Recommended preparation: MTH 333 or permission of instructor.

618-4.5, 619-4.5 Igneous Petrology

Study of the occurrence, chemical-geological features, and genesis of selected families of volcanic and plutonic rocks. Laboratory focuses on petrographic study of igneous rock suites. 3 hours lecture, 3 hours lab. Recommended preparation: GL 612.

620-3 Regional Tectonics

Variations in regional tectonics style as determined by stratigraphy, structure, and geophysical measurements. Permission of instructor recommended. Prerequisite: GL 311.

621-3 Groundwater 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.

622-5 Introduction to Geophysical Prospecting

Introduction to principles of the gravity, magnetic, seismic, electrical, and radioactive prospecting. 3 hours lecture, 4 hours lab. Calculus recommended.

623-4 Seismic Exploration

Study of the theory, observation, and analysis of seismic phenomena as applied to geologic exploration. 2 hours lecture, 4 hours lab. Prerequisite: GL 422, 622, or permission of instructor.

624-4 Gravity Exploration

Study of the theory, observation, and analysis of gravitational phenomena as applied to geologic exploration. 3 hours lecture, 2 hours lab. Prerequisite: GL 422, 622, or permission of instructor.

625-4 Topical Concepts in Geophysics

Special topics in geophysics. 3 hours lecture, 2 hours lab. Prerequisite: GL400/600, 422/622, or permission of instructor.

626-1 Geophysics Seminar

Literature survey and student presentations on selected topics in geophysics. May be repeated. Prerequisite: GL 400/600 or 422/622.

627-4 Regional Structural Synthesis

The synthesis of diverse structural, geophysical, and remote sensing data and their application to regional tectonic interpretation and natural resource evaluation. 3 hours lecture, 2 hours lab. Prerequisite: GL 311/511, 312/643.

628-0.5 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. 3 hours lecture, 2 hours lab.

630-4 Photogeology

The use of aerial photographs in the interpretation of lithology, stratigraphy, and structures. The use and advantages of photoanalysis are covered. 3 hours lecture, 2 hours lab.

632-4.5 Carbonate Petrology

The character, composition, origin, and diagenesis of carbonate rocks are examined utilizing ancient and modern examples. 3 hours lecture, 3 hours lab. Recommended preparation: GL 301.

637-4 Seismic Data Processing

Digital filtering, deconvolution, and migration of seismic data. 3 hours lecture, 2 hours lab. Prerequisite: GL 623.

640-3 Economic Geology

Genesis, classification, and description of economic metal-bearing mineral deposits. Prerequisite: GL 412/612 or 413/613.

643-4 Advanced Structural Geology

Development of the theory of rock behavior. Finite strain and gravity tectonics are discussed. 3 hours lecture, 2 hours lab. Prerequisite: GL 311.

644-4 Formation Analysis

The theory, application, and interpretation of geophysical logs with emphasis on their use in correlation and determining porosity, permeability, and fluid content of subsurface formations. 3 hours lecture, 2 hours lab. Graduate standing or permission of instructor required.

645-4 Geology of Earth Energy Resources

The geology of natural energy sources with emphasis on fossil fuels, especially petroleum and gas. Also includes geothermal energy and radioactive ore deposits. Geological and geographic distribution, genesis, exploration, production, governmental controls, and economic aspects are covered. 3 hours lecture, 2 hours lab. Graduate standing or permission of instructor required.

648-4 Sedimentary Geochemistry

The origin of sedimentary materials resulting from chemical processes. The structures of minerals in sedimentary materials (carbonates, clay) and their changes, with emphasis on properties and identification. 3 hours lecture, 2 hours lab. Prerequisite: GL 629.

649-3 Evolution of Sedimentary Rocks

A quantitative study of the sedimentary rock mass and the fluxes that supply and deplete it, and a review of mathematical models describing the sedimentary cycle. Prerequisite: GL 629.

651-3 Regional Hydrology

Survey of hydrology covering the hydrologic cycle, the hydrologic budget, precipitation, water losses, runoff, the drainage basin, the principles of statistical analysis of data. Analysis of physical properties of water-bearing materials, groundwater movement, elementary well hydraulics, and the groundwater basin. 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. 3 hours lecture, 3 hours 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. 3 hours lecture, 3 hours lab. Prerequisite: GL 656.

663-4 Geologic Applications of Remote Sensing

Familiarizes geology students with and trains them in the applications of remote sensors to general field geology and more explicitly to exploration (mineral and petroleum) geology. Emphasis is on the end product of the remote sensor. 3 hours lecture, 2 hours lab. Introductory geology sequence recommended.

674-3 X-Ray Spectral Analysis

Electron microprobe and x-ray fluorescence analysis of rocks, minerals, and other substances are explained and demonstrated.

695-3 Geochemical Prospecting

Theory, techniques, and application of geochemistry to exploration for economic mineral deposits including hydrocarbons.

698-3 Regional Geology

Literature on the geology of a region is studied in seminars during the quarter; between terms specific areas of the region are visited and examined in a field trip. Advanced standing required.

699-1 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 those who hold graduate teaching assistantships in the Department of Geological Sciences.

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 are pursued in the laboratory. 3 hours lecture, 2 hours lab. Recommended preparation: GL 413 or 613, or equivalent. Concurrent registration in physical chemistry required.

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. 2 hours lecture, 2 hours lab. Recommended preparation: GL 613 or equivalent.

740-4.5 Sedimentary Analysis

The theories, techniques, and applications of microscopic, physical, statistical, and x-ray analyses of sedimentary rocks. 3 hours lecture, 3 hours lab. Recommended preparation: GL 501 or equivalent.

762-4 Groundwater Exploration and Evaluation

Exploration and delineation of aquifers; interpretation of hydrologic tests; case studies. 3 hours lecture, 2 hours lab.

799-1 to 6 Special Problems

Course subtitles vary from quarter to quarter. May be taken for a letter grade or pass/unsatisfactory.

898-3 to 9 Geologic Field Research

Specific areas in a region are studied using a specific area of specialization in the geologic sciences. Data are collected under close supervision and analyzed independently. Formal report of results to be prepared. Field work. Permission of instructor required.

899-1 to 5 Thesis**German/GER****603-4 Advanced Studies: Language/Civilization**

Course content varies. Topic chosen by instructor. Conducted in German. Graduate standing and permission of instructor required.

616-4 German Literature of the Eighteenth Century: Goethe and Schiller

Representative works of Goethe and Schiller. Graduate standing, language competence, and permission of instructor required.

625-4 German Literature of the Nineteenth Century: Prose

Representative works of Eichendorff, Hoffmann, Keller, Meyer, Storm, Fontane, and others. Graduate standing and permission of instructor required.

631-4 German Literature of the Twentieth Century: Prose

Readings and reports in twentieth-century literature. Representative works of Hesse, Mann, Kafka, and others. Graduate standing, language competence, and permission of instructor required.

632-4 German Literature of the Twentieth Century: Drama

Readings and reports in twentieth-century literature. Representative works of Schnitzler, Hofmannsthal, Kaiser, Toller, Brecht, and others. Graduate standing and permission of instructor required.

650-1 to 4 Independent Graduate Research

Course subtitles vary from quarter to quarter. Graduate standing, language competence, and permission of instructor required.

681-4, 682-4 Independent Reading for Graduate Students

Course subtitles vary from quarter to quarter. Graduate standing, language competence, and permission of instructor required.

Health, Physical Education, and Recreation/HPR**630-1 to 3 Coaching Theory**

The theory, skills, strategies, and organization principles of coaching a particular sport. Typical sports covered include baseball, basketball, football, soccer, swimming, track and field, tennis, and volleyball. Prerequisite: HPR 101 in same sport.

635-1 to 3 Officiating

A study of the rules and techniques of officiating a particular sport. Typical sports covered include baseball, basketball, football, soccer, and volleyball. Prerequisite: HPR 101 in same sport.

688-1 to 6 Independent Study

Independent reading, writing, and/or reporting in area related to health, physical education, or recreation. Graduate standing and permission of program coordinator and instructor required.

689-1 to 6 Workshop in Health, Physical Education, and Recreation

An intensive study of content, curriculum, method, or materials designed to meet the needs of preservice and inservice professionals in health, physical education, and recreation. Subtitles indicate specific area.

710-4 Physical Education for Children with Special Needs

Provides the student with the knowledge to assess students with handicapping conditions, to plan appropriate physical activities based on this assessment, and to provide the activities described in the plan. Prerequisite: HPR 212 or equivalent.

720-4 Motor Development and Acquisition of Motor Skills

Study of the relationship of motor learning and motor control processes in the development of human motor skills. Prerequisite: HPR 450 or equivalent.

740-4 Administration of Interscholastic Athletics

Presents ways of directing interscholastic athletic programs. Emphasis is on personnel administration, program development, facility management, fiscal management, and winning community and professional support. Prerequisite: HPR 340 or equivalent.

750-4 Scientific Foundations for Conditioning

Study of scientific foundations for conditioning. Topics include exercise training techniques, heart rate, blood pressure, ventilation, strength, flexibility, and body composition. Laboratory methods are also a part of this course. Prerequisite: HPR 351 or equivalent.

753-4 Assessment of Physical Activity

Deals with the assessment of physical activity and focuses on such topics as selection of measurement materials, techniques of test administration, and essential statistical methods for scientific evaluation. Prerequisite: HPR 455 or equivalent.

760-4 Advanced Athletic Training Techniques

Study of advanced athletic training techniques, including examination of trauma, contusions, hematoma, strains, sprains, fractures, open wounds, and dislocations. Prerequisite: HPR 460 or equivalent.

780-5 Research in Physical Education

The first part of this course is a study of the research processes in physical education and the development of a research project in the student's area of interest. The second part is the actual research project. Prerequisite: HPR 455 or equivalent.

History/HST**515-4 The History of France Since the Old Regime**

History of France from the collapse of the Old Regime and the beginning of the French Revolution to the present. Focus is on political, ideological, and cultural factors.

518-4 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.

527-4 History of Russia to 1801

A survey of the political, social, economic, and cultural history of Russia from its beginnings to the early nineteenth century, through Paul I.

528-4 History of Russia Since 1801

Russia: reforms, reaction, revolution, Bolshevism. A survey of Russia since 1801, from the period of the Napoleonic wars to the present covering politics, culture, diplomacy, revolutions, and the Soviet regime.

535-4 Sports in American Life

Survey of the development of American sports from colonial times to 1980, with emphasis on the social, political, and ideological forces that transformed folk games into commercial ventures.

590-4, 591-4, 592-4 Medieval Western Europe

From the decline of the Western Roman Empire to ca. 1300. Primary emphasis on Italy, Germany, and France. 590: 285-814. 591: 814-1100. 592: 1100-1350. Offered alternate years. Graduate standing required.

605-4 Ancient History

Courses offered under this number examine selected problems in Roman history to the death of Constantine in A.D. 337. Specific title and prerequisite to be announced in quarterly class schedule.

615-4 Early Modern European History

Courses offered under this number examine selected problems in European history from the decline of the Roman Empire through the Renaissance and Reformation. Several of the courses offered under this number will be listed jointly with the Department of Religion. Specific title and prerequisite to be announced in quarterly class schedule.

625-4 Modern European History

Courses offered under this number examine modern Europe from the Enlightenment to the present through a national (e.g., Germany), chronological (e.g., nineteenth century), or topical (e.g., socialism) approach. Specific title and prerequisite to be announced in quarterly class schedule.

635-4 British History

Courses offered under this number examine particular periods of British history (e.g., modern Britain), or topics (e.g., British constitutional history). Specific title and prerequisite to be announced in quarterly class schedule.

645-4 Middle Eastern History

Courses offered under this number examine the Balkans and the Middle East from the Middle Ages to the present. Topics may include Byzantine history, the Crusades, and the Middle East today. Several of these courses will be offered jointly with the Department of Political Science and Urban Affairs. Specific title and prerequisite to be announced in quarterly class schedule.

655-4 Latin American History

Courses offered under this number examine selected Latin American nations (e.g., Mexico), particular topics (e.g., the Age of Dictators), and regions of current historical interest (e.g., Central America). Specific title and prerequisite to be announced in quarterly class schedule.

665-4 Far Eastern History

Courses offered under this number examine various periods of Chinese history and the modern histories of other Asian nations (e.g., India), or regions (e.g., Southeast Asia).

670-4 Colonial American History

Courses offered under this number examine the colonial, Revolutionary, and early national periods of American history, and topics such as Puritanism or the origins of early American political thought. Specific prerequisite to be announced in quarterly class schedule.

675-4 Nineteenth-Century United States History

Courses offered under this number examine distinct periods in the nineteenth century (e.g., Civil War and Reconstruction), and major topics such as slavery. Specific title and prerequisite to be announced in quarterly class schedule.

680-4 Twentieth-Century United States History

Courses offered under this number examine particular stages of the twentieth-century American experience (e.g., the Progressive era), or selected topics (e.g., the civil rights movement). Specific title and prerequisite to be announced in quarterly class schedule.

685-4 Special Topics in United States History

Courses offered under this number allow intensive analysis of topics drawn from the entire range of the American experience, such as religion, diplomacy, women, immigration, and urbanization. Several of these courses will be offered jointly with the Department of Religion. Specific title and prerequisite announced in quarterly class schedule.

691-1 to 4 Independent Readings

Faculty-directed readings in field of student's choice. Usually requires reports and conferences with instructor. Permission of instructor required.

695-4 Comparative History

Courses offered under this number compare developments or movements in different parts of the world and/or different times in history. Such courses may compare revolutions, slave systems, religious movements, or other human experiences that transcend a particular time or place. Specific title and prerequisite to be announced in quarterly class schedule.

698-4 Historiography

Introduction to the work of representative historians and important theories of historical interpretation. Completion of 20 credit hours of history required.

700-4 Historical Methods

Intensive training in the research methods and materials of history. Required of all graduate students who have not had HST 300 or equivalent.

701-708 Reading Seminars

May be repeated with content change to a maximum of 12 credit hours. Graduate standing and permission of instructor required.

701-4 Seminar in United States History to 1865**702-4 Seminar in United States History Since 1865****703-4 Seminar in Ancient, Medieval, and Early Modern European History****704-4 Seminar in Modern European History****705-4 Seminar in Latin American History****706-4 Seminar in Far Eastern History****707-4 Seminar in African History****708-4 Seminar in History**

Topics to be arranged.

710-4 Introduction to Archives and Manuscripts

Acquaints the student with the fundamental problems and techniques of managing a historical archive or manuscript collection. Permission of director of Archival and Historical Administration required. 12 credit hours of history or permission of instructor required.

711-2 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.

712-4 The Management and Interpretation of History Museums

Prepares students for positions with historical organizations as preservation officers, editors of historical publications, and for conducting historical surveys. Permission of director of Archival and Historical Administration required.

713-2 Advanced Problems in Historical Administration

Furnishes students with the training and background necessary for positions in historical societies and similar organizations that preserve, maintain, or interpret historical properties. Permission of director of Archival and Historical Administration required.

714-2 Advanced Problems in Archival Work

Provides students with major problems in archival work and manuscript curatorship to prepare them for careers as manuscript librarians, archivists, oral historians, and records management specialists. Permission of director of Archival and Historical Administration required. Prerequisite: HST 710.

715-5 Historical Management Internship

Gives Plan C students a 300-clock-hour internship in cooperating historical agency. Provides practical training in various aspects of historical management. Report must be written by the student on the internship experience. Graded pass/unsatisfactory. Prerequisite: HST 710, 711, 712, 713, and 714.

716-4 Introduction to American Architectural History: Preservation

Provides the necessary foundation in American architectural history for supervision of or participation in the preservation program of a historical organization.

717-1 to 2 Practica: Archives and Museums

Familiarizes the student with archivists' and preservationists' techniques. Variable titles. Graded pass/unsatisfactory. Graduate standing required.

718-4 Oral History Techniques

The study of oral history techniques and methodology.

719-4 Practice of Oral History

Development of skill in the practice of oral history by means of intensive work in carrying out an oral history project. Field work included. Prerequisite: HST 718.

799-4 to 8 Thesis

Approval of departmental curriculum committee required for enrollment.

Humanities/HUM**701-5 Worldviews and Worldways I**

A general introduction to humanities study. A cross-cultural survey of major ways to view the world and the human situation. Exploration of key methods for studying these human constructions within the worldview they exemplify. Prerequisite: ENG 701 or HST 700.

702-5 Worldviews and Worldways II

A general introduction to humanities study. Examination of one specific culture in light of its fundamental systems for giving meaning to the world and human life. Employs various methodological tools to explore the culture. Prerequisite: HUM 701.

703-2 to 9 Humanities Project

Individual project with an adviser. Must be approved by and arranged with director of Master of Humanities program.

799-1 to 4 Directed Studies

Individual study in the humanities under the direction of a faculty supervisor. Scope of project must be outlined in advance. May be repeated with different titles. Open to students in the Master of Humanities degree program. Permission of instructor and director of Master of Humanities program required.

Library and Communication Science/LCS**611-3 Reference Materials and Bibliography**

Important reference works, indexes, and bibliographies with practical problems in their use. Student examines role in the interaction between the user and the information environment.

613-3 Introduction to Archives and Manuscripts

Acquaints the student with the fundamental problems and techniques of managing a historical archive or manuscript collection. Completion of 9 credit hours of history required.

621-3 Cataloging and Classification

Study of the development of the Dewey Decimal classification scheme and its application to library media center situations. The basic principles of descriptive cataloging, application of current cataloging rules, including subject headings.

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.

645-3 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.

646-3 Teaching Library and Research Skills in Elementary and Secondary Schools

Study of the hierarchy of library and library research skills, ways to develop materials and to teach those skills; introduction to computer-assisted information retrieval.

649-3 Introduction to Instructional Media

A survey course in instructional media including the interpretation of visuals (projected and nonprojected), film, instructional TV, gaming, audio technology, multimedia systems, computers, operation of audiovisual equipment, and media facilities. Focus is on the appropriate use of media for specific instructional outcomes.

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 is emphasized.

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.

661-3 Selection of Materials

Selection of materials suitable for the library media center or the elementary/secondary school with special emphasis on nonprint materials. Graduate standing and completion of core courses required.

663-3 Literature for Adolescents and Young Adults

Study of literature appropriate for adolescents and young adults. Survey, evaluation, and selection of books; techniques of reading guidance; and promotion of books.

670-1 to 6 Workshop in Library and Communication Science

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. Specific subtitles to be added with individual workshops.

681-4 to 12 Library/Media Practicum in Elementary Schools

Supervised practice in elementary school media center. Field experience. Formal application must be made through the office of the director of Laboratory Experiences in Education during the first two weeks of the quarter prior to enrollment. Prerequisite: LCS 611, 621, 649, 691.

682-4 to 12 Library/Media Practicum in Secondary Schools

Supervised practice in secondary library media center. Field experience. Formal application must be made through the office of the director of Laboratory Experiences in Education during the first two weeks of the quarter prior to enrollment. Prerequisite: LCS 611, 621, 649, 661, 691.

685-3 Computers for Educators

Computer software and hardware systems and their uses are examined. Their effect on education and the teacher is emphasized.

686-3 Applications of Computers in Education

Explores types of educational software and applications, software evaluation, curriculum development, and lesson planning integrating computer courseware.

687-4 Introduction to BASIC for Educators

Introduction to computer programming in the BASIC language including programs and techniques useful to educators. Topics include techniques for program design, flowcharting, coding, testing, and documentation.

691-3 Organization and Administration of School Media Centers

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. Completion of 9 credit hours in library communication science required.

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. Also focuses on 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. Basic national and trade bibliographic tools, selection aids, and the mechanics of development. The importance of a well-conceived development policy is emphasized.

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 are emphasized. Recommended preparation: LCS 611.

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. Recommended preparation: LCS 611.

719-3 Information Sources in Science and Engineering

Introduction to the broad range of information sources and methods of access to specific data in science and engineering. Methods of information exchange and dissemination within each of the specific disciplines are examined. Emphasis on acquiring sufficient skills to enable students to provide reference and information services in a variety of libraries and information environments. Recommended preparation: LCS 611.

- 721-3 Selection and Utilization of Media Materials**
Introduction to the broad range of communication media, other than print, and equipment now used in various types of libraries, media centers, and information environments. The tools and the criteria for selection, as well as the methods of equipment utilization, are explored. Media such as the cathode ray tube and other computer-assisted information systems are examined as well as the more traditional film, microform, and audio materials.
- 723-4 Principles of Information Organization**
Analyzes the theories and methods of organizing information and collection for efficient and effective use. Emphasis on 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 are examined.
- 735-3 Advanced Production of Media Materials**
Examines the philosophy and methodology of producing media materials. Examines 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.
- 749-3 Developing Materials for Instruction**
Advanced course in the development of a wide range of techniques and materials for the improvement of instruction. The student develops and creates specific instructional materials for a particular class or grade level.
- 770-1 to 9 Independent Study**
An individualized course of study under the close supervision of a member of the faculty. May include but is not limited to extensive readings, the performance of a research project, a paper, or a production. Departmental approval required.
- 779-3 Seminar in Educational Media**
Individual and group study of problems related to library/media work in elementary and secondary schools. Enrollment limited to educational media majors. A major scholarly paper is required. Should be taken near completion of master's degree program. Permission of adviser required.

780-3 to 12 Internship

The student is assigned for a maximum of ten hours per week to a library, learning center, computer facility, or broadcasting operation to gain practical experience under supervised conditions. Graded pass/unsatisfactory. Departmental approval required.

781-3 LOGO and Problem Solving

Provides an introduction to LOGO with a major focus on the problem-solving processes of the language for educators. Educators have an opportunity to be involved with the LOGO learning process and to prepare implementation of LOGO in their classrooms. Completion of a geometry course recommended. Completion of a computer literacy course or permission of instructor required.

782-3 Designing Educational Software

Provides the elements of instructional design, storyboarding instruction, and translation of instruction into computer software. Knowledge of entry-level BASIC programming language and curriculum development required.

795-3 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: LCS 449, 649, or ED 776 or departmental approval.

799-1 to 9 Master's Project

The project may be a thesis or creative production and will be prepared under the guidance of the student's advisory committee. Permission of the director of the Division of Library and Communication Science required.

Linguistics/LI**671-4 Introduction to Historical and Comparative Linguistics**

Principles of the historical and comparative study of languages; introduction to Indo-European, Germanic, Romance, and Slavic philology. Graduate standing and permission of instructor required.

Management/MGT**621-3 Graduate Survey in Management**

A survey course of basic management designed for students who have 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.

702-3 Survey in Operations Management

Introduction to the management of operating systems; techniques and methods employed to plan and control manufacturing and other operating systems. Designed for individuals who have had no previous course in production or operations management. 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. Evaluation of personnel systems, with emphasis on implications of personnel policy and practice. Prerequisite: MGT 621 or equivalent. Course 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. Course centers 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 offered at least once annually.

706-3 Organizational Development and Change

Addresses both organization design and change. Organization development is presented as an ongoing change process which must be planned and managed. A variety of interventions are explained, and situations are analyzed to determine effectiveness. Prerequisite: MGT 700.

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. Prerequisite: MGT 621 or equivalent. Course offered at least once annually.

714-3 Technology Assessment/Technological Forecasting

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. 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 enables the student to bring together all aspects of administrative policy making through the use of specific case problems. The primary focus is the strategic management process. Completion of all required core courses or equivalent required.

741-3 Operations Management

Introduction to the management of operating systems; techniques and methods employed to plan and control manufacturing and other operating systems. Designed for individuals who have had no previous course in production or operations management. Prerequisite: MGT 621; QBA 620, 621; or equivalent.

750-3 Materials Management

Survey of materials management functions in modern organizations, including purchasing, shipping and receiving, transportation, traffic, warehousing, inventory control, and materials handling. Emphasis is on procurement and logistics support of organizational operations. Prerequisite: MGT 621 or equivalent.

751-3 Production and Inventory Management

Seminar in policies, practices, and techniques for the planning and control of inventories and production levels. Major topics include forecasting, inventory management systems, and material requirements planning (MRP). Prerequisite: MGT 741; QBA 620, 621; or permission of instructor.

752-3 Quality Assurance

Seminar in policies, practices, and techniques for the planning and control of the quality function. Major topics include capability analysis, process control techniques, and monitoring of incoming and outgoing quality levels. Prerequisite: MGT 741; QBA 620, 723; or permission of instructor.

753-3 Selected Topics in Management

Topics as given below. See quarterly class schedule for prerequisites.

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

755-3 Health Care Management

(Listed jointly with Department of Community Medicine; see CME 731.) Overview of health care systems, public and private. Topics include managing health service organizations and health delivery systems, marketing health care, and major influences on health professions and organizations. Seminar format. Graduate standing required. Prerequisite: MGT 621.

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 offered at least once annually.

763-3 Systems Management

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 offered at least once annually.

780-6 Management Internship

One-quarter internship in a selected private or governmental organization under the direction of a faculty adviser and employment supervisor. Details to be arranged by the department or college office. Enrollment in the M.B.A. program, completion of at least seven out of ten core courses, and departmental approval required.

781-1 to 3 Special Studies in Management

Intensive reading or research in a selected field of advanced management. Course subtitles vary from quarter to quarter. Permission of department chair required.

799-1 to 9 Thesis

To be arranged.

Marketing/MKT**621-3 Graduate Survey in Marketing**

A survey course in marketing designed for students who have had no previous course work in marketing.

635-3 Starting New Ventures

Concepts and techniques of how to start your own business. Development of a business plan to encompass opportunity assessment, market analysis, financing, staffing, production, tax accounting, legal, insurance, and marketing aspects. For nonbusiness majors only; not for credit toward business degree.

642-3 Direct Marketing

Introduction to the theories, concepts, and techniques of modern direct marketing. Coverage includes direct response methods in consumer and industrial marketing and in nonprofit organization marketing. Prerequisite: MKT 621 or equivalent.

653-3 Special Topics in Marketing

Topics vary widely: quantitative techniques of market segmentation, marketing policy in an age of discontinuity, product planning and development, and price management. See quarterly class schedule for specific topic and prerequisites. Graduate standing required. Prerequisite: MKT 621.

675-4 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 621, FIN 621.

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

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. Required of marketing majors in the M.B.A. program. Prerequisite: MKT 741, QBA 723.

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

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. Prerequisite: MKT 621 or equivalent.

730-3 Consumerism and Social Issues in Marketing

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 interest, 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 equivalent.

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. Required of all M.B.A. students, including marketing majors. A qualifying examination to test the student's entry-level knowledge of basic marketing is administered the first week of class. Prerequisite: MKT 621 or equivalent.

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 621 or equivalent.

770-4 Marketing Policy and Management

Study of basic marketing theory, including marketing analysis, market planning, organization of performance of marketing activities, and control techniques.

771-4 Seminar in Marketing

Seminar dealing primarily with the functional and managerial areas of marketing, focusing on the nature and content of the assumptions underlying programs for moving into the market place and on marketing programs, per se.

780-6 Marketing Internship

One-quarter internship in a selected private or governmental organization under the direction of a faculty adviser and employment supervisor. Details to be arranged by the department or college office. Enrollment in the M.B.A. program, completion of at least seven out of ten core courses, and departmental approval required.

781-1 to 6 Independent Studies in Marketing Management

Readings or research in a selected field of marketing. Advanced graduate standing and permission of instructor required.

799-1 to 9 Thesis

To be arranged.

Mathematics/MTH**504-4 Mathematics as a Human Activity**

Shows nonscience students some of the applications and uses of mathematics.

516-4, 517-4 Numerical Methods for Digital Computers

(Listed jointly with Department of Computer Science; see CS 516, 517.) An introduction to numerical methods used in the sciences. Includes methods of interpolation, data smoothing, functional approximation, integration, solutions of systems of equations, and solutions of ordinary differential equations. 3 hours lecture, 2 hours lab. Prerequisite: for 516, MTH 231, 253 or 355, CS 142 or 210; for 517, MTH 233, 316.

532-3 Complex Variables

Topics discussed include power series expansion, the formula of Cauchy, residues, conformal mappings, and elementary functions in the complex domain. An applied course, intended for students of science and engineering. Prerequisite: MTH 232.

- 533-3 Partial Differential Equations and Boundary Value Problems**
 Partial differential equations, boundary value problems, eigenfunctions, Fourier series, applications. Prerequisite: MTH 232, 233.
- 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 231, 451, 471.
- 545-4 Geometry for Elementary School Teachers**
 Axioms, finite geometries, nonmetric and metric lengths, angles, area, volume, polygonal figures, elementary curves. Prerequisite: MTH 344.
- 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, and other number-theoretic functions. Prerequisite: MTH 231.
- 599-1 to 5 Selected Topics**
 Selected topics in mathematics. May be repeated. Permission of instructor required.
- 606-3 Mathematical Modeling**
 Structure and properties of mathematical models. Size effects, dimensional analysis, graphical methods, comparative statics, stability, optimization techniques, probabilistic models, Monte Carlo simulation. Two quarters of calculus required.
- 607-3 Optimization Techniques**
 (Listed jointly with Department of Engineering; see EGR 607.) Concepts of minima and maxima; linear programming; simplex method, sensitivity, and duality; transportation and assignment problems; dynamic programming. Prerequisite: MTH 233, 253 or 355.
- 610-4 Theoretical Foundations of Computing**
 (Listed jointly with Department of Computer Science; see CS 610.) Examines the limitations of algorithmic processes in problem solving. The following approaches to this issue are presented: Turing machines, Markov algorithms, recursive functions, and the methods of Kleene and Post. Other topics include Church's hypothesis, as well as the halting problem and related decision problems. 3 hours lecture, 2 hours lab. Prerequisite: CS 600 and a 300-level math course; or CS 142 and a 400-level math course; or CEG 520.
- 623-3 to 4 Advanced Logic**
 (Listed jointly with Department of Philosophy; see PHL 623.) 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. Course subtitles vary from quarter to quarter. Prerequisite: PHL 123, 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. Completion of the calculus sequence required.
- 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.
- 634-5 Introduction to Complex Analysis**
 Complex arithmetic, differentiation (analytic functions, the Cauchy-Riemann equations), elementary functions and their mapping properties, integration (Cauchy's theorem, Cauchy integral formula), Taylor and Laurent series, poles, residues, the residue theorem. Recommended preparation: MTH 431. Prerequisite: MTH 232.
- 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.
- 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 231; for 652, MTH 651.
- 655-5 Matrix Algebra**
 (Listed jointly with Department of Biomedical Sciences; see BMS 655.) Matrices, systems of equations, vector spaces, inner products, linear transformations, determinants, eigenvalues, eigenvectors, quadratic forms, and symmetric matrices. Prerequisite: MTH 231.
- 657-3 Combinatorics**
 Topics from permutations, combinatorics, generating functions, recurrence relations, Polya's theory of counting. Prerequisite: MTH 231.

658-3 Applied Graph Theory

(Listed jointly with Department of Computer Science; see CS 658.) Introduction to methods, results, and algorithms from graph theory. Emphasis on graphs as mathematical models applicable to organizational and industrial situations. Prerequisite: MTH 231, CS 142.

671-3 Geometry

Topics in the foundation of Euclidean geometry, introduction to non-Euclidean and other geometries. Prerequisite: MTH 231.

672-3 Projective Geometry

Projective and affine planes and spaces. Change of coordinates. Projective transformations. Conics. Prerequisite: MTH 231.

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 232.

680-3 Methods of Applied Mathematics: Geometric Methods

The basic mathematical tools for the description of physical systems in three-dimensional space: vector and tensor analysis, matrices, curvilinear coordinate systems. Intended for students in applied fields. Prerequisite: MTH 232, 253 or 355.

681-3 Methods of Applied Mathematics: Differential Equations

Solution methods for ordinary differential equations commonly arising in physics and engineering. Systems of equations, linear spaces, eigenvalue problems, Sturm-Liouville theory, orthogonal functions. As time permits, additional topics selected from Bessel and Legendre functions, stability theory, Liapunov's methods, autonomous systems and the Poincare phase plane, existence and uniqueness theorems. Prerequisite: MTH 233, 253 or 355.

682-3 Methods of Applied Mathematics: Integral Methods

The use of integral transforms in the solution of differential and integral equations. Fourier series, Fourier and Laplace transforms and inverses, integral equations, Green's functions. Prerequisite: MTH 332 or 435.

688-1 to 5 Independent Reading

Course subtitles vary from quarter to quarter. Permission of instructor required.

692-1 to 5 Seminar

Permission of instructor required.

699-1 to 5 Selected Topics

Selected topics in mathematics. May be repeated. Permission of instructor required.

700-3 Principles of Instruction in Mathematics

A survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. Enrollment limited to mathematics majors or departmental approval required.

716-4 Numerical Analysis I

(Listed jointly with Department of Computer Science; see CS 716.) Mathematical analysis of numerical methods used in the sciences. 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: MTH 233, 333, 355, 432 or equivalent; CS 142 or equivalent.

717-4 Numerical Analysis II

(Listed jointly with Department of Computer Science; see CS 717.) Continuation of MTH 716. Prerequisite: MTH 716.

718-4 Numerical Analysis III

(Listed jointly with Department of Computer Science; see CS 718.) 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.

736-4 Calculus of Variations

Problems and methods of the calculus of variations presented in a manner suitable for students of mathematics, physics, or engineering. Prerequisite: MTH 332, 333; or MTH 432.

737-4 Complex Analysis I

Complex numbers, analytic functions, series, topology of the plane, conformal mappings. Prerequisite: MTH 632 or 635 or 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 355, 452; or 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.

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.

792-1 to 5 Special Problems

Course subtitles vary from quarter to quarter. Permission of instructor required.

799-1 to 5 Selected Topics

Selected topics in mathematics. May be repeated. Permission of instructor required.

800-1 Graduate Seminar

Permission of instructor required.

830-1 to 4 Topics in Analysis

Permission of instructor required.

850-1 to 4 Topics in Algebra

Permission of instructor required.

870-1 to 4 Topics in Geometry

Permission of instructor required.

899-1 to 18 Graduate Research

Course subtitles vary from quarter to quarter. Permission of instructor required.

Microbiology and Immunology/M&I**654-3 Microbial Genetics**

(Listed jointly with Department of Biological Sciences; see BIO 654.) The basic concepts of production of microbial mutations, their detection, and analysis; the use of microbial genetics in elucidating cellular functions; and the construction of plasmids and their use in genetic engineering. Graduate standing required. Prerequisite: BCH 421 or BIO 402 or equivalent.

699-1 to 4 Special Problems in Microbiology

A maximum of 4 credit hours applicable to degree requirements. Departmental approval required.

700-4 Microbial Inhibitors and Antibiotics

The mechanism of action of antibiotics and inhibitors in microorganisms at the cellular, macromolecular, and metabolic levels of organization. Emphasis is on research applications and the basis of chemotherapy. Prerequisite: M&I 426/726, BCH 421/621 or departmental approval, BIO 402.

721-4.5 Microbial Physiology

Study of the physiological and biochemical processes unique to microorganisms. Permission of instructor recommended.

726-5 Immunology and Basic Virology

Study of the fundamentals of immunobiology and basic virology. Emphasis on the regulatory and cellular level of host immune responses against microbial pathogens, as well as mechanisms of immunopathology, and on the characteristics and molecular biology of virus pathogens. Prerequisite: BIO 202, 402; CHM 216 or equivalent.

727-5 Pathogenic Microbiology

Study of microorganisms pathogenic for man and animals using the organ system approach. Emphasis on mechanisms of pathogenesis and host resistance. Includes a project segment devoted to the independent study of the mechanisms of pathogenesis in the host-parasite interactions of the infectious agents used. Prerequisite: M&I 726; BIO 202 or 402; CHM 216; or departmental approval.

728-3 Diagnostic Medical Microbiology and Immunology

Identification of etiological agents of disease; emphasis on identification of bacteria, fungi, and viruses using culture and immunological methods. Graduate standing and departmental approval required. Prerequisite: BIO 202, 402; CHM 216 or equivalent.

731-3 Basic Virology

Introduction to the field of virology with major emphasis on animal viruses. A study of the intrinsic properties of viruses and their interaction with cells; multiplication, disease production, genetics, and tumor induction. Projects assigned to each student. Prerequisite: BCH 421, BIO 402, or permission of instructor.

745-5 Immunobiology

A study of the biology of the immune system in terms of current concepts of antibody formation and function. Acquired, delayed, and immediate hypersensitivity are studied with respect to immunological deficiencies, malignancy, tolerance, graft rejection, infection, and acquired resistance. Prerequisite: M&I 726, 728; BCH 621, 622, or BIO 402.

800-1 Microbiology Seminar

See quarterly class schedule for topics. Graded pass/unsatisfactory.

801-1 to 5 Microbiology and Immunology Seminar/ Journal Club

Course on selected topics in microbiology. Departmental approval required.

822-4 Principles of Host-Parasite Interaction

A study of infection and resistance, the result of which may be the production of infectious disease. The effect of microbial virulence factors, mode of entry of microorganisms into the body, their spread through tissue, and the role of the host immune responses are studied. Prerequisite: M&I 726 or equivalent; BIO 402.

831-3 Seminar Topics in Molecular Virology

Structure, infectious process, replication, maturation, release, and genetics at the molecular level of the major groups of animal viruses. Graduate standing required. Prerequisite: M&I 431/731.

833-3 Seminar Topics in Viral Oncology

Understanding the processes involved in cell transformation by oncogenic viruses. Graduate standing required. Prerequisite: M&I 431/731.

840-2 to 5 Special Topics in Immunology

Students select, present, and analyze information from the current literature in immunobiology. Seminar/discussion format. May be repeated by students interested in the various topics of immunobiology. Prerequisite: M&I 745 or departmental approval.

842-3 Seminar Topics in Transplantation Immunology

Survey of the fundamentals of transplant immunology. Topics include mechanisms of intra- and interspecies rejection, histocompatibility genes and their products, graft-versus-host diseases, immunologically privileged sites, techniques for immunosuppression, immune tolerance, and the immunobiology of the maternal/fetal relationship. Prerequisite: M&I 745 or departmental approval.

843-3 Seminar Topics in Tumor Immunology

The host-tumor relationship is studied intensively. Interrelationships between tumor growth and host immune responses are examined at the molecular and cellular levels. Prerequisite: M&I 745 or departmental approval.

844-3 Seminar Topics in Immune Regulation

Maintenance of immune homeostasis is studied with emphasis on the contributions of lymphocyte subpopulations. Sequelae of immune imbalance are studied. Graduate standing required. Prerequisite: M&I 745 or departmental approval.

846-3 Seminar Topics in Infection and Immunity

Focuses on both beneficial and adverse host responses to microbial and metazoan parasites. Effects of infection on immune function are stressed. Prerequisite: M&I 726, 745, or departmental approval.

899-2 to 18 Graduate Research

Supervised thesis research.

Modern Language Humanities/ML

See also French, German, Linguistics, Spanish.

599-1 to 4 Studies in Selected Subjects

Course of variable content dealing with problems, approaches, and topics in the field of modern languages. Course subtitles vary from quarter to quarter. Graduate standing and permission of instructor required.

Music/MUS**Music Education**

Registration requires graduate standing in music, or permission of the director of graduate studies in music, and permission of the instructor.

635-4 Introduction to Music Education for the Special Learner

Materials, techniques, curriculum for teaching music to the special learner in public/private school music programs.

680-1 to 4 Workshops in Music

Study of selected special topics or problems in music, or special areas of music teaching. Specific 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 to present.

701-4 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.

- 702-4 Introduction to Research in Music Education**
Class studies and individual projects. Reading, research, discussion, reports; interpretation of contemporary research. Prerequisite: MUS 701.
- 704-4 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 large group and ensemble literature from 1500 to present. Rehearsal techniques; performance practices. Selection of literature; programming.
- 714-3 Instrumental Literature and Techniques**
Critical study of large groups 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.
- 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**
Advanced study of various marching band styles and techniques. Adopting drum corps techniques, selection of materials, writing shows, field planning and production.
- 780-1 to 4 Pedagogy**
Advanced course in techniques, practices, and materials for group and individual instruction. Musical styles and interpretation. Performance in instruments or voice. Specific titles to be announced.
- 799-1 to 6 Thesis**
To be arranged with the departmental director of graduate studies. A maximum of 6 hours of thesis credit applicable to degree requirements.

Theory of Music

Registration requires graduate standing in music, or permission of the director of graduate studies in music, and permission of the instructor.

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

In-depth historical study of musical structures related to the styles of significant compositions from chant through the Baroque period.

734-3 Analytical Techniques II

In-depth historical study of musical structures related to the styles of representative compositions from the Classical period to the present.

735-4 Contrapuntal Techniques

Study of contrapuntal techniques with practical application in writing and analysis.

741-3 Band and Orchestral Arranging

Study of band and orchestral instrumentation; scoring of transcriptions and original compositions.

742-3 Choral Arranging

Arranging for choral ensembles common to schools, grades 6-12.

Music History and Literature

The following courses, MUS 746, 749 and 751, 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. Registration requires graduate standing in music, or permission of the director of graduate studies, and permission of the instructor.

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

747-3 Baroque Music
(ca. 1600-ca. 1750)

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

749-3 Twentieth-Century Music
(ca. 1900-present)

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

Performance

Registration for graduate credit in any area of performance requires a successful audition.

Ensembles

Registration for ensembles also requires permission of the instructor.

650-3 Opera Production and Coaching
Production of opera; public performance; individual coaching. For advanced singers. At the discretion of the instructor course requirements may include participation in Dayton Opera productions.

705-1 Chamber Music

715-1 Ensemble

Private Study

700-1 or 4 Piano

710-1 or 4 Voice

720-1 or 4 Organ

730-1 or 4 Woodwinds

740-1 or 4 Brass

750-1 or 4 Percussion

760-1 or 4 Strings

Nursing/NUR

614-3 Selected Topics
Special topics. May be repeated. For nursing majors only.

617-2 to 4 Selected Topics
Special topics. May be repeated.

701-3 Professional Nursing Seminar

Critical review of current professional nursing education, practice, and research. Discussion is focused on role identification; social, financial, legislative, and political influences; and individual philosophy and commitment. Must be taken first or second quarter.

702-4 Concepts and Processes for Advanced Nursing Practice with Clients Having Optimal States of Health

Focuses on health promotion. Emphasis on clinical strategies designed to enrich health of designated population. Strategies based on nursing, group, change, teaching/learning, and other theories. Clinical practicum required. Prerequisite: NUR 708.

703-4 Concepts and Processes for Advanced Nursing Practice with Clients in Altered Health States

Focuses on health promotion, rehabilitation, and maintenance of clients in altered health states in the community by early recognition and interventional health strategies. Comprehensive multidisciplinary approaches to client care are explored. Clinical practicum required. Prerequisite: NUR 708.

704-3 to 5 Clinical Seminar—Problems and Field Work Associated with People Experiencing Depleted Health Potential

Focus is on health maintenance, long-term care, and rehabilitation of individuals in the community who are experiencing depleted health potential. Comprehensive multidisciplinary approaches for provision of continuity of care for these individuals are explored. Consideration is given to developing community programs for client care. Clinical practicum required. Prerequisite or corequisite: NUR 708.

705-3 Curriculum Development in Nursing Education

Principles of curriculum design, development, implementation, and evaluation of nursing programs are explored. Synthesis of learning acquired by the student in clinical nursing, education, and research courses is expected.

706-7 Practicum in Nursing Education

Observation, participation, and practice in implementing concepts in nursing programs. Seminars enable students to synthesize previous learning, discuss teaching strategies, the role of the educator, and clinical, classroom, and program evaluation. Successful completion of the comprehensive exam required. Prerequisite: NUR 709.

707-3 Introduction to Research Design and Methodology

Review and critical analysis of components of nursing research design, including collection, analysis and interpretation of data. Continued emphasis on the professional nurse as consumer of nursing research.

708-3 Theoretical Basis of Nursing Practice

Analysis of nursing theories, models, and concepts and other selected theories with the aim of synthesis in the development and application to the nursing process, education, research, and administration. (Elective by advisement for all students without this background.)

709-3 Teaching Strategies in Nursing

The art, principles, and strategies related to teaching and learning in nursing are explored. The synthesis of learning acquired in clinical, research, and educational courses is expected. Prerequisite: NUR 705.

711-3 Advanced Nursing Roles

Provides an in-depth analysis of roles in advanced professional nursing. Focuses on major concepts, theories, and processes common to roles and functions in various settings. Graduate standing in School of Nursing required.

714-3 Selected Topics

Advanced study of various topics. Specific titles announced in quarterly class schedule each time course is offered.

715-1 to 3 Independent Study

Faculty-directed, individualized study on original problems in an area of interest to the student.

720-3 Foundations of Advanced Clinical Practice—Adult Nursing

Adult nursing theories and concepts related to advanced nursing practice. Role behavior of advanced clinical specialists of adults; psychosocial, cultural, political, and economic forces affecting advanced clinical practice of adults; complex adult systems; health problems, and more. Completion of 6 credit hours of advanced science support courses required. Prerequisite: NUR 711.

721-7 Advanced Clinical Practicum—Adult Nursing

Involves application of nursing process in an advanced clinical practitioner role utilizing theoretical and experiential knowledge. Seminars and guided experiences are used in the application of knowledge and abilities in fulfilling the role of practitioner. Prerequisite: NUR 720.

722-3 Foundations of Advanced Clinical Practice—Gerontological Nursing

Theories and concepts related to advanced nursing practice. Role behavior of advanced gerontological clinical specialists; psychosocial, cultural, political, and economic forces affecting gerontological nursing; complex gerontological systems; theories of gerontological development; health problems, and more. Completion of 6 credit hours of advanced science support courses required. Prerequisite: NUR 711.

723-7 Advanced Clinical Practicum—Gerontological Nursing

Involves application of nursing process in an advanced clinical practitioner role utilizing theoretical and experiential knowledge. Seminars and guided experiences are used in the application of knowledge and abilities in fulfilling the role of practitioner. Prerequisite: NUR 722.

732-3 Health Care Resource Management

Exploration of economic resources and budgeting in health care organizations. Study of intra- and interprofessional relationships, job satisfaction, quality assurance, and performance standards.

733-7 Practicum in Nursing Administration

Observation, participation, and practice in the administration of nursing services in health care settings. Weekly seminars provide an opportunity for synthesis of previous learning and discussion of issues identified in specific nursing administration positions. Prerequisite: NUR 732 and administration support courses.

781-3 Thesis/Research Project Seminar

Focus is on assisting the student in identifying a research problem and developing a plan that will serve as a basis for a thesis or research project. Graded pass/unsatisfactory. Prerequisite: NUR 707.

799-1 to 3 Thesis/Research Project Advisement

Systematic investigation of a research problem. Permission of instructor required.

Pharmacology/PHA**750-3 Biotransformation and Kinetics**

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 890.) Topics covered are the general bases of toxicology and therapeutics; pharmacokinetics, xenobiotic metabolism, and their effects on determination of the dose-response-time relationship. Completion of a course in physiology, biochemistry, or calculus, or permission of instructor required.

751-4 General Toxicology I

Designed as an introduction to general toxicology covering the principles of intoxication and detoxication, classification of poisons, exposure characteristics, biotransformation and biokinetics of poisons, systemic toxicology including CNS, splanchnic organs, cardiovascular, hematopoietic, reproductive, respiratory, and skeletal systems. Graduate standing or permission of instructor required.

752-4 General Toxicology II

Designed as an introduction to general toxicology and given sequentially to PHA 751. Particular toxic agents are studied, including teratogens, mutagens, oncogens, heavy metals, other environmental contaminants and toxins. Clinical, forensic, industrial, and agricultural toxicology are addressed along with regulations that apply to the field. Graduate standing or permission of instructor required. Prerequisite: PHA 751.

879-5 General Pharmacology I

Introduces the student to drug-receptor interactions, dose-response relationships, physicochemical principles of drug action and distribution, pharmacokinetics, and mechanisms of action plus uses of drugs affecting both autonomic and central nervous system functions. Graduate standing and physiology, biochemistry, and anatomy required.

880-4 General Pharmacology II

Extends the principles and theories learned in PHA 879 and applies them to the action of drugs on the respiratory, endocrine, GI, and GU systems. Special attention is given to antibiotics, antineoplasia, immunosuppressants, and toxicology. Graduate standing required. Prerequisite: PHA 879.

Philosophy/PHL**532-4 Studies in Political Philosophy**

Course of variable content dealing with topics in ancient and modern political philosophy. May be repeated.

541-4 Aesthetics

Study of theories concerning the nature of the work of art, aesthetic experience, the arts, and beauty. Permission of instructor required.

549-4 Asian Religious Philosophy

(Listed jointly with Department of Religion; see REL 549.) Perennial themes in Asian cultures, such as individual, society, and cosmos; appearance and reality; time and history; karma, freedom, and responsibility. Treatment of these themes in the philosophical traditions of Asian cultures.

578-4 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 include ethics of abortion, euthanasia, experimental medicine, and behavior control.

581-4 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.

582-4 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 is on Alfred North Whitehead.

583-4 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 pre-suppositions of contemporary secular religious movements in existentialism. The problem of the ultimate from the secular perspective.

599-1 to 4 Studies in Selected Subjects

Course of variable content dealing with problems, approaches, and topics in the field of philosophy. Permission of instructor required.

601-4 Major Philosophers

Introduction to the major writings of the outstanding philosophers. Involves presentation and critical examination of the philosophers' views. May be repeated. Permission of instructor required.

623-3 to 4 Advanced Logic

(Listed jointly with Department of Mathematics and Statistics; see MTH 623.) 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. Course subtitles vary from quarter to quarter. Prerequisite: PHL 123, 323; or one of these together with one mathematics course beyond calculus; or permission of instructor.

624-4 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 permission of instructor.

631-4 Classical and Medieval Political Philosophy

(Listed jointly with Department of Political Science and Urban Affairs; see PLS 601.) Critical examination of political ideas from 500 B.C. to A.D. 1500 with special attention to Plato, Aristotle, Cicero, St. Augustine, St. Thomas Aquinas, Luther, Calvin, and Machiavelli. Permission of instructor required.

632-4 Modern Political Philosophy

(Listed jointly with Department of Political Science and Urban Affairs; see PLS 602.) Critical examination of political ideas from 1600 to 1900, with special attention to Hobbes, Locke, Rousseau, Montesquieu, Hume, Burke, Hegel, Bentham, Marx, and Mill.

642-4 Philosophy of Literature

Examination of philosophical ideas found in literature, philosophical interpretations of literature, and evaluations of theories and aesthetics of literature. Permission of instructor required.

667-4 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 permission of instructor.

681-3 to 4, 682-3 to 4, 683-3 to 4 Independent Reading

Faculty-directed readings in philosophical literature. A written proposal, approved by the department, is required prior to enrollment.

694-4 Existentialism

(Listed jointly with Department of Religion; see REL 694.) Representative writers of the existentialist movement.

695-4 Metaphysics

Investigation of classical and contemporary attempts to develop a theory of the nature of being and reality. Prerequisite: PHL 111 or 112 or permission of instructor.

696-4 Epistemology

Origin, certainty, and extent of human knowledge. Prerequisite: PHL 111 or 112 or permission of instructor.

751-1 to 5, 752-1 to 5, 753-1 to 5 Research in Philosophy

Research designed for specific needs of qualified students. 1 to 5 hours tutorial. Graduate standing and permission of instructor required.

Physics/PHY**500-3 Properties of Semiconductor Materials**

Topics covered are crystal structure and growth; quantum theory and atomic structure; energy bands in solids; charge carriers and thermodynamic equilibrium; generation and recombination of excess charge carriers; diffusion; and junctions. Prerequisite: PHY 242.

501-3 Semiconductor Device Physics

Topics covered are p-n junction diodes; bipolar junction transistors; field effect transistors; integrated circuits; other semiconductor devices; and fabrication of semiconductor devices. Prerequisite: PHY 500 or permission of instructor.

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. 4 hours lab for five weeks, 3 hours lecture. Recommended preparation: PHY 260 or equivalent. Prerequisite: PHY 242.

532-3 Lasers

Introduction to the physics of lasers including emission and absorption processes in lasing, the factors controlling laser gain, the properties of optical resonators, and a survey of salient features for principal types of lasers. Prerequisite: PHY 243 and 260 or CHM 121; or permission of instructor.

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.

610-2 Laboratory Arts and Techniques

Introduction to hand and machine tools in the fabrication of laboratory equipment. Emphasis is on a "hands-on" approach. Practical experiences are given in vacuum and soldering technology involving commonly utilized materials. Instructional lecture is included with the lab. Departmental approval required.

620-3 Thermodynamics*

First and second laws of thermodynamics; general thermodynamic formulas with applications to matter. Prerequisite: PHY 210 and 211, or 242.

621-3 Statistical Thermodynamics*

Kinetic theory of gases. Maxwell-Boltzmann statistics, introduction to quantum statistics. Prerequisite: PHY 620.

630-2 to 4 Electronics

A study of the basic theory and application of tubes and transistors in present day circuitry as found in research instrumentation. 1 to 2 hours lecture, 2 to 4 hours lab, depending on credit hours taken. Prerequisite: PHY 240, 241, 242, or equivalent.

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 232, 233.

660-4 Introduction to Quantum Mechanics

Mathematical structure of quantum mechanics. Applications to selected one- and three-dimensional problems with emphasis on atomic structure. Prerequisite: PHY 260, 372; MTH 333.

661-4 Introduction to Solid State Physics

Selected properties of solids and their quantitative explanation in terms of simple physical models. Applications of quantum mechanics to solids. 3 hours lecture, 2 hours lab. Prerequisite: PHY 316, 460, or 660.

662-4 Introduction to Nuclear Physics and Relativity

Special theory of relativity. Nuclear radiation, nuclear properties, nuclear transformations, and elementary particles and interactions. Prerequisite: PHY 460 or 660.

673-3, 674-3, 675-3 Mathematical Physics

A survey of the field of mathematical physics including vector analysis, analytical mechanics, electromagnetism, and thermodynamics. Departmental approval required.

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. Departmental approval required. Prerequisite: PHY 372, 452; MTH 333.

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. Departmental approval 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. Enrollment limited to physics majors or departmental approval required.

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. Departmental approval required.

710-3, 711-3, 712-3 Quantum Mechanics

An introduction to nonrelativistic quantum mechanics. Schrodinger's equation. Matrix mechanics. Applications to simple atomic and nuclear systems. Departmental approval 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. Departmental approval required.

728-2 to 3 General Relativity

Principles of the general theory of relativity with applications to gravitation and cosmology. Review of special relativity and tensor analysis. The equivalence principle, curvature, and Einstein's field equations. Prerequisite: PHY 260, 372, 452; MTH 333. Corequisite: PHY 681 or permission of instructor.

729-2 to 3 General Relativity

Continuation of PHY 728. Applications of general relativity. Gravitational radiation and gravitational collapse. Prerequisite: PHY 728. Corequisite: PHY 682.

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. Departmental approval 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. Departmental approval required.

770-3 Selected Topics

A course on a selected topic in physics. Departmental approval 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. Departmental approval required.

799-1 to 5 Minor Problems

A course to enable the student to pursue a topic on a tutorial basis. Cannot be used for thesis credit. Departmental approval required.

800-0.5 Seminar

Scheduled discussions of current problems in physics. Centered around regular student presentations. Departmental approval required.

899-1 to 15 Research

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. May be repeated. Departmental approval required.

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

Physiology and Biophysics/P&B**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. Departmental approval required.

701-1 to 5 Selected Topics in Physiology

A selected area is discussed in greater detail than in the basic course (PHS 702, 703). May be offered by visiting or adjunct professor as well as by department faculty. Some topics may have laboratory associated with lectures. Prerequisite: PHS 702, 703, or permission of instructor.

702-6 Basic Human Physiology I

Subjects include homeostasis, cell function, muscle action, nervous system integration, circulation. 4 hours lecture, 2 hours lab, conference. One year each of biology, chemistry, and physics, or departmental approval required.

703-7 Basic Human Physiology II

Subjects include negative feedback regulation; metabolism; gastrointestinal, pulmonary, renal, and endocrine functions; integrative functions. 4 hours lecture, 2 hours lab, conference. Prerequisite: PHS 702 or departmental approval.

720-3 Neurophysiology

Survey of neurophysiology with emphasis on somatic and autonomic control of body function. Prerequisite: PHS 702, 703, or permission of instructor.

732-3 Control Mechanisms of the Cardiovascular System

Autonomic nervous system control of heart and vessels including cranial and spinal control, responses to stress, and pathology of the control system. Prerequisite: PHS 702, 703, or permission of instructor.

733-3 Cardiac Dynamics

The basic principles of cardiac function from the viewpoint of several disciplines. The heart is described as a muscle, as well as a pump, with special reference to physiological, clinical, and mathematical considerations. Prerequisite: PHS 702, 703, or permission of instructor.

741-3 Pulmonary Physiology

Survey of the respiratory, vascular, and biochemical mechanisms involved in transport of O₂ and CO₂ from atmosphere to cells. Nonrespiratory functions of the lung are also discussed. Prerequisite: PHS 702, 703, or permission of instructor.

751-3 Renal Function

In-depth study of the mechanisms of renal function with special emphasis on the regulation of water and electrolyte excretion in mammals. Prerequisite: PHS 702, 703, or permission of instructor.

761-3 Gastrointestinal Physiology

Survey of gastrointestinal physiology emphasizing integrative mechanisms of motility, secretion, and absorption. Prerequisite: PHS 703 or permission of instructor.

771-3 General Endocrinology

Survey of endocrinological mechanisms and their role in integration of body function. Prerequisite: PHS 703 or permission of instructor.

772-2 General Endocrinology Laboratory

Exercises reinforce principles described in PHS 771. Prerequisite or corequisite: PHS 771.

781-3 Physiological Control Mechanisms

Integrative course in physiology emphasizing applications of control theory. Prerequisite: PHS 702, 703, or permission of instructor.

782-2 Physiological Control Mechanisms Laboratory

Exercises reinforce principles described in PHS 781. Prerequisite or corequisite: PHS 781.

783-5 Physiological Aspects of Exercise

Integration of physiological mechanisms involved in exercise. Cellular, neuromuscular, cardiovascular, and respiratory changes are discussed with relationship to exercise performance. 4 hours lecture, 2 hours lab, student recitation. Prerequisite: PHS 702, 703 or equivalent, or permission of instructor.

784-5 Isometric Exercise

A survey of the field of isometric exercise physiology including fiber type, motor unit recruitment patterns, EMG, endurance, cardiovascular responses, and clinical implications of this form of exercise. Permission of instructor required.

800-2 Physiology Seminar

Student organizes and presents material from a selected series of topics to colleagues and faculty. Rotated among registrants once each week. May be repeated once.

899-2 to 18 Graduate Research

Supervised thesis research. Graduate standing and approval of supervisory committee or department required.

Political Science/PLS**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

(Listed jointly with 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. Familiarity with bivariate statistics equivalent to one course required.

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.

539-4 United States Health Policy

Critical review of important political, social, and economic causes and consequences of health policies in the United States.

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.

552-4 Ethnic Politics

Compares ethnic identity and politics in western societies, including the United States, Canada, Great Britain, and France. Topics include minorities and the welfare state, affirmative discrimination, and black politics in the United States.

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.

556-4 Politics and Society in France

Examines the historic interaction of French culture and politics. Topics include the growth of the French nation and state, French society, the nature of modern politics and institutions, and France's role in world affairs.

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.
- 599-1 to 4 Studies in Selected Subjects**
Course of variable content dealing with problems, approaches, and topics in the field of political science.
- 601-4 Classical and Medieval Political Thought**
Critical examination of political ideas from 500 B.C. to A.D. 1500 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. May be repeated once. Prerequisite: PLS 510 or permission of instructor.
- 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. May be repeated once. Permission of instructor required.
- 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. Some background in introductory statistics recommended.
- 629-4 Urban Communications Theory**
(Listed jointly with 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. May be repeated once. Permission of instructor required.
- 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 roles of various socializing agents.
- 643-4 Administrative Law Procedure**
Study of the law controlling the process by which policy is made and administered by public agencies. Topics include policy formulation and budgeting, legislative delegation, administrative agencies, rule-making and adjudication.
- 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.
- 650-4 Political Institutions in Primitive Societies**
(Listed jointly with Department of Sociology and Anthropology; see ATH 650.) 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. Completion of 12 credit hours of anthropology required.

- 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. May be repeated once. Permission of instructor required.
- 691-1 to 4 Independent Research**
Supervised individual research on selected topics. Arranged between student and faculty member directing the study. May be repeated once. Permission of instructor required.
- 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. May be repeated once. Permission of instructor required.
- 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.
- 811-3 History and Systems of Psychology**
Historical and philosophical precursors of the knowledge base in psychology. Early philosophers' and recent thinkers' views of epistemology, existentialism, consciousness, and behavior. Permission of instructor required.
- 812-3 Memory, Cognition, and Individual Differences in Information Processing**
Structure of human cognitive systems. Relationship of individual differences, including cognitive styles and intelligence test performance, to cognitive structure and processing. Applications to clinical and training problems. Permission of instructor required.
- 813-3 Learning and Motivation**
Principles of behavior theory emphasizing human behavior. Topics include Pavlovian principles and emotional states, operant principles, cognitive variables, and the biological constraints on learning. Permission of instructor required.
- 814-3 Advanced Statistics and Experimental Design**
Strengths, limitations, and application of research designs. Statistical theory and principles of descriptive and major parametric and nonparametric inferential procedures. Develops ability to critically review research, demonstration, and evaluation results. Lecture, lab, field work. Permission of instructor required.
- 815-3 Research Design**
Research issues in correlation and prediction. Computerized data processing and introduction to program evaluation, operations and system analysis. Research issues relevant to professional psychology including single subject, nonintrusive research methods. Lecture, lab, field work. Permission of instructor required.
- 816-3 Measurement Theory and Techniques: Program Evaluation**
Emphasis on knowledge of measurement theory, test construction, survey methods, and questionnaire techniques. Study of reliability and validity of measurement devices. Familiarity with APA standards for tests and test usage. Permission of instructor required.
- 830-3 Physiological Psychology**
Physiology of body systems including endocrine, nervous, musculoskeletal, respiratory, cardiovascular, reproductive, and renal systems. Autonomic and endocrine regulation of body systems in homeostasis and during stress. Permission of instructor required.
- 831-6 Neuropsychology**
Neurophysiology emphasizing major CNS structures and tracts, location and function of cranial nerve nuclei and cranial nerve pathways. Organization of CNS vasculature and localization of function. Lecture, lab, field work. Permission of instructor required.

Professional Psychology/PSI

All professional psychology courses can be taken for letter grade or pass/unsatisfactory.

833-3 Psychopharmacology

Interaction of genetic and environmental influences on behavior; inheritance of dominant, recessive, sex-linked characteristics; genetic influence in psychopathology, intellectual function, and personality development; genetic counseling. Permission of instructor required.

850-3 Theories of Personality

Personality and behavior in a clinical setting. Psychodynamic, phenomenological, dispositional, and behavioral theories of personality. Role of cognition, person-situation interaction, extroversion, self-esteem, and achievement motivation in therapy. Permission of instructor required.

851-3 Psychopathology

Covers definition and models of psychopathology including biochemical, genetic, dynamic, and behavioral dimensions; diagnostic systems, differential diagnosis, and treatment selection. Variables affecting individual and group functioning also are covered. Permission of instructor required.

852-3 Human Development: I

Conceptualizations of infancy, early childhood, and adolescence including physical, cognitive, intellectual, social, and interpersonal development. Lecture, lab, field work. Permission of instructor required.

853-3 Human Development: II

Topics span early adulthood to old age including death and dying. Typical stresses and/or life tasks are discussed for each period, tying in biological, sociological, and interpersonal factors. Lecture, lab, field experience. Permission of instructor required.

870-3 Social Psychology

Theories and experimental findings regarding determinants of social behavior including social motivation, attribution theory, perception of people, attitude theories, group processes, interpersonal attraction, and environmental determinants of behavior. Lecture, lab, field work. Permission of instructor required.

871-3 Social Deviancy

Study of juvenile justice system, delinquency, criminal behavior, and antisocial behavior. Discussion of familial social factors that contribute to deviant behavior, and particular reference to children and adolescents. Permission of instructor required.

872-3 Social Systems

Family as an institution: socioeconomic status, rural-urban, ethnic, cultural, religious. Sex and age roles. Socialization practices and patterns of parenting. Lecture, lab, field work. Permission of instructor required.

873-3 Influence of Economic Systems on Behavior

Introduction to basic economic concepts and models. Effects of economic policy on dysfunctional human behavior and family economics as it relates to behavioral problems, along with class and racial differences. Permission of instructor required.

874-3 Psychology of Minorities

Effects of prejudice, social policies, housing-desegregation, and language styles on work and other relationships. Problem areas, strengths of minorities. Managing prejudice within the professional/client relationship. Lecture, lab, field work. Permission of instructor required.

875-3 Conflict Resolution

The affective, cognitive, and behavioral components of conflict. Negotiating conflicts between individuals and within groups, including black/white, male/female, labor/management, and police/community. Management of aggression and hostage management. Lecture, lab, field work. Permission of instructor required.

876-3 Forensic Psychology

Introduction to legal and criminal justice system. Study of criminal and civil law in relation to professional practice. Study of evidentiary procedures. Discussion of adversary procedures. May be taken for letter grade or pass/unsatisfactory. Permission of instructor required.

877-3 Organizational Psychology Processes

Analysis and assessment of systems, management styles, work environments, stress and stress management, and executive assessment. Personnel relations, productivity, and human factors (man/machine interface) are considered. Lecture, lab, field work. Permission of instructor required.

878-3 Forensic Seminar

Fundamental legal concepts and introduction to adversary and court systems; review of statutory and case law related to psychology and relationship of psychology to civil and criminal law. Lecture, lab, field work. Permission of instructor required.

880-3 Chemical Dependency

Incidence and prevalence of use and misuse of substances, with emphasis on addiction syndromes and stages of alcoholism/addiction. Theories of addiction/misuse and underlying personality dynamics and styles. Lecture, lab, field work. Permission of instructor required.

881-3 Health Psychology: I

Techniques of therapy applied to populations whose problems arise from faulty lifestyles and not from serious psychopathology. Topics include stress management, weight control, and health maintenance. Lecture, lab, field work. Permission of instructor required.

882-3 Psychology of Disability

The process and psychological and sociocultural effects of prolonged and continuous disability including symptomatic and role dysfunction. Institutional and "deinstitutional" processes and effects, family, community, and "alternative" services. Lecture, lab, field work. Permission of instructor required.

911-3 Basic Psychotherapeutic Methods: I

Process of client designation, problem identification, and functional analysis. Client expectancy, establishing relationships, developing information base for linking, consultation, and referral. Interviewing styles and types. Lecture, lab, field work. Permission of instructor required.

912-3 Intelligence and Aptitude Assessment

Basic intelligence and aptitude assessment devices and interface with intervention plans. Biological, individual, and social system influences, and minority and social class issues in assessment. Lecture, lab, field work. Permission of instructor required.

913-3 Personality Assessment: I

Study of circumscribed personality theories and nonpathological aspects of personality measurement and predicting behavior; individual differences as related to personality. Knowledge of tests for measurement of personality; their use and limitations. May be taken for letter grade or pass/unsatisfactory. Permission of instructor required.

914-3 Personality Assessment: II

Objective and projective techniques; how and when to administer, score, interpret, and convey results meaningfully. Emphasis is on integrating these results into the clinical situation. Lecture, lab, field work. Permission of instructor required.

916-3 Child Therapy

Behavior disorders of children and adolescents. Behavior therapy, group therapy, family therapy, milieu therapy, and pharmacotherapy as intervention techniques. Problems associated with the treatment of children. Lecture, lab, field work. Permission of instructor required.

930-3 Basic Psychotherapeutic Research

Strategies and problems unique to psychotherapy research. Outcome research in psychotherapy. Relation of outcomes to diagnosis and survey of predictors of success in psychotherapy. Permission of instructor required.

931-3 Basic Psychotherapeutic Methods and Concepts: II

Freud and development of psychoanalysis, neo-Freudian, and ego psychology schools. Structural aspects, techniques, and evaluation of psychoanalysis including stages of development, the unconscious, and psychodynamics. Lecture, lab, field work. Permission of instructor required.

932-3 Crisis Intervention

Theory and definition of crisis. Individual and community support systems and crisis programs in hospitals, suicide and crisis centers, and office, family, and other settings. Lecture, lab, field work. Permission of instructor required.

933-3 Behavioral Interventions

History and assumptions of behavior therapy. Assessment for behavioral intervention techniques of behavior therapy emphasizing cognitive approaches. Intervention in problem areas with high probability outcomes. Lecture, lab, field work. Permission of instructor required.

934-3 Brief Psychotherapy

Study and discussion of problem-focused, time-limited interventions. Study of concepts and techniques; use of programmatic and group methods.

935-3 Family Therapy

Organization and structure of the family and common problem areas. Review of theories of family therapy and treatment strategies of marital and sexual dysfunctions. Lecture, lab, field work. Permission of instructor required.

936-3 Humanistic Intervention

Theory, technique, and research base of client-centered psychotherapy. Theory of assessment procedures and techniques of transactional analysis. Gestalt psychotherapy and selected existential approaches. Lecture, lab, field work. Permission of instructor required.

937-3 Psychophysiological Interventions

Clinical applications of psychophysiology and evaluation of psychophysiological change. Evaluation of biofeedback techniques in the treatment of psychological and psychophysiological disorders. Biofeedback in clinical practice. Lecture, lab, field work. Permission of instructor required.

938-3 Group Psychotherapy

Background, development, and theory of small groups. Effective leadership techniques and procedures for planning, conducting, and evaluating group interaction and progress. Lecture, lab, field work. Permission of instructor required.

939-3 Child Psychopathology

Classification and diagnostic systems related to children. Behavioral problems and related problems in life adjustment, learning, and adaptation to peers. Current theories of etiology and treatment interventions. May be taken for letter grade or pass/unsatisfactory. Permission of instructor required.

941-3 Consultation

Consultation as used for analysis and change in human service settings, business, and industry. Learning principles used to change public, community, group, and individual behavior. Lecture, lab, field work. Permission of instructor required.

954-3 Health Psychology: II

Psychological theory and applications in general health, medical, surgical, and health delivery systems. Psychological interventions in specific health problems and in dealing with terminal illness and death. Lecture, lab, field work. Permission of instructor required.

955-3 Stereotype and Prejudice: Geriatric Psychology

Psychological and social derivation of stereotypes and prejudice and their maintenance. Techniques for assessing and modifying stereotypes and prejudice including self-awareness, group, educational, and environmental approaches. Lecture, lab, field work. Permission of instructor required.

956-3 Group Interventions

Intensive treatment of subject materials or techniques designed to provide the student with increased breadth of experience or specialization in specific interventions, assessments, concepts, or approaches. Permission of instructor required.

968-3 Special Interventions

Study and discussion of unique programs for focalized psychological problems, e.g., phobias, treatment of psychopaths, multiple personalities, and other specialized intervention techniques not covered in previous intervention courses. Variable titles. Permission of instructor required.

970-3 Individualized Service Planning and Quality Assurance

Practicum in developing, monitoring, and reviewing individualized service-by-objective plans and programmatic service plans. Peer review, criteria development, and other quality assurance methods are applied. Lecture, lab, field work. Permission of instructor required.

971-3 Community Psychology

Study of influence of community upon behavior, status of mental health centers, and history of these developments. Study of integration of psychology and psychological services into community. Discussion of community-based groups, Alcoholics Anonymous, and Gamblers Anonymous. Permission of instructor required.

972-3 Service Systems: Planning, Management, and Evaluation

Problem identification, analysis, intervention management, planning, and evaluation related to systems of service, organization, and support. Quality assurance, operations theory, and evaluation applied to service delivery. Lecture, lab, field work. Permission of instructor required.

973-3 Professional Practice Seminar

Study of the establishment and maintenance of independent or small group practice. Discussion of issues related to practice management. Permission of instructor required.

980-3 Professional Development

Issues relevant to students' development as professional psychologists including professional involvement, legal and legislative issues, professional ethics and standards, and relation with other professional groups. Permission of instructor required.

995-1 to 5 Directed Readings

Individualized course of readings completed under faculty supervision. Content area and specific readings must be approved by faculty supervisor. Permission of instructor required.

996-1 to 5 Directed Research

Research or evaluation performed under faculty supervision. Research topic and methods must be approved by faculty supervisor. Permission of instructor required.

997-6 Supervised Experience

Faculty-supervised clerkship, field placement, or other isolated circumscribed professional experience. Permission of instructor required.

998-3 Directed Projects

Project of excellence or other professional project carried out with faculty approval and supervision. Permission of instructor required.

999-12 Internship**Psychology/PSY****503-4 Psychology of Health Behavior**

Survey of the contributions of psychology of health care. The focus is both theoretical and practical, emphasizing the integration of physiological and psychological knowledge. Prerequisite: PSY 111, 112.

504-4 Industrial and Organizational Psychology

Scientific psychological principles, procedures and methods applied to human behavior in organizations. Graduate standing required. Prerequisite: PSY 111, 112.

506-4 Engineering Psychology

(Listed jointly with Department of Engineering; see EGR 506.) Introduction to the study of human factors in the design and operation of machine systems. Prerequisite: PSY 111, 112.

507-4 Tests and Measurements

An introduction to the construction and use of attitude scales, aptitude and ability tests in organizational settings with special emphasis on the utilization of standard tests. Prerequisite: PSY 111, 112; MTH 127.

508-4 Environmental Psychology

Effects on behavior of environmental factors such as crowding, noise, pollution, temperature, lighting, and architecture. Also covers applications of psychological knowledge and techniques in dealing with current environmental problems. Prerequisite: PSY 111, 112.

509-4 Behavior Modification: Method and Theory

Basic survey of principles of conditioning as related to problems in human adjustment. General principles of the psychology of learning emphasized but are illustrated with cases of interest to a wide variety of helping professionals; e.g., psychologists, educators, social workers, nurses and speech therapists. Graduate standing required. Prerequisite: PSY 111, 112.

510-4 Psychology of Women and Men

The current state of research evidence about sex differences in all aspects of human behavior as well as patterns of public attitudes about the natures and proper roles of men and women are examined. Prerequisite: PSY 111, 112.

511-4 Abnormal Psychology

An overview of the facts and theories pertaining to abnormal behavior. Topics include classification and diagnosis, causes, and treatment of abnormal behavior. Not open to psychology majors. Prerequisite: PSY 111, 112. (Previously listed as PSY 505.)

521-4 Cognition and Learning

A survey of cognitive processes with emphasis on learning and memory systems. Topics include short-term memory, retrieval mechanisms, conceptual structures and skills tests (IQ), mnemonic techniques, and amnesias. Graduate standing required. Prerequisite: PSY 111, 112.

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.

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.

592-4 Advanced Physiological Psychology

Survey of physiological mechanisms of behavior with emphasis on motor and sensory systems. Permission of instructor required. Prerequisite: PSY 591.

600-4 Advanced Research Design and Quantitative Analysis

Use of factorial designs and multivariate tests in psychological research. Graduate standing required. Prerequisite: PSY 300 or equivalent. (Previously listed as PSY 615.)

601-4 Advanced Experimental Design: Packaged Computer Programs

Focuses on the use of canned computer programs such as SPSS, SAS, and BIOMED in the design, analysis, and interpretation of behaviorally oriented research. Graduate standing required. Prerequisite: PSY 300, 400, or equivalent. (Previously listed as PSY 616.)

621-4 Advanced Topics in Cognition and Learning

Detailed examination of selected areas in cognition and learning. Graduate standing required. Prerequisite: PSY 321 or equivalent.

629-4 Interpersonal Relations Skills

Surveys the scientific literature on conformity, obedience, interpersonal choice, and verbal and nonverbal communication; relates this information to enhancement of everyday communication and interaction; and introduces techniques for developing basic interpersonal skills. Prerequisite: PSY 331 or 351, or equivalent.

631-4 Advanced Theory and Research in Personality

A review of selected topics in personality. Focuses on selected personality constructs and their measurement (i.e., need for achievement, self-concept) as well as situational determinants of behavior. Graduate standing required. Prerequisite: PSY 300, 331, or equivalent.

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. Permission of instructor required.

635-4 Abnormal Psychology

Causes, symptoms, influence, and prevention of abnormal behavior and their relation to normal behavior. Field trips to appropriate local institutions. 4 credit hours of advanced psychology required.

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 311 or 361 or 411 or permission of instructor.

637-4 Behavior Modification

Applications of psychological principles to a wide variety of behaviors. Prerequisite: PSY 331 or 411/635 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, 411, or advanced standing and permission of instructor.

641-4 Advanced Developmental Psychology

Development of learning and cognition in children is covered in depth. Graduate standing required. Prerequisite: PSY 311, 341, or permission of instructor.

643-4 Psychometrics

A survey of the basic principles, problems, and techniques of psychological testing with special emphasis on test construction, interpretation, and usage. Permission of instructor required.

644-4 Advanced Industrial Psychology

Theories and research findings in selected topics in industrial psychology. Permission of instructor required.

647-4 Psychology of Aging

Overview of the theoretical, methodological, and conceptual issues in the study of human aging. Focus is on both current research and applied relevance. Prerequisite: PSY 341 or permission of instructor.

650-4 Biofeedback: Research and Application

An introduction to biofeedback in the context of general behavior theory of learning. Literature is surveyed. Topics include problems of methodology and experimental design, and application to problems in clinical psychology. Recommended preparation: PSY 391. Prerequisite: PSY 361 or permission of instructor.

651-4 Advanced Topics in Experimental Social Psychology

Detailed examination of selected areas of current research in social psychology. Graduate standing required. Prerequisite: PSY 300, 351, or permission of instructor.

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. Permission of instructor required.

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. Permission of instructor required.

661-4 Advanced Topics in Learning and Motivation

Continued study of conditioning, learning, and motivation. Graduate standing required. Prerequisite: PSY 300, 361, or permission of instructor.

665-4 Information Processing

A survey of experimental findings in animal and human memory with emphasis on their implications for current theories of memory. Permission of instructor required.

671-4 Advanced Topics in Perception

Special emphasis on modern controversial issues and theories. Graduate standing required. Prerequisite: PSY 300, 371, or permission of instructor.

675-4 Signal Detection Theory

Presents signal detection theory in the context of Thurstonian scaling and statistical decision theory. Studies the application of signal detection theory in various areas of psychology including psychophysics, memory, physiology, and psycholinguistics. Prerequisite: PSY 300 or permission of instructor.

678-4 Animal Behavior

(Listed jointly with Department of Biological Sciences; see BIO 678.) The physiology, phylogeny, and ontogeny of behavior. Field trips are planned. Completion of a course in statistics and BIO 302 recommended. Permission of instructor required. Prerequisite: PSY 111, 112, 300; or BIO 111, 112, 114; or BIO 101, 102, 103.

681-4 History of Psychology

Major trends in the development of psychology from its beginning to the present. Permission of instructor required.

682-4 Theories and Systems in Psychology

Comprehensive treatment of the historical antecedents for selected theories and systems in psychology. Permission of instructor required.

- 688-1 to 4 Seminar in Special Topics**
Variable content. Specific topics announced in quarterly class schedule when course is offered. Permission of instructor required.
- 690-1 to 4 Independent Readings—Selected Topics in Psychology**
Specific topics are selected by student and instructor. Topics vary from quarter to quarter. Graded pass/unsatisfactory. Permission of instructor required.
- 691-4 Advanced Topics in Physiological Psychology**
Detailed examination of selected areas in cognition and learning. Permission of instructor required. Prerequisite: PSY 391.
- 698-1 to 4 Independent Research**
Original problems for investigation. Permission of instructor required.
- 717-3 Molecular Biology of Learning and Behavior**
Modern molecular biological investigations of the process of learning and memory. Implications for the development of a molecular theory of memory processes are considered. Permission of instructor required. Completion of courses in molecular biology, biochemistry, or cell biology recommended.
- 721-4 Engineering Psychology**
The application of psychology to equipment design and man-machine relationships. Permission of instructor required.
- 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. Permission of instructor required.
- 726-4 Attitude Structure and Change**
Study of attitude as a social psychological concept, including problems of measurement, empirical findings, and theoretical models. Permission of instructor required.
- 727-4 Small Groups**
Current theory and research in selected areas of small groups, including communications, group norms and conformity, group structure, leadership. Permission of instructor required.
- 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. Permission of instructor required.
- 731-4 Theories of Personality**
Contemporary theories of the development, organization, and dynamics of personality. Permission of instructor required.
- 733-4 Community Psychology**
Seminar on policy formulation and programming for community-oriented approaches to mental health problems. Covers history, policy, and program development difficulties; social problem versus illness models of psychopathology and treatment, and preventive interventions. Permission of instructor required.
- 735-4 Systems Analysis and Organizational Change**
Designed to give the student an overview of the systems approach to organizational diagnosis, planning, and intervention in human service organizations. Behavioral interventions are emphasized. Prerequisite: ABS 703, 721, 722, or permission of instructor.
- 751-4 Proseminar in Human Factors Psychology I**
An in-depth review of major areas of human factors research. The areas reviewed in this course complement those areas reviewed in PSY 752. Prerequisite: PSY 721 or equivalent or permission of instructor.
- 752-4 Proseminar in Human Factors Psychology II**
An in-depth review of major areas of human factors research. The areas reviewed in this course complement those areas reviewed in PSY 751. Prerequisite: PSY 721 or equivalent or permission of instructor.
- 759-0 to 1 Seminar in Human Factors**
Weekly discussions of topics in human factors. For students in human performance program of applied behavioral sciences. Departmental permission required.
- 761-4 Human Learning Psychology**
Phenomena, principles, and problems of learning and retention. Permission of instructor required.
- 762-4 Advanced Learning**
A survey of experimental findings in animal and human learning with emphasis on their implications for current theories in learning. Permission of instructor required.
- 763-4 Advanced Motivation**
A survey of experimental findings in animal and human motivation with emphasis on their implications for current theories of motivation. Permission of instructor required.
- 766-1 Human Information Processing Laboratory**
Laboratory experiments in human information processing illustrating basic cognitive phenomena. Practical experience in measurement techniques and experimental design. Permission of instructor required. Corequisite: PSY 665.
- 771-4 Perception**
Selected problems in perception with emphasis on theoretical interpretations. Permission of instructor required.

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. Permission of instructor required.

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. Permission of instructor required.

776-3 to 4 Visual Science

Study of visual systems including psychophysical measurement, temporal and spatial properties, display criteria, colorimetry, and visual system modeling. Permission of instructor required.

777-1 Visual Science Laboratory

Laboratory experiments in visual psychophysics and perception illustrating phenomena studies in PSY 776. Practical experience in measurement techniques. Permission of instructor required. Corequisite: PSY 776.

785-4 Intermediate Statistics

Statistical methods and interpretations encountered in experimental studies and presentations of behavioral data. Permission of instructor required.

873-4 Vestibular Function

Role of vestibular organs in space orientation. Stimulus parameters, anatomy, neurophysiology, psychophysics, perception, performance, and motor responses are examined with special reference to aerospace vehicles. Permission of instructor required.

875-4 Psychoacoustics

Advanced examination of auditory psychophysics and perceptual processes involving consideration of peripheral and central auditory physiology whenever possible. Permission of instructor required.

968-4 Manual Control and Psychomotor Skills

Description of human control processes and their models. Analyses of human skills and skill typology. Permission of instructor required. Prerequisite: PSY 665 or equivalent.

991-4 Psychobiology of Stress

The effects of psychological stress on neuroendocrine and other physiological systems are explored. The implications of these relationships for disease processes and human performance are discussed. Permission of instructor required.

**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. Designed to strengthen the mathematics background of students who have had little or no formal training in linear algebra and calculus. 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 a limited background in statistics. Prerequisite: QBA 620 or equivalent.

652-3 Systems Simulation in Business and Economics

Introduction to simulation techniques as applied to business and economic systems. Topics include basic concepts, applications, design, and operation of computer models. Prerequisite: CS 142 or equivalent.

723-3 Quantitative Methods for Business Decisions I

A study of statistical techniques including regression, correlation, hypothesis testing, and analysis of variance. Prerequisite: QBA 620 and 621 or equivalent.

724-3 Quantitative Methods for Business Decisions II

Various topics related to the mathematical analysis of business decisions including mathematical programming, waiting line analysis, and simulation. Prerequisite: QBA 620, 621.

725-3 Business and Social Science Research Methods

A study of statistical analysis procedures including bivariate, multiple, and curvilinear regression and correlation; the concepts and applications of two-group and multiple discriminant analysis; and an introduction to principal component analysis. The course is application oriented and includes the use of computer packages. Prerequisite: QBA 723.

726-3 Applications of Management Science

Integer programming, dynamic programming, and nonlinear optimization topics are covered. Multilocation inventory models including material requirements planning (MRP) techniques, METRIC, MOD-METRIC, and related models are discussed. Graduate standing required. Prerequisite: QBA 723, 724; MGT 751.

729-3 Random Sampling Techniques and Multifactor ANOVA for Modern Business

Stratified and cluster sampling procedures as used in marketing, economics, and management. Single and multifactor analyses of variance applicable to audits, manufacturing data, and administrative/economic/management decisions. Prerequisite: QBA 723.

753-3 Selected Topics in Quantitative Analysis

Seminar in special topic areas of quantitative analysis. Subject matter will vary each time course is offered. Students should check with instructor to determine subject before registering. Permission of instructor required.

764-3 Seminar in Logistics Design

Examines the major engineering and management techniques involved in the design, fielding, operation, and phaseout of equipment systems. The impact of maintainability, availability, and reliability on system costs is also covered. Graduate standing required. Prerequisite: QBA 726.

780-6 Quantitative Business Analysis Internship

One-quarter internship in a selected private or governmental organization under the direction of faculty adviser and employment supervisor. Details to be arranged by the department or college office. Enrollment in the M.B.A. program, completion of at least seven out of ten core courses, and departmental approval required.

781-1 to 3 Special Studies in Quantitative Business Analysis

Intensive reading or research in a selected field of advanced quantitative business analysis. Topics vary from quarter to quarter. Permission of instructor required.

Rehabilitation/RHB**670-1 to 3 Workshop in Rehabilitation**

Special workshop courses to meet the needs of in-service rehabilitation professionals as well as providing courses on a one-time basis to meet special interest needs. Graduate standing required.

701-1 to 5 Counseling Theory and Practice

Surveys the major theories of counseling and provides opportunities to develop the basic skills associated with the counseling process. Also addresses the key philosophical and ethical issues associated with the counseling profession.

702-1 to 5 Medical Assessment

Study of severe and multihandicapping physical impairments including systems involved, causal relationships, and related problems. Specific titles to be announced.

703-1 to 5 Applied Research in Rehabilitation

Introduction to current rehabilitation research and rehabilitation program evaluation models.

704-1 to 5 Psychological Adjustment: Severe Disability

A study of psychological adjustment problems in severe disability. The interaction effect of severe disability on personality development, emotional adjustment, family structure, and self-image is examined. Prerequisite: RHB 701, 702, 703.

705-1 to 5 Behavioral Assessment

Surveys psychological tests and measurements with particular emphasis on attitude, interest, vocational, and personality tests. Understanding of basic principles and their application to counseling in various settings are stressed. Recommended preparation: ED 751. Prerequisite: RHB 701.

706-1 to 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.

711-1 to 5 Introduction to Vocational Evaluation

An overview of the history, philosophy, theoretical basis, goals, function, and scope of vocational evaluation. Theories and principles concerning work and career development are also explored. Forty hours of field experience required. Prerequisite: RHB 701, 702, 703.

721-4 Prognostic Aspects of Vocational Evaluation

Study of processes, principles, and techniques used to determine and predict work behavior and vocational potential. Consideration is given to adapting assessment tools and systems to clients' needs. Prerequisite: RHB 303, 701, 702, 703, 711.

730-1 to 4 Epidemiology of Chemical Dependency

Addresses the sociocultural influences associated with chemical dependency. Examines models of drug and alcohol use and the personal evolution of chemical dependency, and the ethical and legal ramifications germane to work in the drug abuse field. Graduate standing required. Prerequisite: RHB 701, 705; CNL 663, 863 or permission of instructor.

731-1 to 4 Treatment Approaches in Chemical Dependency

The theory and practice of a variety of treatment modalities, including in-patient and out-patient approaches, family interventions, and group techniques. Emphasizes systems approaches and holistic intervention strategies. Also covers self-help groups such as Alcoholics Anonymous and Al-Anon. Graduate standing required. Prerequisite: RHB 730 or permission of instructor.

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.

774-3 Selected Problems

Examines techniques of rehabilitation applied to selected disability groups such as mental retardation, drug abuse, emotional disturbances, alcoholism, and cultural and social deprivation.

775-1 to 4 Graduate Seminar

Includes the study of community-related rehabilitation program efforts in terms of individualized systems analysis.

801-1 to 10 Internship I

Student spends approximately twenty to thirty hours per week in a selected rehabilitation setting performing assigned entry-level work consistent with the integration of skills, attitudes, and knowledge of rehabilitation counseling. Specific titles to be announced. Permission of instructor required. Prerequisite: RHB 704, 705, 706.

802-1 to 10 Internship II

A culminating integrative experience for graduate rehabilitation counseling students. Student spends from twenty to thirty hours per week in a rehabilitation setting providing professional-level rehabilitation counseling and services to severely disabled clients. Specific titles to be announced. Permission of instructor required. Prerequisite: RHB 704, 705, 706.

811-5 Use and Interpretation of Vocational Evaluation Data

Interpretation of evaluation data to client, rehabilitation personnel, and facility staff. Attention is given to vocational counseling, staff conferences, report writing, and follow-up. Prerequisite: RHB 701, 702, 703, 704, 711, 721.

873-15 Internship—Vocational Evaluation

Supervised practical experience in a vocational evaluation unit. The student concurrently spends two hours per week in an Organization and Management of VE Units seminar. Prerequisite: RHB 701, 702, 703, 704, 711, 721, 811.

Religion/REL**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 contemporary perspectives. Open to juniors and seniors in all colleges.

501-4 Religion and Sexuality

Analysis of the relation of religion to sexuality and related ethical issues.

503-4 Space and Faith: Topics in Religion and Geography

(Taught jointly 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 with different subtitles.

504-4 Religions in the Biblical Period

Examination of selected religious movements and/or problems in the biblical period and their interconnectedness and mutual influences. May be repeated with different subtitles. Graduate standing required.

505-4 Topics in Biblical Literature

Examination of selected aspects of biblical literature from both literary and historical perspectives to explore the possible structures, functions, and meanings of this literature for its original community. May be repeated with different subtitles.

506-4 The Marxist-Christian Dialogue

(Taught jointly with Department of Political Science and Urban Affairs; 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. Permission of instructor required.

509-4 Christianity

An examination of the structures of religious experience which have shaped the development of Christianity in history. Institutional and ritual forms are investigated as systems of meaning against the backdrop of the general history of religions.

510-4 Early and Medieval Western Religious Thought

Survey of important themes in the religious thought of the major Western traditions. Selected readings from primary sources and secondary interpretations.

511-4 Reformation and Modern Western Religious Thought

Survey of important themes in the religious thought of the major Western traditions. Selected readings from primary sources and secondary interpretations.

516-4 Judaism: Faith and People

Judaism as a religious culture of a particular people is examined critically, historically, and phenomenologically.

518-4 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.

520-4 Religion and Ethics in the Arts

Analysis of the religious and ethical dimensions, themes, and problems presented in selected contemporary art forms, e.g., architecture, cinema, drama, literature, music, painting, and sculpture. May be repeated with different titles.

525-4 Understanding Death

Basic issues in death and dying, using resources from human sciences and humanities in a religious perspective.

530-4 Topics in American Religion

Examination of selected topics in American religion to investigate basic religious structures and to explore the relationship of religious phenomena to their cultural context. May be repeated with different subtitles.

540-4 Topics in Asian Religion

Studies in the religious dimension of Asian cultures, with attention to historical, social, and aesthetic perspectives. May be repeated with different subtitles.

549-4 Asian Religious Philosophy

(Listed jointly with Department of Philosophy; see PHL 549.) Perennial themes in Asian cultures, such as individual, society, and cosmos; appearance and reality; time and history; karma, freedom, and responsibility. Treatment of these themes in the philosophical traditions of Asian cultures.

560-4 Anthropology of Religion

(Listed jointly with Department of Sociology and 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.

561-4 Sociology of Religion

(Listed jointly with Department of Sociology and Anthropology; 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. Permission of instructor required.

563-4 Religion and Psychology

An introduction to selected themes, issues, and problems in the interaction of religion and psychology. Differing points of view are considered. May be repeated with different titles.

570-5 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 each time course is offered.

578-4 Ethics and Medicine

(Taught jointly with 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 include ethics of abortion, euthanasia, experimental medicine, and behavior control.

581-4 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.

582-4 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 is on Alfred North Whitehead.

583-4 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.

600-4 Seminar in Religion

Topics chosen by the department. Permission of instructor required. May be repeated.

610-4 Religious Themes in Literature

(Taught jointly with 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.

617-4 Evolution

(Taught jointly with Department of Biological Sciences; see BIO 617.) Introduction to the biological, philosophical, theological, and ethical aspects of evolution. Permission of instructor required.

619-3 Ethics in an Industrial Society: the Responsibility of Business in Society

(Taught jointly with 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.

629-4 Foundations for Religion Studies

Introduction to various methods utilized in religion studies and an application of these methods to concrete data.

630-3 Teaching About Religion in the Public Schools

(Taught jointly with the College of Education and Human Services; 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.

631-4 Religion in American Life

Development of religious thought and institutional life in the United States viewed in relation to American social change. Offered alternate years.

641-4 Islam

Study of the origin and development of Islam, including contemporary issues and problems. Offered on an irregular schedule.

654-4 Age of Renaissance and Reformation

Decline of European feudalism and rise of the nation-state; revival of culture and arts; decline of Universal Church and growth of religious diversity. 1550-1648. Offered alternate years.

670-1 to 6 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. Course subtitles vary from quarter to quarter. May be repeated subject to maximum limits established by student's department. Permission of instructor required.

694-3 to 4 Existentialism

(Listed jointly with 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. A minimum of 30 credit hours of advanced work in religion or approved related courses is required (related courses must be approved by the department chair).

Social Work/SW**520-1 to 6 Workshops in Current Problems**

(Listed jointly with Department of Sociology and Anthropology; see SOC 512.) Intensive study of a particular problem area, utilizing professionally qualified personnel from academia and the practice community. Specific subtitles to be added with individual workshops. May be repeated to a maximum of 12 credit hours.

570-4 Community Welfare Agencies and Services

Analysis of community social service agencies and generic social work interaction skills necessary to meet social welfare needs. 3 hours lecture, 1 hour field experience. Graduate standing and permission of instructor required.

580-4 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 permission of instructor required.

581-4 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 are studied and simulated. Graduate standing and permission 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. May be taken for letter grade or pass/unsatisfactory.

662-4 Social Gerontology

(Listed jointly with Department of Sociology and Anthropology; see SOC 662.) The study of social aspects of aging; the needs of the population and society's response to those needs.

663-4 Social Gerontology II

(Listed jointly with Department of Sociology and Anthropology; 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 equivalent experience.

664-4 Racial and Ethnic Awareness in the Human Services

Impact of racism and ethnicity on the delivery of human services. Examination of interpersonal relationships and institutional policies and procedures with an opportunity to develop strategies for change at both levels. Prerequisite: SW 270, 380, or equivalent.

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 announced in quarterly class schedule. Permission of instructor required.

681-4 *Interventive Methods with Individuals and Families*

In-depth study of social work practice theory for the enhancement of social functioning of individuals, especially within the family context. Graduate standing and permission of instructor required.

682-4 *Interventive Methods with Groups and Families*

In-depth study of social group work practice theory, including conjoint family intervention. Course learning experiences will incorporate practice simulations. 3 hours lecture, 1 hour field experience. Graduate standing and permission of instructor required.

683-4 *Advanced Practice: Families*

In-depth study of social work practice theory for the enhancement of family social functioning. Graduate standing and permission of instructor required.

684-4 *Interventive Methods with Organizations and Larger Systems*

Concepts and strategies for social welfare resource mobilization and utilization in communities, and for effecting change in existing organizations, and service delivery systems. Graduate or eligible senior standing required. Prerequisite: SW 570 or permission of instructor.

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 for relevance to social work practice. 3 hours lecture, 1 hour recitation. Graduate standing and permission 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 for relevance to social work practice. 3 hours lecture, 1 hour recitation. Graduate standing and permission of instructor required.

694-2 to 4 *Directed Studies in Social Work*

May be taken for letter grade or pass/unsatisfactory. Graduate standing and permission of instructor required.

777-1 to 4 *Special Problems in Social Welfare Policy and Services*

Seminar on selected topics related to the operation of the American social welfare system: issues, trends, and services. Variable content. Specific topics announced in quarterly class schedule. Permission of instructor required.

Sociology/SOC**510-4 *Sex and Gender Roles***

Explores cross-cultural sociological knowledge and theories concerning origin/nature of sex roles; stratification of sexes in various societies; sex roles in institutions of family, education, religion, politics, economics, health; other topics such as socialization and media. Graduate standing required.

512-1 to 6 *Workshop in Current Problems*

Intensive study of a particular problem area, utilizing professionally qualified personnel from the academic and community environments. Specific subtitles to be added with individual workshops. May be taken for letter grade or pass/unsatisfactory. May be repeated to a maximum of 12 credit hours. Permission of instructor required.

514-1 to 6, 516-1 to 6 *Workshop in Current Problems*

Intensive study of a particular problem area, utilizing professionally qualified personnel from the academic and community environments. Specific subtitles to be added with individual workshops. May be repeated to a maximum of 12 credit hours with different titles.

520-4 *Sociology of Deviant Behavior*

Extensive exploration of the various sociological approaches to the study of deviance and social disorganization with an emphasis on contemporary sociological theory and research. Graduate standing or permission of instructor required.

532-4 *Juvenile Delinquency*

Problems of definition and treatment of delinquency; preparation for further study and work with delinquents. Permission of instructor required.

540-4 *Social Organization*

Theories and analysis of social organization from micro- to macro-levels with emphasis on theories of equilibrium and disequilibrium. Graduate standing or permission of instructor required.

541-4 *Social Stratification*

Structures, theories, and consequences of social inequality with special emphasis on the United States. Graduate standing or permission of instructor required.

- 550-4 *Sociology of Occupations and Professions***
Investigation, analysis, and discussion of contemporary theories focusing on the relationship of the individual to his or her work. Graduate standing or permission of instructor required.
- 560-4 *Sociology of the Family***
Sociological analysis of development of the family, its relationship to society, and its contribution to personality. Graduate standing or permission of instructor required.
- 561-4 *Religion and Society***
(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 on religion. Graduate standing or permission of instructor required.
- 563-4 *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 or permission of instructor required.
- 596-2 *Careers for Sociology Majors***
(Listed jointly with Department of Sociology and Anthropology; see ATH 596.) A combination workshop and field study in which graduate students learn how to prepare a resume, how to find out about career possibilities, and how to meet people who are active practitioners.
- 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 to a maximum of 12 credit hours with different topics. Graduate standing or permission of instructor required.
- 601-4 *Selected Topics in Theory/Methods***
Specific topics are announced when course is offered. May be repeated to a maximum of 12 credit hours with different topics. Graduate standing or permission of instructor required.
- 632-4 *Penology***
Historical development and critical assessment of penal institutions. Field visits to selected institutions. Prerequisite: SOC 330 or 332 or permission of instructor.
- 633-4 *Internship in Corrections***
Supervised field experience in corrections (probation, parole, jail, etc.). Course requires readings, a log, progress reports, and a paper synthesizing readings and field experience. Enrollment required for two consecutive quarters. 8 credit hours from SOC 330, 332, or 432, and permission of instructor required.
- 634-4 *Social Life in Extreme Conditions***
Examines the concept of social organization via the forms social interaction takes in extreme conditions such as mental hospitals, concentration camps, prisons, and skid rows. Graduate standing or permission of instructor required.
- 639-4 *Selected Topics in Problems/Deviance***
Variable content. Specific topics announced when course is offered. May be repeated to a maximum of 12 credit hours with different topics. Graduate standing or permission of instructor required.
- 641-4 *Industrial Sociology***
Cross-cultural analysis of industrialization; organization of relationships within industrial social groups. Graduate standing or permission of instructor required.
- 642-4 *Race and Minority Relationships***
A study of intergroup, racial, and ethnic group relations, including the processes and consequences of conflict, prejudice, and discrimination. Graduate standing or permission of instructor required.
- 644-4 *Urban Sociology***
An approach to understanding the causes and consequences of urbanization and the varieties of urban life. Graduate standing or permission of instructor required.
- 646-4 *Neighborhoods and Communities***
Examination of various types of American communities and major theories concerning them. Graduate standing or permission of instructor required.
- 661-4 *Medical Sociology***
The social dimension of health and illness. Consideration of the patterns of disease, along with the organization, provision, and delivery of health care services. Graduate standing or permission of instructor required.
- 662-4 *Social Gerontology***
(Listed jointly with 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.
- 663-4 *Social Gerontology II***
(Listed jointly with 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 permission of instructor.
- 670-4 *The Future of the Family***
Investigation, analysis, and discussion of contemporary research focusing on the family as a changing social institution. Graduate standing or permission of instructor required.

679-4 Selected Topics in Social Institutions

Variable content. Specific topic announced when course is offered. May be repeated to a maximum of 12 credit hours with different topics. Graduate standing or permission of instructor required.

681-4 Sociology of Small Groups

Study of face-to-face interaction with emphasis on both intergroup and intragroup structure and processes. Graduate standing or permission of instructor required.

689-4 Selected Topics in Microsociology

Variable content. Specific topics announced when course is offered. May be repeated to a maximum of 12 credit hours with different topics. Graduate standing or permission of instructor required.

690-2 to 4 Directed Studies in Sociology

May be taken for letter grade or pass/unsatisfactory. Graduate standing and permission of instructor required.

701-2 to 4 Selected Topics in Sociology

Variable content. Specific topic announced when course is offered. May be repeated to a maximum of 12 credit hours with different topics. May be taken for letter grade or pass/unsatisfactory. Graduate standing or permission of instructor required.

720-4 Seminar in Social Deviance

(Listed jointly with Applied Behavioral Science program; see ABS 761.) Study of contemporary theories of deviant behavior from both an institutional and social psychological perspective, with special emphasis on the relationship between social change and social disorganization. Prerequisite: SOC 320 or 520 or permission of instructor.

Spanish/SPN**602-4 The Spanish Novel of the Nineteenth Century**

Nineteenth-century prose works by Galdós and others. Graduate standing and permission of instructor required.

603-4 Advanced Studies: Language/Civilization

Variable content. Topic chosen by instructor. Conducted in Spanish. Graduate standing and permission of instructor required.

611-4 Golden Age Drama

Intensive readings of dramas by playwrights of the sixteenth and seventeenth centuries. Graduate standing and permission of instructor required.

612-4 Modern Drama

Intensive readings of dramas by playwrights of the nineteenth and twentieth centuries. Graduate standing and permission of instructor required.

621-4 Cervantes

Intensive study of the works of Cervantes, including *Don Quixote*, *novelas ejemplares*, *entremeses*, and longer dramatic works. Lectures, discussions, and oral reports on Cervantes and his time. Graduate standing and permission of instructor required.

631-4 Seminar in Spanish Literature

Intensive study of selected topics in peninsular literature. Background lectures, oral reports, and discussions. Course subtitles vary from quarter to quarter. Graduate standing and permission of instructor required.

632-4 Seminar in Spanish-American Literature

Readings and reports in the novel, poetry, and drama of selected Spanish-American authors. Representative works of Borges, García, Márquez, Rulfo, Paz, Vargas Llosa, Sánchez, and others. Graduate standing, language competence, and permission of instructor required.

641-4 Contemporary Spanish Literature

Readings in the novel, poetry, and drama of major Spanish writers in the post-Civil War period. Graduate standing and permission of instructor required.

642-4 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 permission of instructor required.

650-1 to 4 Independent Graduate Research

Course subtitles vary from quarter to quarter. Language competence, graduate standing, and permission of instructor required.

662-4 The Generation of 1898

Novels, poetry, and theatre of Unamuno, Baroja, and others. Graduate standing and permission of instructor required.

681-4, 682-4 Independent Readings for Graduate Students

Course subtitles vary from quarter to quarter. Language competence, graduate standing, and permission of instructor required.

Statistics/STT**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. Must be taken in sequence. Prerequisite: for 560, two calculus courses.

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 are selected from unequal probability, stratified, cluster, replacement, double, and simple random sampling. Prerequisite: two statistics courses.

586-1 to 5 Independent Reading in Statistics and Probability

Permission of instructor required.

596-1 to 5 Topics in Statistics and Probability

Course subtitles vary from quarter to quarter. Permission of instructor required.

601-4 Nonparametric Methods

Distribution-free estimation and hypothesis testing procedures. Includes methods for use in one- and two-sample location and dispersion problems, nonparametric alternatives to ANOVA and regression, goodness-of-fit tests, measures of association, and tests for randomness. Prerequisite: STT 666 or equivalent.

624-4 Statistical Control Methods for Quality and Productivity I

Control charts including adaptations, acceptance sampling for attributes and variables data, acceptance plans, sequential analysis, statistics and probability distributions, and applications. Prerequisite: STT 360 or 363 or permission of instructor.

626-4 Reliability and Life Data

Presentation of important models and methods, and analysis of lifetime and survival data. Prerequisite: STT 361 or equivalent.

661-4 Theory of Statistics I

Probability models, density and distribution functions, expectation, marginal and conditional distributions, stochastic independence, moment generating function, central limit theorem, decision theory, and estimation of parameters. Prerequisite: MTH 232 or permission of instructor.

662-4 Theory of Statistics II

Hypothesis testing, linear model, and nonparametric methods. Prerequisite: STT 661 or permission of instructor.

664-4 Biostatistics

(Listed jointly with Biomedical Sciences Ph.D. program; see BMS 664.) Classical statistical techniques for analysis and interpretation of research data, with emphasis on biomedical applications. Includes descriptive statistics, distributions, experimental design, ANOVA, regression, correlation, contingency table analysis, and nonparametric procedures. Graduate standing required. Not open to mathematics or statistics majors.

666-4 Statistical Methods I

Classical statistical techniques for analysis and interpretation of research data, with heavy emphasis placed on the use of packaged computer routines and the use of linear models. Includes basic probability and statistics review; simple, multiple, and polynomial regression; indicator variables in regression; and multiple and partial correlation. Nonparametric methods. Analysis of categorical data. Exploratory data analysis. Prerequisite: MTH 253 or 355, and STT 256 or 361 or equivalent.

667-4 Statistical Methods II

Continuation of STT 666. Includes analysis of variance, multiple comparisons, factorial experiments, analysis of covariance and randomized block designs. Exploratory data analysis. Prerequisite: STT 666.

669-4 Introduction to Experimental Design

Use of techniques of experimental designs, blocking, Latin squares, regression design. One or more statistical computing packages are used to analyze resulting data. Emphasis is placed on applications to various areas of scientific research. Prerequisite: STT 667 or equivalent.

686-1 to 5 Independent Reading in Statistics and Probability

Permission of instructor required.

696-1 to 5 Topics in Statistics and Probability

Permission of instructor required.

701-4 Time Series Analysis

Stochastic models for discrete time series in the time-domain, moving average processes, autoregressive processes, forecasting, model identification, model estimation. Prerequisite: STT 661 or permission of instructor.

702-4 Applied Stochastic Processes

Stationary processes, Markov chains, Poisson processes, pure birth process, queuing processes, inventory problems, and traffic flow problems. Prerequisite: STT 661 or permission of instructor.

721-4 Sampling Design

Applications of sampling theory and basic methods of sampling selection. Simple random sampling, systematic sampling, sampling with probability proportionate to unit size, use of auxiliary estimators, and Warner's procedure. Prerequisite: STT 661 or permission of instructor.

740-4 Contingency Table Analysis

Standard techniques for analyzing two-dimensional contingency tables. Log-linear model analysis developed for analyzing higher-dimensional tables, including model selection procedures, logit models, and incomplete tables. SAS and BMDP procedures are used. Prerequisite: STT 666 and permission of instructor.

744-4 Applied Multivariate Analysis

Matrix theory, multivariate distributions, correlation and regression, MANOVA, tests on covariance matrices, test of independence, canonical correlation, classification and discrimination, structure of multivariate observations. At least two courses in probability and statistics or equivalent required. Prerequisite: MTH 253 or 355.

761-4 Linear Models I

Concepts of matrix algebra and the multivariate normal distribution are developed in order to study the general linear model of full rank. Some applications of regression are covered. Prerequisite: STT 662, MTH 253, and a statistical methods course or permission of instructor.

762-4 Linear Models II

Computing techniques and applications of the general linear model. Correlation and regression are emphasized in particular. Prerequisite: STT 761.

764-4 Design of Experiments

Topics chosen from analysis of variance involving subsamples, missing values, disproportionate subclass numbers, estimation of variance components, incomplete block design including lattice designs and other factorial systems, fractional replication, split-plot trials, multiple comparison techniques, and combining experiments. Graduate standing required. Prerequisite: STT 667 or permission of instructor.

767-4 Applied Regression Analysis

Multiple linear regression with introduction to more complicated models, including nonlinear models and up-to-date computing techniques. A course in mathematical statistics or permission of instructor required.

786-1 to 5 Independent Reading in Statistics and Probability**791-3 to 4 Statistical Consulting**

Consultation with graduate students and faculty on statistical problems arising from research projects. Graduate standing in mathematics or statistics and permission of instructor required. Prerequisite: STT 662, 667.

796-1 to 5 Topics in Statistics and Probability

Permission of instructor required.

899-1 to 18 Graduate Research

Supervised thesis research. Course subtitles vary from quarter to quarter. Permission of instructor required.

Theatre/TH**531-3 Studies in Film History**

Courses offered under this title provide an intensive study of a selected area of film history. Specific title announced each time course is offered. Prerequisite: TH 131 or permission of instructor.

533-3 Studies in Film Genre

Courses offered under this title provide an intensive study of a film genre, e.g., the Western, the musical, the gangster film. Specific title announced each time course is offered. Prerequisite: TH 131 or permission of instructor.

635-3 Studies in Film Criticism

Intensive examination of a selected area of film criticism. Specific title announced each time course is offered. Permission of instructor required.

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 Affairs/URS**599-1 to 6 Studies in Selected Subjects**

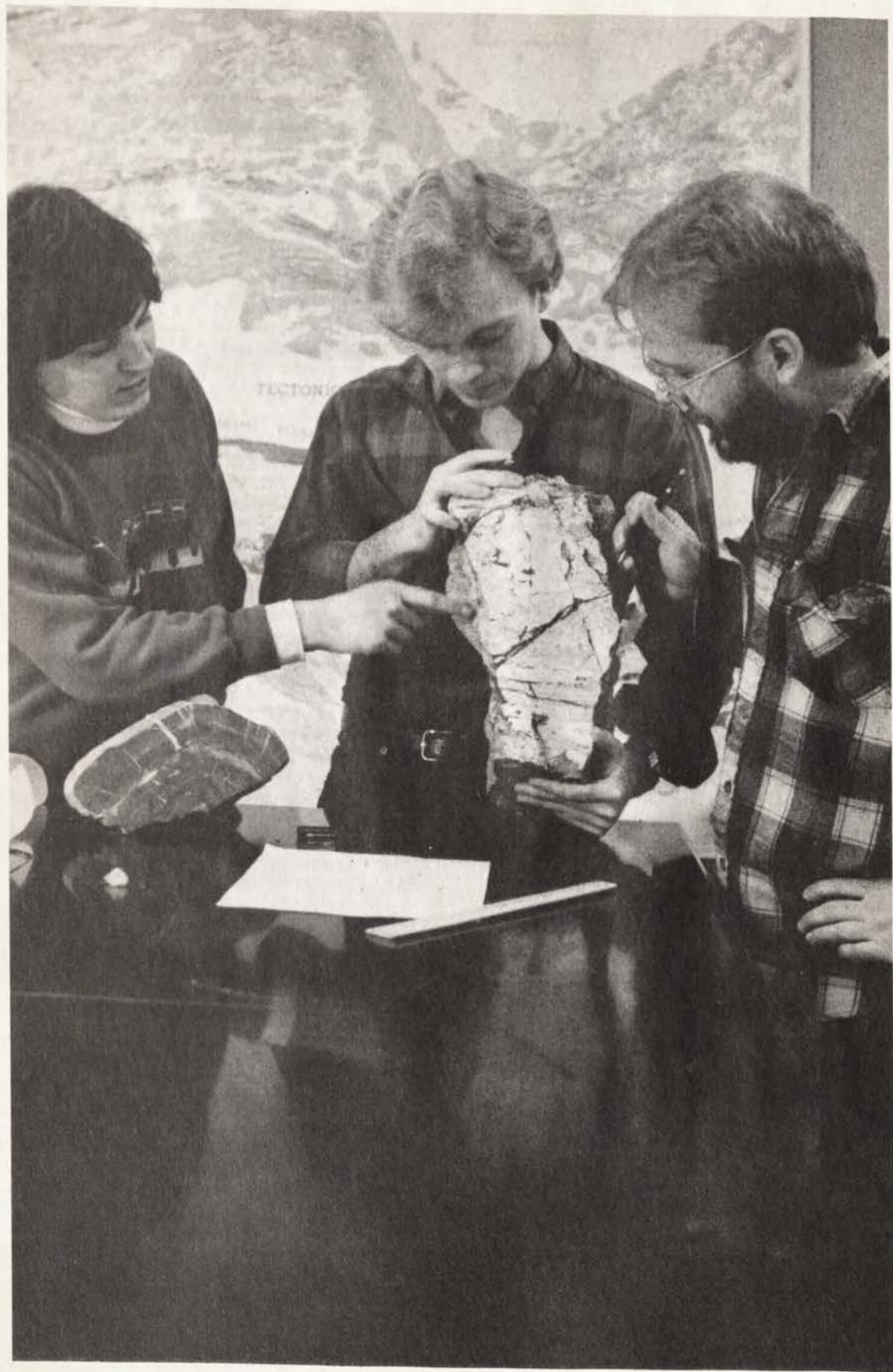
Course of variable content dealing with problems, approaches, and topics in the field of urban studies. Permission of instructor required.

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 to a maximum of 12 credit hours.

Systems Engineering

See Engineering, Computer Engineering



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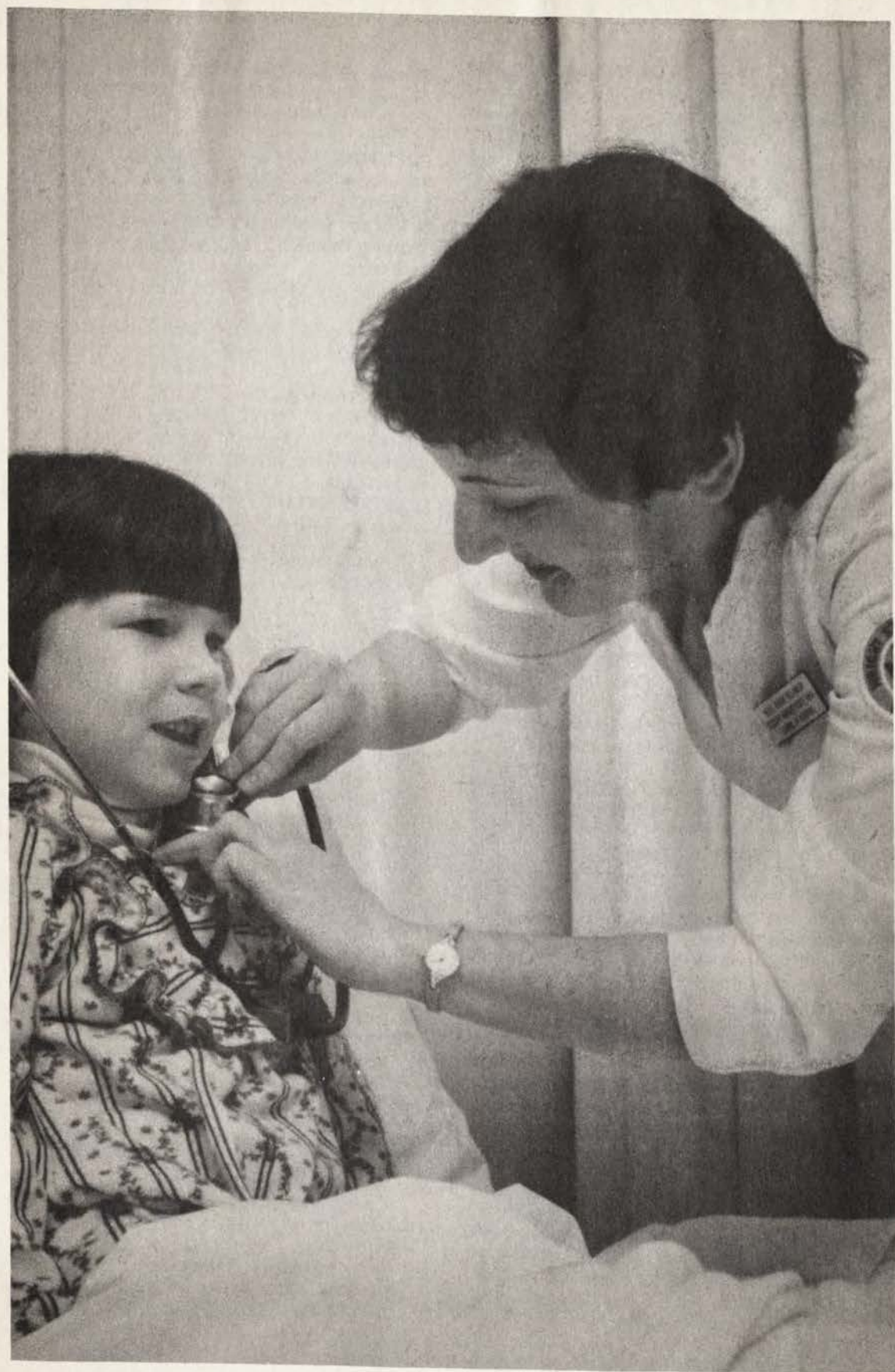
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Notice to Students

The Family Education Rights and Privacy Act of 1974 (Public Law 93-330)

The following notice is published as a public service for the student body. Federal regulations require annual notice to students on this subject.

Wright State University has for many years regulated access to student records. Federal regulations now apply in this area and are designed to protect the privacy of student records. The statute and regulations govern access to records, their release, and the rights of students to review and, if necessary, challenge information they believe to be inaccurate.

This notice, to be published annually, is a digest of these regulations. The full text is available for student examination in the Office of Student Development, the Office of the Registrar, the Affirmative Action Office, and in most college offices. A more detailed digest of the act may also be found in the *Student Handbook*.

Under the act, "education records" means, with certain exceptions as listed below, those records, files, documents, or other materials related directly to a student and maintained by any unit of the university. The following categories of information are exempt and are not considered to be "education records": (a) records made by university personnel which are in the sole possession of the maker and are not revealed to any other person; (b) records maintained by campus security; and (c) medical and counseling records used solely for treatment. (Records pertaining to students, which are maintained by university offices, are official records, and as such, remain the property of Wright State University.)

Students may seek access to their records by submitting a written and dated request on forms provided by each office from which information is sought. The head of that unit will make the records available within forty-five days and give students the right to challenge any material contained therein on the basis of it being inaccurate, misleading, or inappropriate. The right to challenge grades does not apply under the act unless the grade was inaccurately recorded. Exceptions to the right to review records by students are as follows: (a) financial records of parents; (b) confidential letters and statements of recommendation made prior to January 1, 1975, and any other recommendations for which the student has voluntarily waived the right to access.

Wright State University does not maintain education records in any one central office. Records are maintained generally in the respective colleges and schools, the Offices of the Registrar, Student Development, Career Planning and Placement, Admissions, Financial Aid, University Division,

Veterans Affairs, Bursar, Athletics, Health Services, and Handicapped Student Services. Questions concerning the location of individual student records should be directed to the Office of Student Development or the registrar.

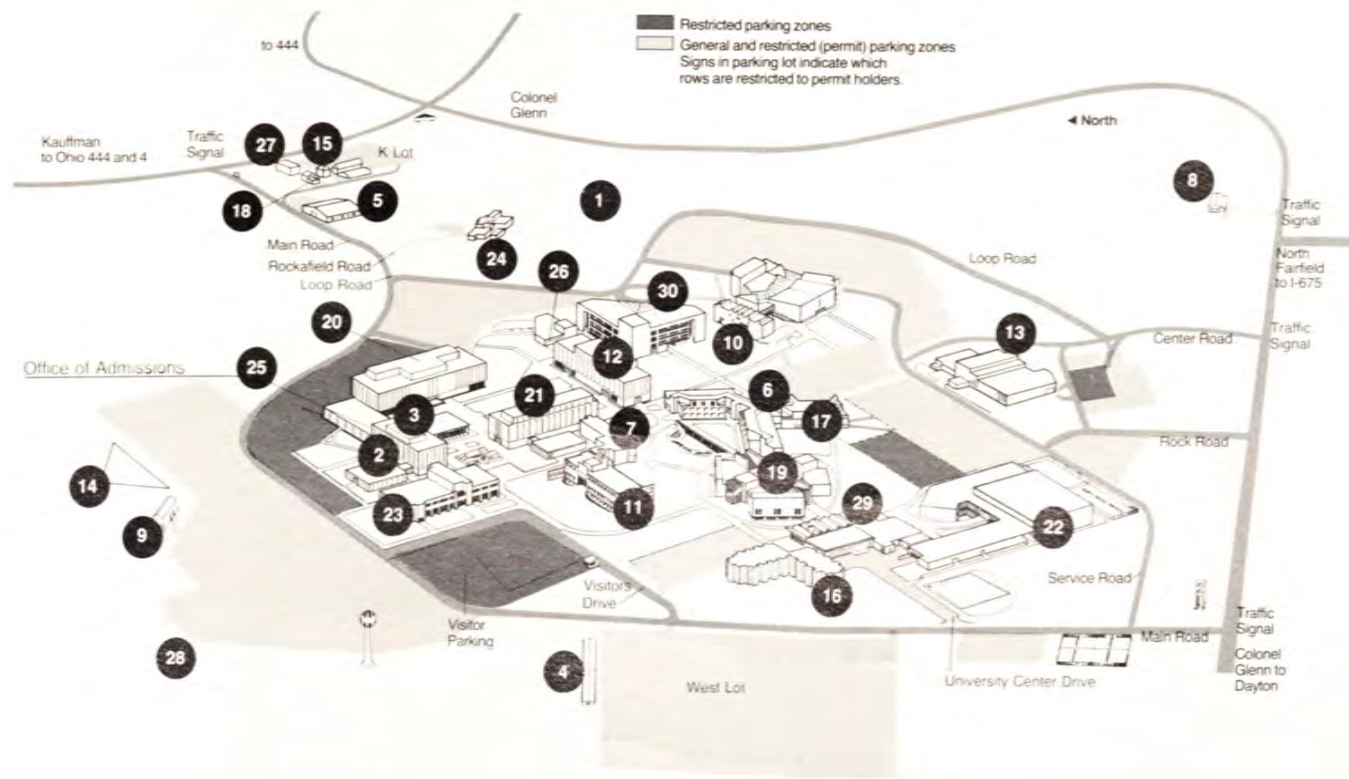
With specified exceptions, the university may release information in students' records to others if: (a) there is written consent from the student specifying the records to be released, the reasons for such release and to whom, and with a copy of the records provided to the student if desired by the student; or (b) such information is furnished to comply with judicial orders upon condition that the university make a reasonable attempt to notify the student in advance of compliance by the university.

Information identified as public information may be released to anyone without the student's written consent. This includes the student's name, address, telephone listing, date and place of birth, major field of study, participation in officially recognized activities and sports, weights and heights of members of athletic teams, dates of attendance, degrees and awards received, and the most recent previous educational agency or institution attended by the student.

A student may request his/her name, address, and telephone number not be included in the public student directory by checking the appropriate box on the quarterly registration form. A student may request that public information, other than directory information, not be made public by signing, during the first week of classes each quarter, a request to withhold information, available in the Office of Student Development. The university will not notify a student's hometown newspaper of outstanding academic achievement (e.g., if the student is named to the dean's list) if the student requests either of the above options.

Education records or personally identifiable information other than public information may be released without the written consent of the student to the following only: (a) other university officials who have legitimate educational interests; (b) officials of other schools in which the student intends to enroll, provided the student is informed of the record transfer, receives a copy of the record, if desired, and has an opportunity to challenge the content of the record; (c) authorized representatives of certain federal agencies, and education agencies, or state educational authorities under certain conditions; (d) in connection with a student's application for, or receipt of, financial aid; (e) state and local officials or authorities to whom information is specifically required to be reported or disclosed pursuant to the

Ohio Revised Code adopted prior to November 19, 1974; (f) organizations conducting studies for, or on behalf of, educational agencies or institutions for the purpose of developing, validating, or administering predictive tests, administering student aid programs, and improving instruction, if such studies are conducted in such a manner as will not permit the personal identification of students and their parents by persons other than representatives of such organizations and such information will be destroyed when no longer needed for the purpose for which it is conducted; (g) accrediting function; (h) parents of a dependent student as defined in section 152 of the Internal Revenue Code of 1957; (i) in connection with an emergency, appropriate persons may be advised if the knowledge of such information is necessary to protect the health and safety of the student or other persons; (j) in compliance with judicial order or pursuant to lawfully issued subpoena, upon condition a reasonable attempt to notify the student is made in advance of the compliance therewith.



Campus Map

- | | | | |
|--------------------------------|---|--|-----------------------------------|
| 1 Achilles Hill | 10 Creative Arts Center | 17 Health Sciences Building | 25 Student Services |
| 2 Administrative Wing | 11 Engineering and Mathematical Sciences Building | 18 Lowery House | 26 Television Center |
| 3 Allyn Hall | 12 Fawcett Hall | 19 Medical Sciences Building | 27 Transportation Services Center |
| 4 Alumni/Foundation Building | 13 Frederick A. White Center | 20 Millett Hall | 28 University Apartments |
| 5 Art Annex | 14 Garden for the Senses (Clara E. Weisenborn) | 21 Oelman Hall | 29 University Center |
| 6 Biological Sciences Building | 15 Gaza House | 22 Physical Education (James A. Rhodes) Building | 30 University Library |
| 7 Brehm Laboratory | 16 Hamilton Hall | 23 Rike Hall | |
| 8 Brown House | | 24 Rockafeld House | |
| 9 Campus Ministry Center | | | |

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Wright State University
Dayton, Ohio 45435

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