1992-1994 Wright State University Graduate Course Catalog

Wright State University

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### Academic Calendar 1992–94

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

**Fall Quarter**
- September 14, Monday/classes begin
- November 11, Wednesday/Veterans Day holiday
- November 24, Tuesday/classes end
- November 25–29, Wednesday–Sunday/Thanksgiving holiday
- November 30–December 5, Monday–Saturday/final examinations
- December 5, Saturday/Fall commencement

**Winter Quarter**
- January 4, Monday/classes begin
- January 18, Monday/Martin Luther King Day holiday
- March 13, Saturday/classes end
- March 15–20, Monday–Saturday/final examinations

**Spring Quarter**
- March 29, Monday/classes begin
- May 31, Monday/Memorial Day holiday
- June 5, Saturday/classes end
- June 7–12, Monday–Saturday/final examinations
- June 12, Saturday/Spring commencement

**Summer Quarter**
- June 14, Monday/Terms A and C classes begin
- July 5, Independence Day holiday
- July 19, Monday/Term B classes begin
- August 19, Thursday/Terms B and C classes end

**Fall Quarter**
- September 13, Monday/classes begin
- November 11, Thursday/Veterans Day holiday
- November 23, Tuesday/classes end
- November 24–28, Wednesday–Sunday/Thanksgiving holiday
- November 29–December 4, Monday–Saturday/final examinations

**Winter Quarter**
- January 3, Monday/classes begin
- January 17, Monday/Martin Luther King Day holiday
- March 12, Saturday/classes end
- March 14–19, Monday–Saturday/final examinations

**Spring Quarter**
- 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, Monday/Terms A and C classes begin
- July 4, 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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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.

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 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 513/873-2976.

This catalog was prepared by the Department of University Publications, with the cooperation of the School of Graduate Studies and the colleges and schools of Wright State University, Dayton, Ohio.
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Important Phone Numbers

General Information
Information Center
142 Allyn Hall
873-2310

Offices and Facilities
Admissions
Graduate Admissions
Gerald C. Malicki, Assistant Dean and Director of Graduate Admissions and Records
106 Oelmann Hall
873-2976

International Admissions
Harriet C. Dadras, Coordinator of International Admissions
122 Student Services
873-2712

School of Medicine, Student Affairs/Admissions
Dr. Paul G. Carlson, Associate Dean for Student Affairs and Admissions
210 Medical Sciences Building
873-2934

School of Professional Psychology, Office of Student Affairs
Omintha R. Petrie, Director of Student Services/Admissions
110 Health Sciences Building
873-3492

Undergraduate Admissions, Office of Ken Davenport, Director of Undergraduate Admissions
127 Student Services
873-2211

Affirmative Action Programs
Juanita Wehrle-Einhorn, Director
224 Millett Hall
873-3207

Bolinga Cultural Resources Center
Lillian M. Johnson, Interim Director
129 Millett Hall
873-2086

Bookstore, University
Anita Lafferty, Manager
075 University Center
873-2875

Bursar, Office of the
Carol Stevenson, Bursar
143 Allyn Hall
873-2021

Disability Services, Office of
Stephen H. Simon, Director
133 Student Services
873-2140

Educational Resource Center
Francis C. Yu, Director
244 Millett Hall
873-2883

Financial Aid, Office of
David R. Darr, Director of Financial Aid
129 Student Services
873-2321

Library, Paul Laurence Dunbar
Arnold Hirshon, University Librarian
126 Paul Laurence Dunbar Library
873-4125, Hours
873-2525, Circulation

Library, Fordham Health Sciences
Sarah Timmons, Associate University Librarian
125D Medical Sciences Building
873-2003

Registrar, Office of
145 Allyn Hall
873-2451

Residence Life Office
Candace Hull, Associate Director of Student Development for Residence Life
042 University Center
873-4172

Student Employment, Office of
Brent W. Young, Associate Director for Student Employment, Career Services
152 Allyn Hall
873-2926

University Testing Services
Jeanne M. Fraher, Assistant Director for University Testing Services, University Division
Pamela L. Wallace-Johnson, Assistant Director for Academic Advising, University Division
131 Student Services
873-2841

Veterans Affairs, Office of
David R. Darr, Coordinator, Veterans Affairs
151 Allyn Hall
873-2727

Colleges and Schools
College of Business and Administration
110 Rike Hall
873-2437

College of Education and Human Services
228 Millett Hall
873-2821

College of Engineering and Computer Science
405 Russ Engineering Center
873-5001

College of Liberal Arts
445 Millett Hall
873-2225

College of Science and Mathematics
134 Oelmann Hall
873-2611

School of Graduate Studies
106 Oelmann Hall
873-2976

School of Medicine
114 Medical Sciences Building
873-3010

School of Nursing, Wright State University-Miami Valley
401 Allyn Hall
873-3131

School of Professional Psychology
117 Health Sciences Building
873-3490

Wright State University Lake Campus
100 Dwyer Hall
7600 State Route 703
Cincinnati, Ohio 45222
1-800-237-1477
419/562-5000
Graduate Program Officers

School of Graduate Studies
Joseph F. Thomas, Jr., Dean and Associate Vice-President for Research
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 Logistics Management
Roger Sylvester, Director of M.S. in Social and Applied Economics Program

Accountancy
H. Jim Snavely, Acting Chair

Economics
G. Thomas Sav, Chair

Finance, Insurance, and Real Estate
Daniel J. Kaufman, Jr., Chair

Management
Rupert F. Scherer, Chair

Management Science and Information Systems
Myron K. Cox, Chair

Marketing
John Hafer, Chair

College of Education and Human Services
Frederick J. Gies, Dean

Department of Educational Leadership
B. Charles Leonard, Chair
Advanced Programs in Educational Leadership
Charles W. Ryan
Certification Advisor for Educational Personnel
Gerald P. Sturm
Teacher Leader
June A. Kisch

Department of Human Services
Gregory R. Bernhardt, Chair
Art Therapy
Gary C. Barlow
Business and Industry
Eileen F. Selt
Chemical Dependency
S. Joseph Emanuel
Community Mental Health
Mary Ann Jones
Counseling Exceptional Children
Diane E. Frey
Gerontology
Gregory R. Bernhardt

Marriage and Family Counseling
Gregory R. Bernhardt

Student Personnel Services in Higher Education
Wilma J. Henry

Department of Teacher Education
Will E. McCarther, Chair

English
Larry Chance

Mathematics
Carl Benner

Science
James Uphoff

Special Education
Michael Williams

Department of Health, Physical Education, and Recreation
Stephen D. Frederick, Chair

Department of Educational Technology, Vocational Education, and Allied Programs
Bonnie K. Mathies, Chair

Business and Vocational Education
Donna Courtney

College of Engineering and Computer Science
James E. Brandeberry, Dean
Clark E. Beck, Assistant Dean
Richard K. Rathbun, Assistant Dean

Computer Science and Engineering
Alastair D. McAulay, Chair

Systems Engineering
Biomedical and Human Factors Engineering
Anthony J. Cacioppo, Interim Chair
Electrical Engineering
Belle A. Shenco, Chair
Mechanical and Materials Engineering
Richard J. Bethke, Interim Chair

College of Liberal Arts
Perry D. Moore, Dean
William E. Rickert, Associate Dean

English Language and Literatures
Henry S. Limouze, Chair
History
Edward F. Haas, Chair
Humanities
David M. Orenstein
Music
Sharon H. Nelson
Urban Affairs
Mary E. Mazey, Chair
Graduate Council Members

School of Graduate Studies
Joseph F. Thomas, Jr., Dean
Gerald C. Malicki, Dean’s Alternate

College of Business and Administration
Waldemar M. Goulet, Dean
Rishi Kumar, Dean’s Alternate
Khurshid Ahmad, Faculty Member, 1990-92
Nabil Hassan, Faculty Member, 1991-93
Frank Stickney, Faculty Alternate

College of Education and Human Services
Frederick J. Gies, Dean
Charles L. Willis, Dean’s Alternate
Phyllis Henderson, Faculty Member, 1991-93
Jan La Forge, Faculty Member, 1990-92
Alyce Jenkins, Faculty Alternate

College of Engineering and Computer Science
James E. Brandeberry, Dean
Richard Bethke, Dean’s Alternate
Kevin G. Kirby, Faculty Member, 1990-92
Raymond E. Sifred, Faculty Member, 1991-93
Ramana V. Grandhi, Faculty Alternate, 1991-92

College of Liberal Arts
Perry D. Moore, Dean
William E. Rickert, Dean’s Alternate
Edward Haas, Faculty Member, 1991-93
Lawrence Hussman, Faculty Member, 1990-92
David Orenstein, Faculty Alternate

School of Medicine
Kim Goldenberg, Dean
Cheryl Maurana, Dean’s Alternate

Chemistry
Sue Cummings, Chair

Geological Sciences
Byron Kulander, Chair

Microbiology and Immunology
Neal S. Rote, Chair

Physiology and Biophysics
Peter K. Lauf, Chair

Mathematics and Statistics
Edgar A. Rutter, Chair

Physics
Gust Bambakidas, Interim Chair

Other Graduate Programs

Applied Behavioral Science
Robert Pruett

Biomedical Sciences
Larry G. Arlian

Selected Graduate Studies
Joseph F. Thomas, Jr.
This Is Wright State University

Wright State University is a major metropolitan university committed to the traditional values of teaching, research, and service, as well as to providing a leadership role in the development of our community and region.

The connection between the university and the community is genuine and historical. In response to community need for accessible higher education, a community fund raising campaign in the early 1960s generated three million dollars, which financed the purchase of the campus site and the construction of the first building on campus. Wright State opened its doors in 1964 as the Dayton Campus of Miami University and The Ohio State University. 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’s history has been characterized by growth and change. 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. In 1977 Wright State established the School of Professional Psychology and a Ph.D. program in biomedical sciences. In 1986 final approval was granted for the state’s only Ph.D. program combining both computer science and computer engineering.

Many Wright State programs have received national and regional honors. The Department of Theatre Arts, whose faculty includes Academy Award nominated film makers, has received two Ohio Program Excellence awards, including one for its innovative motion picture program. The School of Medicine ranks first in the nation in preparing family practice physicians.

Also unique to Wright State is its graduate program in aerospace medicine, the only program of its kind offered at a civilian university or college in the United States. Wright State is the only university in Ohio to offer a Doctor of Psychology (Psy.D.) degree, and the university’s Master of Art Therapy program is one of only ten nationally accredited programs in this discipline.

In addition to quality academic programs, over 160 student clubs and organizations are active on campus. Many students participate in intramural sports programs, and the university offers 14 Division I intercollegiate athletic programs. The multipurpose Ervin J. Nutter
Wright State University Center, a sports and entertainment complex completed in 1990, offers recreational and cultural opportunities for both the university and the greater Dayton communities.

The Campus
Wright State University is located approximately 10 miles east of Dayton, Ohio, a city with a metropolitan population of over nine hundred thousand. Adjacent to the campus is Wright-Patterson Air Force Base, a center for Air Force research and procurement.

The university's 557-acre campus comprises over 20 modern buildings with extensive research facilities. Wright State is a leader nationwide in providing a campus accessible to people with disabilities. Most of our campus buildings are connected by a unique underground tunnel system and are equipped with elevators, electric doors, and ramps.

Five residential communities house approximately 1,600 undergraduate, graduate, and professional students who live on campus. Commuters can park on campus or avail themselves of public transportation buses via Dayton's Regional Transit Authority.

Student Population
Wright State University's student population of almost 18,000 contains representatives from 42 states and 46 foreign countries. Many students live in the surrounding community, and more than half of our 40,000 graduates have kept their expertise in the local community by choosing to live and work in the greater Dayton area.

Among the university's graduate and professional students, 70 percent are aged 25 or older. Wright State has developed many of its graduate programs so students can attend classes after work hours, and 84 percent of the university's graduate and professional students attend classes after 4 pm.

Organization

School of Graduate Studies
The School of Graduate Studies has the authority to grant graduate degrees at Wright State University. In addition, it shares responsibility for the administration of all graduate programs in the university with the discipline-focused colleges and schools and their academic departments, and administers all graduate academic and admission policies as developed and approved by the Graduate Council. 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 and associate vice-president for research, the assistant dean and director of graduate admissions and records, and their staff.

The School of Graduate Studies had a total enrollment of some 3,500 students in the fall quarter of 1991, 78 percent of whom were part-time students. In addition, 470 students were enrolled in the Schools of Medicine and Professional Psychology. The graduate school offers 33 master's degree programs and one post-master's degree program through Wright State's colleges and schools. In addition, the College of Education and Human Services, in cooperation with Bowling Green State University, offers a Ph.D. in educational administration, supervision, and higher education.

Academic Units
Academically, the university is organized into 11 units. Undergraduate degrees are awarded through the Colleges of Business and Administration, Education and Human Services, Engineering and Computer Science, 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 offers the Ph.D. degree in biomedical sciences through the College of Science and Mathematics and the School of Medicine, the Ph.D. degree in computer science and engineering through the College of Engineering and Computer Science, and doctoral-level professional degrees through the School of Medicine (M.D.) and the School of Professional Psychology (Psy.D.).

The Graduate Council
The Graduate Council is comprised of deans, elected representatives, and alternates from each of the nine academic colleges and schools, the director of each Ph.D. program, and the graduate school representative from student government. 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 the 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 academic advising and supervision of 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 Student 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 and Sponsored Programs
Universities have traditionally been the source of new knowledge. This new knowledge has usually come from research or creative activities and closely relates to graduate study. To enhance this tradition, the School of Graduate Studies is obligated to help and encourage all forms of scholarly efforts by the graduate faculty and graduate students.

Research at Wright State University has been broadly defined to include creative and scholarly work in all disciplines. This broad definition includes laboratory and field experiments, correlation studies, naturalistic observations, economic research, historical and other documentary studies, and the creative activities of the arts.

Graduate programs at Wright State provide an education that enables graduates to either conduct research or to apply the results of research in their professional work. Students are encouraged to follow these steps shortly after beginning a graduate program: assess their research interests as well as their need for research experience; contact interested faculty
members who will advise and work with them as they conduct their research; discuss their research plans with the department chair or dean; then begin their research project as soon as possible.

The university has established organizational units to support research. Wright State's Research Council is responsible for institutional research policy. The council is chaired by the dean of the School of Graduate Studies and the members are elected representatives of the faculty and the administration.

The dean of the School of Graduate Studies, serving also as associate vice president for research, is the institutional official responsible for university compliance with federal and state guidelines for the ethical conduct of research. Research boards and committees monitor all research and instruction involving use of human subjects, laboratory animals, radioisotopes, and radiation-producing devices. Graduate student researchers will be introduced to the issues of research ethics and safety and must meet the high standards of performance demanded by the university for appropriate research conduct.

The Office of Research and Sponsored Programs identifies sources of external funding appropriate for Wright State University. The office is responsible for the submission of proposals to external agencies and the administration of the resulting award to the university.

Producing new knowledge, an essential part of graduate education, can be enhanced by sponsored research programs. Research News, a publication of the Office of Research and Sponsored Programs, highlights grant-seeking skills and lists trends in federal and private funding, upcoming deadlines for funding programs, and awards received by Wright State University faculty.

Equal Opportunity/Affirmative Action Policy

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

The policy of Wright State University is to not discriminate against any persons on the basis of race, religion, color, sex, sexual orientation, disability, veteran status, national origin, age, or ancestry. In addition, we take 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. Our policy is fully consistent with the various federal and Ohio statutes which prohibit discrimination.

Any questions or comments about the university's policy, and any complaint about perceived discrimination, may be directed to the director of Affirmative Action Programs, 224 Millett Hall, 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 persons with disabilities. Any questions or comments concerning a needed accommodation may be directed to the director of the Office of Disability Services, 133 Student Services, 513/873-2141.

Accreditation and Memberships

Wright State is accredited at the doctoral degree-granting level by the North Central Association of Colleges and Schools. In addition, many of our programs have been professionally accredited by various accrediting agencies. Wright State holds memberships in a number of organizations and participates in many kinds of collaborative ventures with local colleges, universities, state-wide programs, federal laboratories, and Ohio industry. General memberships include the Council of Graduate Schools, Midwestern Association of Graduate Schools, and the American Council of Learned Societies.

For specific information concerning Wright State or programs' accreditation or membership please contact the graduate school or the colleges/schools.
RESOURCES, FACILITIES, AND ACTIVITIES
Student-Centered Resources, Facilities, and Activities

Libraries

The Paul Laurence Dunbar Library

As an integral part of the instructional and research program of the Wright State University community, the Paul Laurence Dunbar Library provides information sources and services to serve the diverse needs of graduate students and faculty in the Wright State community. The library collections, among the largest in the Dayton metropolitan area, include over 460,000 bound volumes, 940,000 microforms, 200,000 U.S. and Ohio documents, and 4,000 periodical subscriptions. Built in 1971 and expanded in 1988, the library building is open over 100 hours per week. The facilities include study tables and carrels, a microforms reading room, and photocopiers.

The library is using the latest technology to provide access to instructional and research materials. The Paul Laurence Dunbar Library public catalog has been computerized since 1986, and it provides access to the holdings of many other area libraries. Beginning in 1992, the library will be one of the first in the state to introduce the new OhioLINK system, which will link the holdings of all academic libraries in Ohio. Wright State's library also provides access to a number of computerized databases, and has CD-ROM services available in a wide range of subjects, including education, business, and psychology.

As a partial U.S. government documents depository, the library provides students and the general public with access to over 200,000 documents and to approximately 49,000 geographical and topographic maps from all over the United States. The library also is a map depository, housing a collection of more than 50,000 geological and topographical maps from throughout the United States.

A number of special services are available through the library. To assist students in the use of the extensive collections, reference librarians are available seven days a week. Orientation and instructional programs help students learn effective use of the library as an information and intellectual resource. The general library services include current periodicals, reserves, and database search services, and there is a special collection for music housed in the Creative Arts Building.

No single academic library can possibly collect all the materials that its graduate students and faculty require for their research. Therefore, interlibrary loan provides access to books and journal articles from other academic libraries throughout the United States. Through a cooperative arrangement, Wright State students are also able to use directly the library resources available at most other Dayton metropolitan area universities.

The Department of Archives and Special Collections houses one of the most complete depositories of information on the Wright brothers in the world. The collection contains about 6,000 items, including manuscripts, records, books, family papers, and awards, and over 3,600 prints made by Orville and Wilbur Wright from their own negatives. The archives also contain many other important collections on aviation history, local and regional history, and rare children's books.

Fordham Health Sciences Library

The Fordham Health Sciences Library, located in the Medical Sciences Building, supports the health sciences educational and research needs of the students and faculty at Wright State University. The collections number nearly 100,000 volumes and 1,500 current serial subscriptions.

The reference staff searches on-line over 200 computerized indexes, abstracts, and bibliographic information banks to produce tailor-made subject bibliographies in the biomedical and life sciences. CD-ROM versions of MEDLINE, Cumulative Index to Nursing Literature, PsycLit, and others are available. Library materials that are unavailable from the Fordham Health Sciences Library may be requested through the library's interlibrary loan service.

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 medical books.

A unique cooperative relationship among the area's hospital libraries and the Fordham 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. Seven of the hospital libraries participate in COLS, the university-wide library public access and circulation system.

University Media Services

University Media Services (UMS) provides a wide range of services including comprehensive material production services, consultation in
media utilization and selection, a large collection of audio-visual equipment and materials, learning lab facilities, preview facilities, and media supplies.

Complete service information is available in the main UMS offices, located in 050 Millett Hall and 020 Rike Hall.

**Computer Services**

Computing and Telecommunication Services provides computing and telecommunication resources for the university. The offices and computing laboratories that support instruction and research are located in the Library Annex basement.

The university has a campus-wide network (Turnpike) that connects many of the resources into a single entity. Turnpike also provides access to state, national, and international resources through the Ohio Academic and Research Network (OARnet), INTERNET, and BITNET. The Ohio Supercomputer Center, which provides state-of-the-art computing, is on OARnet.

Within Computing and Telecommunication Services, University Computing Services (UCS) maintains an HDS mainframe computer used predominantly for administrative systems for student information, financial accounting, and human resources. Accounts for faculty and students are available, if required for course work or research.

Wright State has a number of computers and operating systems available for instruction and research. VAX/VMS and UNIX multi-user computers are accessible to faculty, staff, and graduate students through Turnpike. Accounts for these machines can be obtained by contacting the UCS Help Desk. For classes that require computer use, accounts are generated from class lists. Graduate students' accounts are valid throughout their degree programs.

Electronic mail (EMAIL) is used by students, faculty, and administrative staff to communicate on campus and with colleagues at remote sites on INTERNET and BITNET. Turnpike also provides access to the catalogs of the Paul Laurence Dunbar Library and participating OhioLINK libraries using the same account used for classes, research, or EMAIL.

Access to Turnpike is available through modem access, terminal labs, Local Area Networks, and X-Window terminals. These labs are located in the computer center in the Library Annex and also in the Russ Engineering Building.

Integration of microcomputers into curricula is a goal of the university. UCS maintains networked IBM, IBM-compatible, Apple Macintosh, and a lab accessible to persons with disabilities in the computer center. These networks provide students with the use of software, thus eliminating the need for them to buy the software. UCS labs are open-access labs available to current students. Various colleges and departments maintain microcomputer labs for specific student populations. In addition to the labs in the computer center, UCS maintains remote locations throughout campus.

Academic Computing Resources provides support for the research and instructional clients. A staff of consultants is available to provide support and expertise within a variety of areas.
All new faculty, staff, and students are encouraged to contact the UCS Help Desk for assistance in satisfying their computing and communication needs.

**Bolinga Cultural Resources Center**

The Bolinga Cultural Resources Center opened on January 15, 1971, as a tribute to the memory of Dr. Martin Luther King, Jr. The word *bolinga* means love in Lingala, an African language, and the center promotes cultural pluralism on campus through programs, lectures, and seminars. The center's programs consist of a minority scholars speakers series, community speakers series, and film series. Moreover, it has two important resources: the Paul Laurence Dunbar Collection, comprising over 3,000 books and periodicals relating to the African and African-American experience, and the Peer Supportive Services Program, a program of tutoring and counseling services.

**Student Services**

The Student Life area of the Division of Student Affairs provides general information and growth opportunities to students through a variety of programs, including orientation, international students and exchange, alcohol and substance abuse awareness, leadership development, and student organizations.

The Student Development staff advises student organizations and develops policies concerning students. The numerous organizations on campus include Greek organizations, student media, and a variety of clubs. This office also oversees an on-campus communication system. Each student has a mailbox in Allyn Hall student lounge and receives most official university correspondence there.

International students receive advice and assistance from the Office of International Student Programs. The International Exchange Office offers opportunities for summer experiences in Japan, China, and Brazil.

Wright State's RAPP (Raider Alcohol Awareness Program) Team educates students on responsible behavior and offers a referral service for students needing specific assistance.

The Office of Career Services facilitates graduate students in researching career opportunities related to their anticipated degree. Within three quarters of graduation, graduate students are encouraged to register for assistance in securing a career-track position upon graduation. Placement services include resume assistance; a job-search manual; automatic upload into national resume data bases; career fair and on-campus interviewing.
opportunities; and workshops and resume referral services. Information concerning economic trends, employment outlooks, salary ranges, and employer profiles is also available.

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.

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 Student Health Services in Allyn Hall. Personnel are on duty to treat routine health problems during work hours Monday through Friday and on some evenings. Students needing physician care will be referred to the Frederick A. White Health Center or to a private physician. There is a charge for physician services, if required; student insurance may cover some of this expense.

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 public safety communication center, 121 Allyn Hall, campus telephone extension 2111.

The Office of Parking Services administers the parking system on campus. Campus parking regulations and complete information about parking permits are available at the parking services office, 017 Library, 873-2152. The Office of Parking Services is also responsible for the sale of RTA passes and lost and found articles. Articles are held for 90 days and, if not claimed, are sold or donated.

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.

The Office of Disability 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 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 students 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 students to make a realistic decision about a future career and ensure that students are able to meet the demands of the occupation.

Applicants requiring services available for disabled students are strongly encouraged to contact The Office of Disability Services prior to admission to make arrangements for the necessary services.

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), a game room, box office, billiards room, computer room, rathskeller, faculty dining room, offices for staff and for student organizations, and the bookstore. The student-run University Center Board (UCB) schedules videos, guest speakers, novelty entertainment, dances, and recreational tournaments at the center. The facility can also be reserved for public activities by arrangement with the University Center director's office.
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. The University Bookstore is located on the lower level of the center.

Housing

Wright State University currently has five residential communities which provide campus housing for both undergraduate and graduate students. Hamilton Hall, a traditional residence hall; Hawthorn/Cedar/Hickory, Laurel/Jacob/Boston, and Oak/Maple/Pine, located in the Woods, a series of suite-style residence halls; and the Forest Lane Apartments, a combination of studio and two-bedroom garden apartments, make up the five communities. Once admitted to the graduate school, all students will receive information concerning available campus housing. The university is considering adding additional housing specifically for graduate and professional students, including housing for students with dependents. The Residence Life Office also provides a variety of services to aid students who wish to obtain off-campus housing accommodations. Additional information on both on- and off-campus housing can be obtained by contacting the Residence Life Office.

Intramurals and Athletics

When it's time to take a break from the books, the university offers several athletic alternatives. First, graduate students are encouraged to compete in the intramural programs. Active throughout the academic year, the intramural department offers numerous team sports including touch football, volleyball, indoor soccer, basketball, and softball. Leagues are developed with co-ed teams, as well as all-male and all-female teams. Individual sports include racquetball, table tennis, wrestling, golf, and tennis.

In addition to organized intramurals, open recreation periods offer a second alternative by allowing students to use facilities that include a 25-yard swimming and diving pool, a weight room facility, Nautilus equipment, and two gymnasias.

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. Sports, religious, and special-interest clubs provide many avenues for exploring your interest with a group.

University Center Board (UCB), the campus programming organization, sponsors a variety of entertainment activities for students including concerts, movies, special events, and recreational outings. For students who wish to put their creative talent to work, there are several student media outlets on campus. The student newspaper, The Guardian, which utilizes editors, writers, proofreaders, 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. WSU Cablevision, a student-run cable station, provides classroom training and experience in video production as well as programming for cablecasting throughout the Dayton area. 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 University Center Board offers a widely received foreign/cult film series and sponsors a variety of concerts, speakers, and cultural events. The University Artist Series arranges visits by nationally known artists.
GRADUATE DEGREES, PROGRAMS, AND CREDIT
Graduate Degrees and 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 student's graduate program of study is 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 the opportunity to achieve a high level of professional competence.

The following are the graduate degree programs and their concentrations.

Master's Degrees and Programs

**Aerospace Medicine/M.S.**

**Anatomy/M.S.**

**Applied Behavioral Science/M.A.**

Communication Systems and Technology, Criminal Justice and Social Problems, Training and Development

**Applied Statistics/M.S.**

**Art Therapy/M.A.T.**

**Biochemistry/M.S.**

**Biological Sciences/M.S.**

**Business Administration/M.B.A.**


**Chemistry/M.S.**

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


**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 Rehabilitation Counseling, Counseling Exceptional Children, Gerontology, Marriage and Family, Mental Health, Severely Disabled Rehabilitation Counseling, 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 Facilitator, General, Media Supervisor, Special Education Supervisor, Teacher Leader, Assistant Superintendent, Principalship, Vocational Supervisor
Student Personnel Services/M.A., M.Ed.
School Counseling, School Social Worker

Systems Engineering/M.S.Egr.
Biomedical, Electrical, Human Factors, Materials Science, Mechanical

Urban Administration/M.U.A.

Post-Master’s Degree Programs

Educational Specialist Degree/Ed.S.

Educational Leadership
Curriculum and Instruction
Superintendency

Doctoral Degree Programs

Doctor of Philosophy/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 the biological sciences, chemistry, psychology, physics, engineering, and mathematics may be accommodated in the program.

Computer Science and Engineering
The Ph.D. in computer science and engineering is open to students with degrees in computer science, computer engineering, or related areas and appropriate experience. A strong faculty in the Department of Computer Science and Engineering is assisted by qualified faculty in mathematics, statistics, and electrical engineering. The program contains both traditional and innovative components and consists of two phases. The first phase, approximately two years of concentrated study beyond the baccalaureate degree, culminates with the General Examinations. Those who pass the exams (demonstrating a knowledge of computer architecture, software systems, and either a computer science option [programming languages and theory] or a computer engineering option [linear systems and stochastic analysis]) begin the research phase, which requires another two years. Doctoral students choose research...
topics that are theoretical, practical, or both; demonstrate the use of rigorous scientific procedures; and produce original results that make a recognizable contribution to the field. Most courses are offered in the late afternoon to allow practicing computer professionals to begin the program on a part-time basis.

Educational Administration, Supervision, and Higher Education

Wright State has cooperative arrangements with Bowling Green State University for students to earn a Ph.D. degree in educational administration, supervision, and higher education.

Psychology

The Ph.D. program in the Department of Psychology is focused on the study of human factors and industrial/organizational psychology. It provides students with a unique background for approaching research, design, and evaluation of human systems or organizations. Human factors is primarily concerned with interfaces between machines (including computers) and people or with the design of specific tasks. Industrial/organizational psychology emphasizes social and motivational processes, and looks for ways to modify the set of people who interact in and with a system by selecting people who fit an environment, by training, or by designing organizational structures to motivate performance. Each student majors in either human factors or industrial/organizational psychology and minors in the other one. Students also get practical experience with applied problems, including design, evaluation, and field research. Students are expected to complete dissertation research that is innovative and leads to original results that are theoretically interesting and practically significant.

Professional Doctoral Degree Programs

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 28 hospitals and health care facilities in the Dayton-Miami Valley region, the school features a four-year curriculum with instruction in 24 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 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 students in functioning as professional psychologists 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.

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. Students who pursue the certificate as an independent program will be enrolled in nondegree status.

Certificates may be earned in the Department of Anatomy (Certificate of Anatomy); in the Department of English Language and Literatures (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); in a joint program of the Departments of Mathematics and Statistics and Management Science and Information Systems and the College of Engineering and Computer Science (Quality Assurance); and in the Department of Theatre Arts (Theatre Technology). Interested students should contact the appropriate department for further information.
Graduate Credit

Categories of Graduate Credit

Graduate Courses

In order to take graduate courses for graduate credit, students must be officially accepted for admission to the School of Graduate Studies. Courses that carry graduate credit are listed in the graduate course section of this catalog. The section also contains the course numbering system and course abbreviations.

Workshops and In-Service Courses

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

Students granted special status by the School of Graduate Studies are permitted only 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 advisor and the approval of the department/college concerned and the graduate school, graduate credit completed at another regionally accredited academic institution may be transferred to the student's master's degree program at Wright State.

Credit may be transferred if the following conditions are met:

• The student was in good standing at the other institution.
• The grades in the courses to be transferred are B or better or equivalent as determined by the School of Graduate Studies.
• The credit is within the seven-year time limit for completing a master's degree.
• The amount of credit to be transferred does not exceed 12 quarter hours.
• An official transcript reflecting the course work is on file in the School of Graduate Studies.
• The courses have not been applied toward an awarded degree.
The student has been admitted into degree status, is pursuing a graduate degree program at Wright State, and has a program of study on file in the School of Graduate Studies.

The student must have been registered for a minimum of one academic quarter in a Wright State graduate degree program.

**Credit by Examination**

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

Interested students must obtain the approval of the program advisor 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 $15 per credit hour. Students must return the form to the registrar for posting to their permanent record.

**Graduate Credit Hour Limits**

The maximum number of credit hours for which graduate students may register in a quarter is 16. 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 12 credit hours.

Students who wish to deviate from the normal registration loads listed above must have the approval of the program advisor 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 advisor 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.

**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; indicates work of B quality or better; given only for specially approved courses. (Credit is earned but is not computed in grade point averages.)
- **M** Satisfactory progress; a permanent grade will be assigned upon completion of the project.
- **U** Unsatisfactory performance; indicates work of C quality or below; given only for specifically approved courses.
- **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** Withdraw; given for courses from which the student withdrew or dropped during the fourth through fifth weeks of classes or equivalent or for which the 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. Students have until the end of the fall quarter to challenge a grade received for the previous spring quarter.
FINANCIAL ASSISTANCE, FEES, AND TUITION
Financial Assistance

Introduction

Financial aid available to graduate students includes graduate assistantships, graduate fellowships, Perkins Loans, Stafford Loans, College Work-Study employment, and short-term loans. Information concerning applications for graduate assistantships or fellowships may be obtained from the department concerned or the School of Graduate Studies. Other types of financial aid are handled through the Office of Financial Aid.

Financial aid awards cannot be finalized until students have completed the admission process. Entering students should be sure that a transcript of credits has been sent to the School of Graduate Studies.

Assistantships

Assistantships are awarded through individual departments of instruction and require students to spend a specified amount of time assisting either in instruction, research, or academic support. 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 15 credit hours per quarter.

For information regarding assistantships, directly contact the chair of the department involved or the School of Graduate Studies. To apply for a graduate assistantship, graduate students must complete a Graduate Assistantship Application form. Financial need is not a criterion for selection of graduate assistants; the Financial Aid Form (FAF) discussed in the section on Financial Aid applies to other forms of financial assistance.

Graduate Program Fellowships

Graduate students may be awarded a fellowship by an academic program. Students who are awarded a fellowship are not assigned additional duties in service to the university with the exception of research applicable to the degree. Normally, graduate program fellows must register for a minimum of 12 quarter hours of graduate credit per academic quarter. The program fellow normally receives a four-quarter appointment beginning with the fall quarter.

For information regarding the program fellowships, directly contact the chair of the department, the program director, or the School of Graduate Studies.

Graduate Academic Fellowships

Graduate academic fellowships are awarded to qualified applicants on the basis of academic merit only. However, the Student Affairs Committee of the Graduate Council is empowered to consider other factors as needed to ensure the viability of the fellowship program.
The goals of the graduate fellowship program are to recruit and retain graduate students who have demonstrated academic excellence in the past and who exhibit the potential for continued academic excellence in the future, and to recruit and retain graduate students who are underrepresented ethnic minority groups in graduate education at Wright State.

Fellowships are available to both new incoming and continuing graduate students, including those pursuing both full-time and part-time study. Fellowship applications and information concerning eligibility requirements and fellowship restrictions may be obtained from the School of Graduate Studies.

Professional Nurse Traineeships

The Professional Nurse Traineeship program was established in 1956 and expanded in 1975 to provide financial support to currently licensed professional nurses to study full time, to teach, to serve in administrative or supervisory capacities, 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.

Financial Aid

In addition to filing a Wright State University application for financial aid and a financial aid transcript(s), students and/or their parents must complete a Financial Aid Form (FAF) and send it to the College Scholarship Service. These forms may be obtained from the Office of Financial Aid. The FAF must be submitted no later than the March 1 prior to the start of the academic year to determine eligibility for the Perkins Loan, the Stafford Loan program, and College Work-Study employment program. It should be noted that the FAF is the preferred need analysis document (complete only sections A through J of this form). However, other federally approved need analysis forms will be accepted. No processing fee is required for any of these forms.

Perkins Loans

Since 1958, the federal government has been allocating funds to institutions of higher education, to be lent to students who need financial assistance to attend college. Students may borrow up to $18,000 during their 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 accrual on these loans does not begin until nine months after the student terminates at least half-time enrollment. The loan bears interest at the rate of 5 percent per year and repayment may be extended over a 10-year period. For students who become teachers of handicapped students (mentally, physically, emotionally, or economically handicapped), a certain percentage of these loans may be canceled each year.

Stafford Loan Program

Through the cooperation of lending institutions that participate in the Stafford 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 $7,500 per year, the amount received is determined by the students' computed financial need through the FAF.

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 8 percent begins at the time of repayment and increases to 10 percent beginning with the fifth year of repayment.

College Work-Study Program

Employment through the College Work-Study Program is available to students who demonstrate 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 20 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 personal needs. The entire amount of the loan must be paid in full by the fifth week of the quarter in which the money is borrowed.

Veterans’ Benefits

Veterans and active-duty personnel eligible for the G.I. Bill from the post-Korean and Vietnam periods may convert to the New G.I. Bill as of January 1, 1990. Active duty personnel and veterans must have served without a break in service after October 19, 1984, through June 30, 1985. Only veterans separating after June 30, 1988, are eligible.

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 after June 30, 1985, and paid into the program.

Applications are available from the Veterans Affairs office at Wright State University or from any VA Department of Veteran Affairs office. Educational opportunities are available for children, wives, and widows if the veterans' deaths or permanent total disabilities were service-connected. Wives and children of servicemen declared missing in action or prisoners of war are also eligible.

**Fees and Tuition**

**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. Students who register and do not pay the fees by the required due date will have their registration canceled in order to make classroom space available to other students.

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, 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. Post-dated checks will be returned to the sender.

Students may also use either MasterCard or VISA credit cards to charge most fees paid to the university. In order to use a credit card, students 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, spring, and summer quarters. For a $20 nonrefundable fee, 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 30 days apart. Further information about SIPP is available at the Bursar's Office.

Payment of fees can be mailed to the attention of the bursar, presented in person at the cashier windows, or placed in the depository safe adjacent to the Office of the Bursar 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.

Students whose fees are entirely paid by grants or scholarships must still notify the Office of the Bursar by the established fee payment deadline of their intention to attend Wright State.

Any payment made with a check not honored by the bank will result in the 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 students' enrollment or academic career. If an error is identified, a bill or refund will be issued. The university will issue a refund within 30 days or apply the credit to the account. If students do not make acceptable arrangements to pay any amount due after notification, their current registration will be canceled.
### Fees

#### 1992–93 Quarterly Fees*

<table>
<thead>
<tr>
<th>Master’s Students</th>
<th>Main Campus</th>
<th>WSU Lake Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ohio Resident</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 through 10.5 credit hours/per hour</td>
<td>$115</td>
<td>$108</td>
</tr>
<tr>
<td>11 through 18 credit hours†</td>
<td>1,214</td>
<td>1,135</td>
</tr>
<tr>
<td><strong>Nonresident</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 through 10.5 credit hours/per hour</td>
<td>$206</td>
<td>$199</td>
</tr>
<tr>
<td>11 through 18 credit hours†</td>
<td>2,175</td>
<td>2,096</td>
</tr>
<tr>
<td><strong>Academic Doctoral and Educational Specialist Students</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ohio Resident</strong></td>
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<td>2,096</td>
</tr>
</tbody>
</table>

#### Additional Fees and Charges

- Late registration fee/all students: $25
- Nondegree application fee: $10
- Application fee to change from nondegree to degree student: $15
- Audit fee/per credit hour (laboratory and special courses not open to audit): same as for credit courses
- Drop fee per transaction: $10
- Transcript fee/first request: $3
- Immediate preparation of transcript: $15
- Undergraduate and graduate degree student and certification student application fee: $35
- Returned check penalty/per check: $25
- Applied music fee:
  - one half-hour lesson per week: $80
  - one hour lesson per week: $160
- Proficiency test/per credit hour: $15
- Graduation fee: $35
- International student fee: $52
- Student's Installment Payment Plan application fee/late payment fee: $20/$25

* Fee assessment is based on course level. 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.
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 that were beyond the control of the student (e.g., hospital confinement) and that 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).

Students who officially withdraw from the university before the eighth calendar day of the quarter or its summer session equivalent will receive a 100 percent refund of instructional and general fees paid.

Students who withdraw during the eighth through sixteenth calendar day of the quarter or its summer session equivalent will receive a credit based on 70 percent of the fees assessed. Students who withdraw during the 70 percent period will be charged 30 percent of the total instructional and general fees assessed, regardless of how much they have paid at the time of withdrawal. For students on the installment payment program, the charge of 30 percent of the total instructional and general fees assessed will be subtracted from their payments to determine the amount of any refund.

No refunds will be granted after the sixteenth calendar day of the quarter. Students 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 those students. All refunds will be issued 30 days after the date of withdrawal from the university.

Students who drop 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.

All refunds of fees other than instructional and general fees must be approved by the responsible office or department before submission to the Office of the Bursar (e.g., room and board refunds must be approved by the residence life office).

Appeals regarding charges and refunds of instructional fees, late registration fees, and drop fees must be submitted in writing to the Office of the Registrar. Appeal procedures are available in that office.

Criteria for Ohio Residency

Students who are nonresidents of Ohio must pay a nonresident fee in addition to other fees and charges. The Ohio Board of Regents' Residency Rule 3333-1-10 determines who can be considered an Ohio resident and cites specific exceptions to the rules. The intent of this rule is to exclude from treatment as residents those persons who are present in the state of Ohio primarily for the purpose of receiving the benefit of a state-supported education. If you are in doubt as to your status as an Ohio resident as it applies here, see Appendix I of this catalog which lists Rule 3333-1-10 in its entirety, or contact the Office of the Registrar 513/873-2451.
ADMISSION AND REGISTRATION
Admission and Registration

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.

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

All documents received by the university in connection with an application for admission become the property of Wright State University. Under no circumstances will they be returned to applicants 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.

Admission Categories

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 was admitted provisionally, registration for future quarters will be denied and the student will lose graduate credit for any graduate courses completed during the quarter.

Conditional Status

The student who does not meet the admission requirements for regular status, or who has conditions placed on his or her admission by an academic program, is admitted to a degree program in this status. 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 12 hours of graduate credit, after being admitted into this status, with a 3.0 (a grade equivalent of a B) cumulative grade point average, regular status will be granted upon approval of the graduate program. A student who does not meet these conditions will be dismissed from the School of Graduate Studies.

Nondegree Status

A student who does not plan to work toward a degree may be admitted on a nondegree basis in order to take selected graduate courses. A student cannot receive a degree while in this status. Admission into this status does not imply or guarantee that a student will be granted admission into a degree program; the student must meet all the admission requirements for degree status. If a student is admitted into degree status after completing graduate course work in nondegree status, only 12 hours of acceptable graduate course work may be applied with program approval toward degree requirements.

A student in nondegree status must maintain a 3.0 graduate grade point average. Furthermore, a student in this status who does not have a 3.0 graduate cumulative grade point average during the quarter in which he or she completes 12 hours of graduate course work while in this status will be dismissed from the School of Graduate Studies.

Certification Status

Students who wish to complete teacher certification requirements at the graduate level but who do not wish to pursue a graduate degree may be admitted as a certification candidate. A student cannot receive a degree while in this status. Subject to subsequent acceptance into a degree program and provided the credits are acceptable to the department/college or school, a maximum of 12 credit hours may be applied toward a graduate degree. A student in this status must maintain a 3.0 graduate grade point average.

Senior Permission Status

Seniors at Wright State who have completed 162 credit hours toward the baccalaureate degree and have earned a cumulative grade point average of 3.0 may apply for permission to elect specified graduate courses for graduate or undergraduate credit. Approval must be granted by these students' undergraduate advisor, the chair of the department in which graduate or undergraduate credit is being sought, and the School of Graduate Studies. Only 12 hours of graduate course work taken for graduate credit may be applied toward degree requirements within the graduate department's or program's approval after the students have been admitted into a graduate program.
Special Status

Students in special graduate status are not considered to be admitted into the School of Graduate Studies. 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, not to exceed 12 quarter hours, 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 they are in good standing.

Admission Requirements

1. Complete an application form.
2. Pay a nonrefundable application fee.
3. Have an earned bachelors degree from an accredited college or university.
4. Request all colleges/universities previously attended to send one official transcript directly to the School of Graduate Studies. Official transcripts are required for all previous undergraduate and graduate (if applicable) college work. If courses from one university or college appear on another university's or college's transcript, the applicant is still required to submit an official transcript from the university or college where the course was taken. (Note: Students applying for nondegree status need only submit an official transcript reflecting the award of a bachelors degree from a regionally accredited college or university. Nondegree applicants having completed graduate work should also submit official transcripts reflecting that work.)
5. Meet the minimum requirements for the appropriate admission statuses as follows:

   **Regular Status**
   Admission into regular status requires 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 90 quarter hours (60 semester hours) earned toward the undergraduate degree. Admission into this status also requires approval by a degree program.

   **Conditional Status**
   Students are admitted in this status when their undergraduate grade point average is less than 2.7 but at least 2.5 (based on a 4.0 grading system) or have an undergraduate grade point average of less than 2.5 but above 2.3 if the grades in the last half of undergraduate work constitute 2.7 or better. Admission into this status also requires approval by a degree program.

   **Nondegree Status**
   To be admitted into nondegree status, a student must have a bachelors degree from a regionally accredited college or university. In addition, if the student has previously completed any graduate course work, he or she must have a 3.0 grade point average for that work.

   **Certification Status**
   This status requires a student to have a minimum undergraduate grade point average of 2.3.

6. Students who have taken graduate courses prior to seeking graduate 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.
7. Submit admission test scores, if applicable. (See the following section for test requirements.)

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 International Students section on the following page.

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 Examinations 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.

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 University Division, 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 Examinations (GRE). Information concerning the MAT may be obtained from the University Division or the School of Graduate Studies.

Graduate Record Examinations (GRE)

Applicants to graduate programs in computer science, computer engineering, social and applied economics, urban administration, and certain other programs under particular circumstances, may be required to submit scores on the aptitude and advanced portions of the Graduate Record Examinations (GRE). The GRE consists of two parts: the general test, which contains verbal, quantitative, and analytical portions, and the subject 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 fees are 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 University Division, 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 impairments who wish to take the GRE should follow the directions outlined in the GRE brochure, which is available in the University Division, 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
International Students
Wright State welcomes applications from qualified international students. Approximately 350 students on F-1 and J-1 student visas currently attend the university. Application materials may be requested from the Office of International Student Programs. Applications for admission must be completed three months 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. Several departments or programs have set higher requirements for English proficiency. In addition, international students may be required by their academic advisors to take a university-administered English writing placement test. Students failing this test may 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 and academic fellowships, 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. In addition to meeting the standard English requirements, graduate teaching assistant (GTA) applicants must score 250 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 institutional TSE on campus. Those applicants financing their own education from personal funds must also submit an official bank statement together with the financial statement. 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 advisor 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 Immigration and Naturalization Service. Transfer students must present evidence of above-average ability to do college work.

Registration
Students must be admitted to the School of Graduate Studies in order to register for and earn graduate credit. However, students granted special status may also earn graduate credit, but only in workshop courses.

Wright State is on the quarter system. The academic year is divided into three quarters (fall, winter, and spring) and a summer session (two five-week terms or one 10-week term). There are three different registration periods: early, open, and late. Registration dates for these periods are announced in the quarterly class schedule.

Registration Procedures
Initial Registration
Upon completion of the admission requirements and acceptance by the School of Graduate Studies, students are authorized to register.

Students in the following programs must meet additional requirements before registration will be authorized:

1. Students admitted to the Biomedical Sciences Ph.D. program will be given registration instructions during the fall quarter program orientation period.

2. Students admitted to the Geological Sciences program will receive their registration instructions 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
International Students

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3. Students admitted to the M.B.A. program and the M.S. programs in social and applied
Master's Degree

General Requirements
The School of Graduate Studies administers academic policies and procedures and enforces graduate degree requirements determined by the Graduate Council and applicable to all graduate students. In addition, graduate degree programs may set additional policies and degree requirements. It is important for students to be familiar with both graduate school and degree program policies and requirements, since both must be adhered to for satisfactory academic performance and subsequent graduation. The following sections address graduate school policies and requirements and act as a general guide.

Program of Study
A student's program of study is administered by the department or college/school and is subject to the approval by the School of Graduate Studies. The program of study is a defined program that is negotiated between a student and an academic department offering a program. The institution specifically indicates that it will award the degree sought by the student if the work stipulated in the program of study is satisfactorily completed. Similarly, the student specifically agrees to the responsibility for completing the program as stipulated in the program of study.

The program of study will be used by the School of Graduate Studies to certify students for graduation, to assist in the evaluation of requests for transfer credit, and to verify graduate student petitions requesting waivers to academic policies. Consequently, degree certifications, transfer credit requests, and petitions will not be processed without a completed current and/or amended program of study on file in the student's academic folder in the School of Graduate Studies.

Credit Hour Requirement
All master's degree programs at the university require completion of 45 or more credit hours of graduate course work. A department may require completion of more than 45 credit hours. Please consult requirements for a specific degree and major area.

Residence Requirements
Students are considered to be in residence whenever they are registered on campus as graduate students. A minimum residence of three quarters at Wright State University, devoted wholly or partly to graduate work, is required. In addition, a minimum of 33 credit hours toward the master's degree must be completed at Wright State.

Retroactive Graduate Credit
Under the rules of the Graduate Council, students must be admitted to the School of Graduate Studies in order to receive graduate credit.

Certification and nondegree graduate students who later attain degree status may normally apply with program approval, only 12 quarter hours earned as certification or nondegree students toward a graduate degree. Graduate credit cannot be given for courses completed in order to qualify students for admission to graduate standing.

Students earning workshop credits under special student status (not admitted to the School of Graduate Studies) who later apply for admission and attain degree status may also apply, with program approval, only 12 quarter hours toward a graduate degree.

Academic 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 applied toward the requirements of a graduate degree.

An average of 3.0 for all graduate course work 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. Students must also receive the recommendation of the departmental faculty after an evaluation based on total performance.

Student Evaluation
At the end of 12 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 24 credit hours, whichever comes first, each student will be evaluated by the departmental faculty. This evaluation will be
based on 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) recommended for dismissal from graduate study at this university.

Probation

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 12 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 the Graduate Thesis/Dissertation Handbook, published by the School of Graduate Studies and available in the graduate office. The requirements outlined in this manual are basic minimal criteria that have been approved by the Graduate Council for preparing the thesis. Students should seek the advice of their thesis supervisors and departments for further details. Students are encouraged, but not required, to obtain a format check prior to the final deposit of the 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 advisor and committee.

Students should consult with the academic department as to the course or courses and number of credit hours for which they should register while working on an approved thesis. One unbound copy of the thesis, in prescribed form, is to be taken to the graduate office no later than 30 days after the date the degree was granted. (The due dates are published by the graduate school and distributed to the departments and program offices.) The thesis copy submitted to the graduate school is sent to the library, where a microfilm copy of it is made. The microfilm copy is considered an archival copy and is deposited in the university’s closed stacks in the library. The thesis copy is made available for circulation in the library. Since some departments require additional thesis copies, students should consult their advisors to determine the total number of copies needed.

Comprehensive 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 must satisfactorily complete written and/or oral examinations conducted by the major committee prior to the submission and approval of the thesis. Arrangements for taking the examinations should be made with the candidate’s advisor and the department at least three weeks in advance.

Time Limit

A student must complete all requirements for a master’s degree within seven years unless the student’s specific program has a shorter time limit. The time limit is defined as being from the beginning date of the earliest course taken at Wright State University included in the program of study for the degree.

This time does not include a leave of absence granted in advance for adequate cause by petitioning the Graduate Petitions Committee. Graduate students who fail to take courses or otherwise to pursue their graduate education for a period of one calendar year will automatically be retired from the active files of the School of Graduate Studies. Reapplication for admission will be required to reactivate the student’s records. (No additional fee will be charged).

Second Master’s Degree

A second master’s degree may be earned by taking a minimum of 33 credit hours. Credits for the second master’s degree must be taken after the award of the first master’s degree. These hours must be taken at Wright State University. Departments or programs may specify additional requirements depending on 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.
Dual Master's Degree Program

A dual master's degree program permits common course work to apply toward two graduate programs. Currently, Wright State has approval to offer only one dual program: a Master of Business Administration (M.B.A.) degree and the Master of Science (M.S.) degree in social and applied economics. The requirements for this program are contained in this catalog under College of Business and Administration programs.

While working on a graduate degree at Wright State, a student can take course work that may later be applied toward the requirements of a second Wright State graduate degree provided:

1. the courses are not required by the graduate program that the student is currently pursuing.
2. the student has been granted prior permission (before registering for the courses) by the chair or director of the graduate program to which the courses will be applied and the chair or director of the program into which the student was originally admitted.
3. an approved program of study is on file in the School of Graduate Studies for the second program prior to registering for the graduate course(s).
4. after completing the first program, the student submits a formal application (no fee or transcripts required) to the School of Graduate Studies for admission into the second program.
5. the student is admitted and matriculates into the second program for a minimum of one quarter (at least 12 quarter hours of additional graduate course work during the period of matriculation).
6. the student possesses a minimum of 33 quarter hours of graduate credit (beyond the first master's degree) in order to be awarded the second master's degree.

This policy does not apply to students working on graduate degrees at other institutions.

Application for Degree

Degree candidates must submit a formal application for graduation. The university has established the following filing periods for submitting applications for degrees, based on anticipated date of completion (indicated in parentheses).

- May 15 to August 21 (December)
- November 1 to December 7 (March)
- February 1 to March 1 (June)
- April 25 to May 25 (August)

Applications for graduation may be obtained in the registrar's office. A fee of $35 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 School of Graduate Studies.
2. Complete the requirements for the graduate degree within seven 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 during the quarter in which a thesis is defended.
5. Successfully complete the final comprehensive examination (if required in program).
6. Present one copy of an approved thesis (if required in program).
7. Complete a minimum of 45 quarter hours of program required graduate credit. A minimum of 33 quarter hours of graduate credit must have been completed at Wright State.

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

Graduate students may request a "fresh start" when changing or returning to graduate programs within the School of Graduate Studies. A "fresh start" is defined as beginning a graduate program and having the graduate academic record recalculated to reflect no hours attempted and no graduate grade point average for the new program. A "new program," for fresh start purposes, is defined as a program into which a student transfers while in active status, or a program to which a student returns from inactive status. All courses previously taken at Wright State University will remain on the student's academic record.

Course work completed in a previous Wright State program or other institutions' graduate programs will not be automatically transferred or applied to the requirements of the new program. The new graduate program may, however, recommend to the School of Graduate Studies which courses previously taken are acceptable for transfer into the new program. In no cases will the transfer credit exceed 12 quarter hours. All credit recommended for acceptance must meet the transfer credit policy contained in the Graduate Catalog. After the dean of the School of Graduate Studies approves the transfer credit, the program advisor should enter the courses on the student's program of study. Transfer credit will not be computed into the student's graduate grade point average for the new program.

A student granted a fresh start will be admitted into the new program as a conditional degree-seeking student.

Concentrations of graduate programs do not constitute a new program and, therefore, do not apply to the fresh start policy.

The new program must be completed with a minimum of 45 quarter hours of graduate credit.

The seven-year rule for completing the program requirements starts with the quarter in which the student first registers for courses required by the new program.

To be considered for a fresh start, the student must submit an application to the dean of the School of Graduate Studies. Application forms are available in the School of Graduate Studies office. The dean can approve the application or defer action on it to the Student Affairs Committee of the Graduate Council, which is the final appellate body for such decisions. The student and the academic program are advised by letter of the dean's or the Student Affairs Committee's decision. If a favorable decision is rendered, the registrar is sent a copy of the approved application and advised to make the appropriate adjustments to the student's academic record.

Only one fresh start will be granted to a graduate student at Wright State University.

Petitions to waive any of the conditions of the fresh start policy will not be favorably considered by the School of Graduate Studies.

Fresh Start in Another Graduate Program

A graduate student may be granted a fresh start in another graduate program if:

- the graduate student is currently in active status or is in inactive status for less than five years since withdrawal or dismissal from a graduate program at Wright State University.
- the student has applied for admission and has been accepted by a graduate program different from the one that the student is currently pursuing or had pursued (an admissions petition may have to be submitted to permit acceptance into the graduate program).
Fresh Start in the Same Graduate Program

A fresh start into the same program may be granted to students who have withdrawn or were dismissed from a graduate program at Wright State University under the following conditions:

- A period of time of no less than five years has expired since the student withdrew or was dismissed from a Wright State graduate program.

- The student has been accepted into the same graduate program (an admissions petition may have to be submitted to permit acceptance into the graduate program).

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 the College of Business and Administration and the School of Graduate Studies.

All other requests for change of program must be processed by completing and submitting an application for admission (no fee required) to the School of Graduate Studies. (Note: New letters of recommendation may be required. If permission to use the previous letter or letters for the new program is granted in writing to the student by the original author or authors and the new program, new letters will not be required.) The application and supporting documents will be forwarded to and reviewed by the program concerned and subsequently by the director of graduate admissions and records. The School of Graduate Studies will notify students of the admission decision.

Petition Procedure

Students who wish 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. These students should include all supporting documents and must have the recommendation of the advisor, 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 a petition will not be considered as a precedent for any future action.

Post-Master’s Degrees

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

An applied 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.

The Doctor of Philosophy (Ph.D.) 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 College of Engineering and Computer Science, and the School of Medicine.

A Ph.D. program in computer science and engineering is offered by a program faculty in the College of Engineering and Computer Science.
Academic Policies and Graduate Degree Requirements

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 135 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 76 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 an overall minimum grade point average of 3.0 (B) in all courses in which a 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 students’ 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 the candidacy examination.

Dissertation
Students pursuing the Ph.D. degree must conduct an acceptable original research effort and submit a dissertation based on that research. The dissertation must be approved by the dissertation 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 dissertation defense.

A copy of the approved and defended dissertation, signed by the dissertation supervisor, dissertation or advisory committee, and program director must be submitted to the graduate dean for approval. The final copy of the dissertation must be submitted to the office of the dean of Graduate Studies no later than 30 days after the date of graduation.

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

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 135 hours of acceptable graduate credit
6. Meet residency requirements
7. Successfully defend the dissertation
8. Be registered in the quarter the degree is conferred
9. Present one copy of the approved dissertation to the graduate school office
10. Fulfill all requirements within nine years of entrance into the program
Doctor of Psychology (Psy.D.) Degree

This program is offered by the School of Professional Psychology. The mission of the school is to educate and train qualified individuals from culturally diverse backgrounds at both doctoral and postdoctoral levels for quality practice in professional psychology; foster the development of psychological approaches to the amelioration and prevention of human problems; and model high-quality psychological services.

For information concerning admission, the program, and scholastic policies and procedures, contact the School of Professional Psychology.

Doctor of Medicine (M.D.) Degree

The Wright State School of Medicine offers an innovative, four-year curriculum with instruction in over 20 academic departments. Students will graduate from the School of Medicine with a solid understanding of the basic and clinical sciences. In addition, students will learn to address patient care in a manner that considers the entire individual, including the promotion of health and the prevention of diseases rather than just the immediate diagnosis of a disease or injury.

Additional information concerning the Doctor of Medicine program and admission requirements may be obtained by contacting the School of Medicine.
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 Health. The program provides fundamental information about aviation and spaceflight 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 airmen and airwomen.

The Graduate Faculty

Professors
Winslow J. Bashe, Jr. (Emeritus), epidemiology
Stanley R. Mohler (director), aerospace medicine

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

Assistant Professor
Robin E. Dodge, aerospace medicine

Admission

The minimum requirement for admission to the M.S. degree program in aerospace medicine is the M.D. degree, a clinical year of medical training, and the general requirements for admission into the School of Graduate Studies. Prospective students communicate with the Department of Community Health 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
CMH 601, 602, 621, 622, 641, 642, 651, 652, 654, 656, 701, 711, 731, 899; MGT 621

Anatomy

The Department of Anatomy offers a program leading to the Master of Science degree (M.S.) or a certificate. The major purpose of the Master of Science and certificate programs is to provide the student with a solid foundation in anatomy that can serve as a basis for further graduate studies. A continuation of graduate studies with faculty in the Department of Anatomy leading to a Doctor of Philosophy (Ph.D.) degree is available through the Biomedical Sciences Ph.D. Program.

The Graduate Faculty

Anatomy

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

Associate Professors
Frank Nagy, ultrastructure, cell division, kinetics, male reproductive system, embryology
Gary L. Nieder, early embryo development, embryo implantation
John C. Pearson, neuroanatomy
Larry J. Ream, osteobiology
Jane N. Scott, embryology, reproductive systems

Assistant Professor
Andrew J. Kuntzman, kinetics of the musculoskeletal system

Admission

Criteria for admission to the certificate program are the same as for admission to the master’s degree in anatomy. Minimum requirements include an overall undergraduate grade point average of 2.7. Although there are no uniform prerequisites, most students admitted to the Department of Anatomy have completed at least three years of course work in biological sciences and have a grade point average of 3.0 or better.

The certificate program and the master’s degree in anatomy are closely interlocked. Admission requirements are the same. Course work taken during the first year is nearly identical. Students initially admitted to the certificate program may seek admission to the master’s program prior to completing 12 hours of graduate work. Conversely, students in the master’s program will be awarded a certificate after completion of the minimal requirements of the certificate program.
Degree Requirements

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

1. Completion of a minimum of 45 graduate credit hours in courses that have prior approval of the department. Approval is normally given through the student's faculty advisor.
2. The 45 graduate credits must include 21 credit hours of core courses in anatomy.
3. Required courses are human gross anatomy, microanatomy, neurobiology, and four one-hour seminars.
4. The master's degree also requires the submission and oral defense of a thesis based on original research performed while enrolled as a graduate student at the university.

Residency

Full-time students generally complete the master's degree program in two years. The certificate program can be completed in one academic year.

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 in the planning and evaluating of applied behavioral programs. Following this basic training, each student engages in an individualized program of study in one of the areas of concentration based on his or her personal interests and professional goals. The areas of concentration are communication systems and technology, criminal justice and social problems, and training and development. Specialization can also be arranged in related areas, depending on faculty interest. The individual program of study includes courses in research statistics and methodology, and 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 advisor selected to suit his or her interests and goals.

Participating Faculty

Communication Systems and Technology

Professors
Lewis Shupe, media performance, research methods
Robert Pruett (area head), communication theory, persuasion
James Sayer, mass communication, communication analysis, freedom of speech

Associate Professors
Dan DeStephen, communication research, statistics, computer applications
Barbara Eakins-Reed, male-female communication, nonverbal communication
William Hanks, media design and evaluation, media aesthetics, media law

Assistant Professors
Jeffrey John, message design and evaluation, print media, visual communication
Henry Ruminski, public relations, computer applications, print media

Criminal Justice and Social Problems

Professors
Jeanne H. Ballantine, relations in complex organizations, role transitions
Helen A. Klein, developmental processes, early childhood
Lawrence A. Kurdek, social, affective, and cognitive development
Matthew Melko, social problems, industrial sociology
Jerald O. Savells, family functioning, social deviance, stress management
Harvey A. Siegal, health care delivery systems, alcohol treatment
Gordon Welty, juvenile justice, social theory

Associate Professors
Bela J. Bogner, social gerontology, community mental health
Thomas E. Koebernick, organizational networks, research methods
David Orenstein, social communication, interaction theory, developmental processes
Norma Shepelak (area head), criminology, deviance, social psychology

Assistant Professors
Anita Curry-Jackson, social work
Jean M. Edwards, personality, stress
50 Programs/Applied Behavioral Science

Ellen Murray, penology, juvenile delinquency
Dennis Rome, research methods, social data
Mark Sirkin, research methods, statistics
In Soo Son, research methods, statistics

Training and Development

Professors
Beverly A. Byrum, androgyny, process consulting, interpersonal communication
Robert E. Pruett (director and area head), communication theory, persuasion, conflict
James E. Sayer, mass communication, rhetorical analysis
Lewis Shupe, research design and methods

Associate Professors
Daniel DeStephen, labor-management negotiations, research design, statistics
Barbara W. Eakins, male/female and nonverbal communication
Ronald C. Fetzer, organizational theory training and intercultural communication
William E. Hanks, media research, critical thinking

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 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
The program of study has four components. The first is the research methods. Entering students develop research competence by completing the methodology course sequence. Second, each student completes an individualized set of courses in his or her concentration area consisting of foundation 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. In certain situations, course work may be substituted for the practicum. The fourth part of the training consists of the thesis. The 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 communication systems and technology, criminal justice and social problems, or training and development.

Program of Study

Research Methods
ABS 721, 722, 723

Concentration Courses

Planned by student and advisor

Practicum ABS 779

Thesis ABS 799

Total

55–65

Communication Systems and Technology
Communication systems and technology is concerned with construction and analysis of effective human communication systems in society, and in social service, governmental, and industrial organizations. Students in this specialization analyze print and electronic message design and conduct research into communication effectiveness relative to target audiences. The program includes applied
experience in practicum settings and completion of an applied thesis research project.

**Required Specialization Courses**

ABS 751 Organizational Training and Development
ABS 753 Message Design and Evaluation
ABS 754 Channel Design and Evaluation
COM 741 Communication Theory

**Selected Electives**

ABS 752 Process Consultation
ABS 766 Work Motivation
ABS 788 Graduate Seminar in Applied Behavioral Science
COM 611 Performance for the Media
COM 654 Feature Story Writing
COM 658 Editing for the Media
COM 660 Media Programming and Management
COM 664 Media Criticism
LCS 736 Advanced Production of Media Materials

**Criminal Justice and Social Problems**

The criminal justice and social problems concentration is concerned with the social, psychological, and legal responses to normal and deviant behavior. This area of specialization is designed to acquaint students with current social problems and deviant behaviors (e.g., the criminal justice system and the adult problems, family stress and violence, and elder abuse) as well as society's response to these problems. The program is designed to provide students with advanced applied skills needed to develop, manage, and assess programs of a correctional, educational, or service nature. The program requires experience in practicum settings and the completion of an applied thesis research project.

**Required Specialization Courses (Select 2)**

ABS 771 Seminar on Criminal Justice
ABS 741 Seminar on Life Stages and Life Changes
ABS 761 Seminar on Social Deviance
ABS 781 Seminar on Family Problems

**Selected Electives: Criminal Justice**

ABS 751 Organizational Training and Development
ABS 788 Stress Management Distress and Social Change
COM 653 Communication and Conflict
MGT 700 Organizational Behavior and Theory
PSY 635 Abnormal Psychology
PSY 647 Psychology of Aging
RHB 730 Epidemiology of Chemical Dependency
RHB 731 Treatment Approaches in Chemical Dependency
SOC 520 Sociology of Deviant Behavior
SOC 532 Juvenile Delinquency
SOC 639 Selected Topics in Problems/Deviance
SOC 670 Future of the Family
SW 681 Generalist Practice with Individuals
SW 683 Generalist Practice with Families

**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 needed changes identified by the communication process. Students typically undertake practicum placements in industrial and organizational settings.

**Required Specialization Courses**

ABS 751 Organizational Training and Development
ABS 752 Process Consultation
ABS 766 Work Motivation
COM 741 Principles and Application of Communication Theory

**Selected Electives**

ABS 770 Seminar in Industrial/Organizational Psychology
ABS 775 Methods in Health Care Research and Evaluation
ABS 788 Graduate Seminar in Applied Behavioral Science: Andragogical Mystique
ABS 788 Graduate Seminar in Applied Behavioral Science: Organizational Dynamics
COM 641 Advanced Interpersonal Communication
COM 643 Interviewing
COM 645 Conference Leadership
COM 647 Organizational Communication
COM 651 Communication Consulting and Training
COM 653 Communication and Conflict
COM 655 Nonverbal Communication
MGT 621 Graduate Survey in Management
MGT 700 Organizational Behavior and Theory
MGT 706 Organizational Development and Change
PSY 521 Cognition and Learning
PSY 727 Small Groups
PSY 743 Psychology of Leadership
PSY 763 Advanced Motivation

Applied Mathematics
See Mathematics

Applied Statistics
See Statistics

Art Education
See Education and Human Services

Art Therapy
See Education and Human Services

Biochemistry
The Department of Biochemistry offers a program of study leading to the Master of Science degree in biochemistry. The major purpose of the M.S. program is to provide the student with a strong biochemical background that can serve as a basis for further graduate or professional study. Graduate study with faculty in the Department of Biochemistry leading to a Doctor of Philosophy degree is available through the Biomedical Sciences Ph.D. Program.

Major research interests of the department are grouped into three interrelated areas: signalling mechanisms between and within cells, molecular genetics, and the application of magnetic resonance (MR) to biomedical research. Specific research projects deal with the structure and function of membranes, proteins and enzymes, nucleic acids, chromatin structure and function, molecular genetics, nucleotide metabolism, and the use of MR to study biochemical phenomena.

The Graduate Faculty
Professors
Prem P. Batra, conformation and secondary structure of proteins, nucleotide metabolism
Emil P. Kmetec (Emeritus), mammalian kidney, basement membranes
Daniel T. Organisciak (chair), visual biochemistry, membrane metabolism, neuronal lipid metabolism
Robert A. Weissman, in vivo magnetic resonance, positron emission tomography

Associate Professors
Gerald M. Alter, enzyme structure, hemoglobin conformation, site directed mutagenesis
H. Ira Fritz, clinical nutrition
Michael Lefkak, DNA replication and cloning
Lawrence J. Prochaska, energy-transducing membranes, cytochrome oxidase

Assistant Professors
Michael Boska, MR-human spectroscopy
Carolyn Minth, expression and regulation of neuropeptides
John V. Paietta, gene expression, recombinant DNA
Nicholas V. Reo, carbohydrate metabolism, in vivo magnetic resonance

Adjunct and Joint Faculty
Paul G. Seybold, professor (chemistry), chemical carcinogens, physical biochemistry

Voluntary Faculty
Darrell E. Fleischman, associate professor, cyclic nucleotides, biophysical aspects of photosynthesis
Bruce M. Jarnot, assistant professor (WPAFB), mechanisms of chemical toxicity

Admission
Applicants must fulfill the requirements for admission established by the School of Graduate Studies. A bachelor's degree in the biochemical, biological, or chemical sciences, including course work in organic chemistry, physics, and calculus, is generally required. In addition, letters of recommendation are an important admission consideration.

Degree Requirements
Qualification for the Master of Science degree requires a candidate to fulfill the requirements of the School of Graduate Studies, to complete departmental course work, and to submit an acceptable research thesis.

Summary of Course and Thesis Requirements
1. Biochemistry lecture sequence (BCH 750 and 752). A grade of B must be obtained in
each quarter of these courses. If a B is not obtained, the student may repeat the course (or courses) once. A repeat of BCH 750 and/or 752 must be completed within a year of the quarter in which the deficiency occurs.

2. Radioisotope Principles (BIO 743)
3. Research Perspectives (BCH 702)
4. Graduate seminars: a total of four credit hours of graduate-level seminars in biochemistry or other departments.
5. Two additional 700-level courses; these may include 700-level courses from other departments.
6. The student and his or her thesis advisor will have the responsibility for selecting advanced courses and seminars suited to each student’s program needs and interests.
7. The thesis must be based on hands-on research. The thesis advisory committee must be made up of at least three faculty from the Department of Biochemistry. The student will orally defend the completed thesis and present a departmental seminar on his or her research.

Biological Sciences

The program leading to the Master of Science provides students with the opportunity to gain a solid foundation in modern interdisciplinary biology in preparation for careers as professional biologists in industry, government, or education and research organizations or for further professional training.

Areas of concentration available through the Department of Biological Sciences are cellular/molecular biology including recombinant DNA, molecular genetics, cell models of carcinogenesis, differentiation, and regulation, and organismic/environmental biology including aquatic biology, genetics, animal and plant physiology, parasitology, environmental microbiology, ecology, and toxicology.

Instructional areas within the department consist of formal course work, laboratory research, and special topic seminars. 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 students 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 in biology, therefore, may receive exposure to subjects in the field of specialization, in related biological fields, and to supporting disciplines outside the department.

Students 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 on 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 specific 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 Two generally involves a greater level of involvement in formal graduate courses. Candidates may elect Option Two only after receiving permission from the graduate faculty member who will serve as the advisor and the departmental Graduate Studies Committee. 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 students only after consultation with the chair of the graduate committee. Consideration for electing the appropriate option must be given to the availability of research topics and advisors and to the student’s research and educational interests.

All candidates, regardless of the option chosen, are required to obtain a major advisor 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 advisor 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

Professors
Larry G. Arlian, medical entomology, immunoparasitology, physiology
Wayne W. Carmichael, aquatic biology/toxicology, isolation, culture, toxicology of toxic algae, biotechnology
Shigeru I. Honda, plant organelle structure and function
Jerry H. Hubschman, aquatic biology, parasitology
George J. Kantor, molecular genetics, DNA repair in eukaryotes
Randy C. Moore (chair), plant developmental biology, gravitropism
Marvin B. Seiger, behavioral genetics, ecological genetics

**Associate Professors**

James P. Amon, microbial ecology, including molecular biology, cell biology, and electron microscopy
Clyde D. Barbour, systematics and ecology of fishes
G. Allen Burton, ecotoxicology
Barbara E. Hull, cell biology, histology, electron microscopy, reconstruction of skin in vitro
Mark D. Mamrack, cellular biochemistry, signal transduction, carcinogenesis
Adrian V. Rake, molecular effects of trisomy, aneuploidy
John D. Rossmiller, molecular biology
James R. Runkle, plant ecology, general ecology
Timothy S. Wood, invertebrate ecology, biology of freshwater bryozoans

**Assistant Professors**

Pamela S. Fink, molecular biology, microbial genetics
David L. Goldstein, comparative physiology of osmoregulation, physiological ecology, ornithology
Iain M. Miller, plant-microbe interactions, nitrogen fixation, leaf and root nodules, hypermedia education

**Admission**

In order to meet the minimum requirement for admission to the graduate program in biological sciences, applicants must fulfill the requirements for admission established by the School of Graduate Studies. In addition, a bachelor's degree in the biological or biochemical sciences, including course work in organic chemistry, physics, and calculus is generally required. Admission preference is given to students with a grade point average of 3.0 or better on a 4.0 grading scale. Letters of recommendation are also used in evaluating students for admission.

**Facilities**

The Department of Biological Sciences is housed in a modern, air-conditioned building, well equipped with the newest research instruments. The department maintains 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 greenhouse, radioisotope laboratories, and an electron microscopy center, including complete darkroom capability. The Biological Sciences Building, completed in 1975, 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 counters; amino acid analyzer; infrared, visible, and ultraviolet spectrophotometers; spectrofluorometer; preparative ultracentrifuges; nuclear magnetic resonance spectrometer; mass spectrometer; a wide range of instruments for light microscopy; transmission and scanning electron microscopes; preparative and analytical chromatography instruments; specialized cell and tissue culture facilities; and facilities for recombinant DNA research; and computer services (both PCs and mainframe).

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

The department has excellent working relationships with other departments on campus, with the scientific complex of Wright-Patterson Air Force Base, and with several facilities that are affiliated with the Wright State University School of Medicine.

**Financial Assistance**

Several graduate teaching assistantships and a limited number of graduate research assistantships are available on a competitive basis. These appointments carry a waiver of most tuition and instructional fees for both residents and nonresidents. Appointments are made for the academic year and may be renewed for a second year. Additional assistantship support may be available for the summer quarter. See the "Financial Assistance, Fees, and Tuition" section of the graduate catalog for details.

**Degree Requirements**

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

1. The candidate must complete a minimum of 45 quarter credits. A maximum of 10 credits of graduate courses may be transferred from other institutions. The candidate must participate in the graduate seminars for at least 4 hours of credit. A course in scientific writing (such as BIO 608) is also required.

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 9 credit hours of C grades applicable to the degree.

4. The following requirements apply respectively to the three degree options available. Option One candidates must submit and orally defend a thesis based on original research performed while enrolled as graduate students at the university. Option Two candidates must submit and orally defend a thesis based on a critical review of an extensive collection of published material on an appropriate subject. Option Three candidates must complete 45 credit hours of graduate course work. A maximum of 12 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 advisor. The remainder of the credits, including the 4 seminar credits, must be earned in the life sciences departments. Option Three students are required to complete 4 to 6 credits of BIO 699, Special Problems in Biology. 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.

The primary aim of the program is to prepare students for a research career. In-depth study is possible in a number of areas.

Participating Faculty

The program is a cooperative effort between the College of Science and Mathematics, the College of Engineering and Computer Science, and the School of Medicine, and includes scientists from the Cox Institute, Kettering, Ohio, and the Armstrong Aerospace Medical Research Laboratory at Wright-Patterson Air Force Base.

The program faculty at Wright State reside in a number of departments including anatomy, biochemistry, biological sciences, chemistry, community medicine, computer science, biomedical and human factors 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 120 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

Predoctoral fellowships are available to students on a competitive basis. Students awarded fellowship 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 biochemistry and molecular
biology, cell biology, cell physiology and biophysics, and biostatistics. The advanced curriculum is organized into interdisciplinary tracks or areas of concentration.

The program requires students to take 18 credit hours of advanced courses and six 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 12 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**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry and Molecular Biology I</td>
<td>8</td>
</tr>
<tr>
<td>Cell Biology</td>
<td>4</td>
</tr>
<tr>
<td>Cell Physiology and Biophysics</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to Interdisciplinary Research</td>
<td>4-8</td>
</tr>
<tr>
<td>Biostatistics</td>
<td>4</td>
</tr>
<tr>
<td>Laboratory Rotations (a minimum of two)</td>
<td>6-12</td>
</tr>
<tr>
<td>BMS Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Core Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

**Advanced Courses**

18

**Seminars**

6-9

A minimum of six (including BMS Seminar and Core Seminar above)

**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. Extemuating 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 76 credit hours toward the doctoral degree must be completed at Wright State University.

**Curriculum Overview**

**Year I**

**Quarter I**

Biochemistry and Molecular Biology I

Cell Biology

Introduction to Interdisciplinary Research

Biomedical Sciences Seminar*

**Quarter II**

Biochemistry and Molecular Biology II

Cell Physiology and Biophysics

Introduction to Interdisciplinary Research

Biomedical Sciences Seminar*

Laboratory Rotation†

or Advanced Course

**Quarter III**

Core Seminar

Advanced Course

Research

Biomedical Sciences Seminar*

Lab Rotation†

**Quarter IV**

Advanced Course

Research

Biostatistics

Seminar*

Lab Rotation†

**Year II-Year IV**

Complete advanced courses

Take preliminary examination (by end of Year II)

Seminars*

Research leading to dissertation and defense

*A minimum of six (including BMS Seminar and Core Seminar)
†A minimum of two

**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 advisor, 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 Year I, failure to reattain a cumulative GPA of 3.0 within the next 12 credit hours of course work will result in a recommendation for dismissal from the program.

First-year students enrolled in the core curriculum must achieve an overall grade point average of at least 3.0 after completing Year I. Students who complete Year I with a GPA of less than 2.7 will be recommended to the dean of the School of Graduate Studies for dismissal from the program. Students with a GPA above 2.7 but below 3.0 must reattain a 3.0 by the end of the next quarter (fall). Students who fail to reattain a GPA of 3.0 by the end of fall quarter following Year I will be recommended for dismissal from the program. Students who receive a C in a core course during Year I may repeat the course while continuing advanced courses as determined by the program director. If a student repeats a core course, the grade received the second time will be used in calculating the student's GPA.

Students who fail 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 Affairs.

Summary of Requirements

Listed below is a summary of the requirements for the Doctor of Philosophy degree in biomedical sciences at Wright State University. Students 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 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 one copy of the approved dissertation to the School of Graduate Studies and one copy to the BMS program office
11. Fulfill all requirements within nine years of entrance into the program

Students who have an M.D. degree or are in good standing in the preclinical curriculum of an accredited medical school may be exempted from the BMS core curriculum. Depending on the area of concentration, and the recommendation of the dissertation director, a student may be exempted from 12 hours of advanced courses based on medical credit. Similarly, one of the two lab rotations may be exempted if a student has previously participated in a research project. Topics for the preliminary exam shall be specified by the supervisory committee. Students must accumulate a minimum of 100 quarter hours in the biomedical sciences. All other requirements for the Ph.D. in biomedical sciences are the same as listed previously.

Areas of Concentration

Bioengineering and Biodynamics

Advanced study in biomedical and human factors engineering and biodynamics has emerged as a valuable approach to our understanding of and intervention into complex biological systems. Current areas of interest include medical imaging of bone and noninvasive measurement of bone density; diagnostic ultrasound, biological signal processing, and tissue characterization; mathematical modeling and advanced data manipulation via computer simulation, especially of the cardiopulmonary system and skeletal and cardiac muscle; theoretical and experimental study of gas transport with high-frequency ventilation; rehabilitation engineering and devices to aid the disabled, including functional electrical stimulation of muscle, augmentative communication devices, and an artificial urinary sphincter.
The scope of health care is increasingly dependent on engineering concepts for the invention of sophisticated new research, diagnostic and therapeutic instruments, prostheses, and other medical devices. Also, the application of systems engineering to pharmacokinetics in disease states is expected to provide more effective drug therapy.

Courses emphasize engineering principles and their application, including biomechanics, biofluids, bionanotransport and artificial internal organs, biomaterials, biothermodynamics and heat transfer, biophysics, mathematical modeling and computer simulation, medical instrumentation, and medical imaging.

**Biosystems**

Biosystems teaches the physiological and biophysical approach to understanding life processes at the organ and cellular level and thus serves to explain pathophysiological deviations from the normal. Coronary artery disease, hypertension, and stroke are major causes of human morbidity and mortality in the United States. Chronic renal disease and bronchopulmonary 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. In addition, nervous and mental disorders affect a significant proportion of the patient population in this society. A preventative approach toward these diseases is most desirable; however, to accomplish this aim it is necessary to increase research directed to the understanding of each of these organ systems and their interactions.

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 with simultaneous studies at the cellular level, autonomic control, bone formation and growth, fluid and electrolyte balance, transport in the gastrointestinal system, the structure and function of the reproductive systems, the nervous system, and the integument.

**Genetics**

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

A student in the genetics concentration initially receives instruction in one of the broad fields of genetics (molecular, microbial, or human) and, through subsequent course work, defines a more limited area of interest and investigation. Through a series of lecture, laboratory, seminar, and independent study experiences, students are trained in modern methods of isolating nucleic acids and characterizing their structure and biological activities. The methods used in such characterizations are at the molecular, cellular, and organismal levels. These techniques include recombinant DNA methodology, cloning, sequencing, transfection, electrophoresis, hybridization, oligonucleotide synthesis, modern cytogenetic procedures, and computerized statistical analysis.

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

**Molecular and Cellular Biology**

Present-day biomedical research focuses on the determination of the molecular and cellular basis for disease processes. Research using the molecular and cellular approach has led to a tremendous increase in the understanding of the etiology of cancer, heart disease, and aging. Research disciplines such as biochemistry, biophysics, cell biology, immunology, microbiology, molecular biology, and virology have contributed significantly to the detection and treatment of these diseases. The key molecular and cellular processes involved in disease that are studied in our area of concentration include: macromolecular structure of biological molecules including proteins, enzymes, and membranes in normal and diseased cells; altered control of metabolic pathways and cell energy metabolism in disease; gene expression in normal and transformed cells; changes in cellular immunological responses induced by disease or during pregnancy; mechanisms of energy-dependent and passive movement of ions in normal and diseased cells; changes in cell signalling induced by modified hormone-receptor interactions and second messenger molecules; and changes in cell-cell interaction created by injury or disease. All research in the molecular and cellular biology area of concentration is multidisciplinary; laboratories seek to solve problems rather than focusing on traditional disciplines and their accompanying techniques. Our goal is to create within our students the inquisitiveness and drive to develop a successful career as an independent investigator.
After students have completed the core curriculum, they are required to take at least one course from three groups that have a molecular, cellular, and genetic focus. These courses can vary from enzymology (molecular) to immune regulation (cellular) to molecular genetics (genetic). These advanced courses are taught from the primary literature and students are encouraged to give oral presentations as part of their formal in-class training. Additional advanced courses can come from any group or groups and are tailored to suit the individual student’s needs.

Neuroscience

The understanding of the brain is among the greatest of scientific challenges. While the functional mechanisms of the brain are just now becoming known, neurological disorders such as mental retardation, senile dementia (Alzheimer’s disease), amyotrophic lateral sclerosis (Lou Gehrig’s disease), and paralysis agitans (Parkinson’s disease), to name a few, await the efforts of newly disciplined minds. The excitement of studying neuroscience lies in the opportunity to pursue a fundamental biomedical science with immediate clinical applications.

The objective of the neuroscience track faculty is to involve the biomedical sciences student in the practice of neuroscience research. After completion of a formal introduction into the realm of neuroscience, the student pursues more specific studies through selected advanced courses as well as in laboratory rotations. Educational objectives may be directed towards specialization in neuroanatomy, neurophysiology, neurochemistry, behavioral neuroscience, neuropharmacology, membrane biophysics, or cell biology. Students can also obtain training in the related fields of molecular biology, computer science, bioengineering, and mathematics, which all emphasize the fact that neuroscience is truly an interdisciplinary field.

Toxicology and Environmental Chemistry

Courses in this concentration are arranged for a specific curriculum in pharmacology, general 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 humans 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 toxic substances include pollutants such as insecticides and herbicides; chemicals arising from photochemical processes after their precursors are introduced into the atmosphere; drugs administered for therapeutic or other purposes; and poisons that 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.

Business and Administration

The College of Business and Administration is committed to providing quality education that is both broad based and professionally relevant; to creating an environment that fosters faculty development and strengthens the college’s links with the external community; to a pluralistic model of administration; and to exceeding the high standards of personal and professional conduct advanced by the American Assembly of Collegiate Schools of Business (AACSB), which accredited the college’s graduate business programs in 1979. Consequently, each area of excellence identified—teaching, research, service, and outreach—is part of a university commitment involving the facilitation of growth and development of the metropolitan Dayton area and Miami Valley, and exploration of problems that have local, state, regional, national, and international dynamics.

The College of Business and Administration offers degree programs leading to the Master of Business Administration (M.B.A.) degree and the Master of Science (M.S.) degree in logistics management. Each student’s 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 the student’s 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 work 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 in government and industry such as technical logisticians who need the management education and preparation for growth and career advancement; individuals with an educational background (either technical or liberal) who seek both a management and a technically focused graduate program in logistics; and practicing logistics professionals who wish to develop a broader knowledge of the logistics fields.

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

The Graduate Faculty

Accountancy

Professors
Joseph F. Castellano, financial and governmental accounting
Nabil Hassan, managerial and financial accounting
Donald F. Pabst, financial and managerial accounting
Harper A. Roehm, financial and managerial accounting
H. Jim Snively, financial accounting and theory
John C. Talbott, Jr., taxation and managerial accounting

Associate Professors
Russell H. Hereth, taxation
Hans-Dieter Sprohge, financial accounting, taxation
John P. Walker (chair), auditing, managerial systems

Assistant Professors
Sonia A. Brecha, financial accounting, accounting systems, and international accounting
Susan Lightle, auditing, financial

Economics

For list of Department of Economics graduate faculty, see Economics

Finance, Insurance, and Real Estate

Professors
Peter W. Bacon, financial management, health care finance
Waldemar M. Goulet, financial management, real estate
Nicolas Gressis, financial management, investments

Associate Professors
Khurshid Ahmad, insurance, real estate, personal finance
M. Fall Ainina, financial management, investments
Daniel J. Kaufman, Jr. (chair), financial institutions, financial management
Richard E. Williams, financial management, investments

Assistant Professors
James E. Larsen, real estate, financial institutions
Robert J. Sweeney, financial management
Management

Professors
Charles J. Hartmann, legal environment of business, government regulation, economic analysis of law
Frank A. Stickney, strategic management, systems management, business policy
Thomas J. Von der Embse (Emeritus), organizational behavior and design, management theory, health care management

Associate Professors
James M. Daily, organizational behavior, personnel management, organization development
Robert F. Scherer (chair), organizational behavior, human resource management, organization development, policy issues management
Robert Wagley, management, public policy issues management, business ethics

Assistant Professors
Francis J. Baker, project management, organizational behavior, strategic management
Crystal L. Owen, organizational behavior, organizational theory
Joseph A. Petrick, management, international management, business ethics, quality management, leadership studies
William M. Slonaker, legal environment of business, legal aspects of business organizations, legal aspects of commercial transactions, labor law
Amy C. Wendt, industrial relations, labor relations, human resource management

Management Science and Information Systems

Professors
Michael J. Cleary, quantitative methods, computer applications, quality management
Myron K. Cox (chair), research methodology, statistics

Associate Professors
Gordon K. Constable, logistics management, production operations, quality, statistics
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, decision support systems

Vincent Yen, operations research, management science, statistics, management information systems

Assistant Professors
Joseph W. Coleman, statistical analysis, simulation, management information systems
George G. Polak, network optimization, queuing theory, simulation
Nada R. Sanders, forecasting, decision theory, materials management, expert systems
Li D. Xu, systems theory, integrated information systems, artificial intelligence

Marketing

Professors
Herbert E. Brown (chair), pricing management, direct marketing, marketing management
Peter S. Carusone, product management, entrepreneurship, marketing strategy
Robert J. Kegerreis (Emeritus), marketing management and strategy
Inder P. Khera, marketing strategy, consumer behavior, marketing communications, international marketing
Gordon L. Wise, advertising, credit management

Associate Professor
Thomas D. Dovel, marketing policy, marketing research

Assistant Professor
Paula M. Saunders, marketing strategy, service marketing, direct marketing

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).

Admission to either program is based on a variety of criteria including prior academic performance, GMAT score, intellectual capacity (including quantitative and analytical skills), preparedness for graduate study, and other factors. The College of Business and Administration only admits people who show high promise for successful completion of the program.

Written permission of the director of graduate programs in business and logistics management is required to enroll in 600- and 700-level courses in the College of Business and Administration for 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 before submitting their registration form. 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 in Business

Students who have met all standards for admission to the program will be considered for admission on a regular basis and without conditions. Students with an admission index (AI) of 1000 using overall undergraduate grade point average (UGPA) or an AI of 1050 using the last half (93 quarter hours) UGPA are eligible for regular admission but not guaranteed this status. The AI is computed by multiplying the UGPA by 200 and adding the total GMAT score. Once the minimum AI is met, a variety of criteria is considered. Applicants who have completed graduate level course work must have a 3.0 graduate GPA to be considered for regular admission. International students must score at least 500 on the TOEFL.

Conditional or Provisional Admission in Business

Those students who do not meet the standards for regular admission because of not meeting the minimum AI, being denied regular admission, or missing an official document, but who feel they are qualified for graduate work, may petition the Graduate Programs Committee of the College of Business and Administration for conditional or provisional 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 logistics management. Upon completing 12 credit hours of graduate course work or 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. Provisional admission is granted for one quarter only.

Nondegree or Transient Admission in Business

Applicants who meet all requirements for regular admission but who do not wish to pursue a degree may be admitted as nondegree or transient students. Students are expected to follow all graduate school requirements for such status. Students wishing to become degree candidates must reapply to the admissions office and may apply only 12 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. Candidates should consult with an academic graduate advisor 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 and information systems, economics, management, marketing, quantitative methods, and statistics. Students deficient in any of these areas are required to successfully complete up to 33 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, focus, and other factors. Additionally, students may demonstrate preparation by proficiency testing.

The Stage I Program of Study form must be completed by students before they will be permitted to register for graduate business courses.

<table>
<thead>
<tr>
<th>Stage I—Preparatory Courses</th>
<th>0–33</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 621, 622 Graduate Survey of Accounting, I, II</td>
<td>6</td>
</tr>
<tr>
<td>LAW 611 Graduate Survey of Law and the Legal Environment</td>
<td>3</td>
</tr>
<tr>
<td>EC 621, 622 Graduate Survey in Principles of Economics</td>
<td>6</td>
</tr>
<tr>
<td>FIN 621 Graduate Survey in Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 621 Graduate Survey in Management</td>
<td>3</td>
</tr>
<tr>
<td>MKT 621 Graduate Survey in Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MS 621 Survey of Mathematics for Business, Economics, and Logistics Research</td>
<td>3</td>
</tr>
<tr>
<td>MS 622 Graduate Survey in Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MIS 621 Introduction to Management Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

M.B.A. Program of Study

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

After completing appropriate Stage I preparatory courses, students undertake the Stage II core and concentration courses, a 48-hour program. Thirty credit hours of core courses
are required of all candidates, including micro- and macroeconomic 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.

Further, all students are required to select one, and may choose two, area(s) of concentration from finance, financial administration, health care management, international business, logistics management, management science, marketing, or project management. Students choosing to complete two areas of concentration must complete the concentration requirements of both areas, complete a minimum of 54 credit hours, and have the approval of the director of graduate business programs. Students have the flexibility to choose and structure their concentration(s) to meet career objectives by selecting courses that together provide emphasis within their area(s) of concentration. 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 advisor in accordance with university and college policy. Students must coordinate with an M.B.A. advisor prior to commencing Stage II core and concentration work and prior to meeting with their faculty advisor.

Stage II

<table>
<thead>
<tr>
<th>Core Courses (M.B.A.)</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 715 Statistical Methods for Business Decisions*</td>
<td>3</td>
</tr>
<tr>
<td>MS 717 Quantitative Methods for Decision-Making*</td>
<td>3</td>
</tr>
<tr>
<td>MGT 700 Organizational Behavior and Theory</td>
<td>3</td>
</tr>
<tr>
<td>EC 715 Applied Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>EC 717 Applied Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ACC 741 Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>FIN 741 Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>MS 741 Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>MKT 741 Marketing Strategy</td>
<td>3</td>
</tr>
<tr>
<td>MGT 731 Administrative Policy and Decisionst</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area of Concentration Courses (M.B.A.)</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>See the following for Stage II area of concentration course work (M.B.A.)</td>
<td></td>
</tr>
</tbody>
</table>

*M.S 715 and 717 should be completed within the first 18 hours of Stage II work.

tMGT 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.)

<table>
<thead>
<tr>
<th>Finance</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Concentration Courses</td>
<td>12</td>
</tr>
<tr>
<td>FIN 710 Investment Management</td>
<td>3</td>
</tr>
<tr>
<td>FIN 742 Seminar in Financial Theory</td>
<td>3</td>
</tr>
<tr>
<td>FIN 790 Seminar in International Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>Another 700-level finance course</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concentration Electives</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three of the 6 hours must be business courses, but none may be finance courses.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financial Administration</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Concentration Courses</td>
<td>12</td>
</tr>
<tr>
<td>FIN 742 Seminar in Financial Theory</td>
<td>3</td>
</tr>
<tr>
<td>FIN 743 Seminar in Working Capital Management</td>
<td>3</td>
</tr>
<tr>
<td>FIN 790 Seminar in International Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>ACC 711, 712 Financial Accounting Concepts I, II</td>
<td>6</td>
</tr>
<tr>
<td>Concentration Elective</td>
<td>3</td>
</tr>
<tr>
<td>Accounting seminar course</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Care Management</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Concentration Courses</td>
<td>12</td>
</tr>
<tr>
<td>EC 755 Economics of Health and Health Policy</td>
<td>3</td>
</tr>
<tr>
<td>FIN 750 The Financial Management of Health Service Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MGT 755 Health Care Management</td>
<td>3</td>
</tr>
<tr>
<td>PHL/REL 578 Ethics and Medicine</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Concentration Electives</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three of the 6 hours must be business courses.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>International Business</th>
<th>18</th>
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<tbody>
<tr>
<td>Required Concentration Courses</td>
<td>12</td>
</tr>
<tr>
<td>ACC 753 International Accounting</td>
<td>3</td>
</tr>
<tr>
<td>EC 641 International Trade and the Economy</td>
<td>3</td>
</tr>
<tr>
<td>FIN 790 Seminar in International Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>MKT 716 International Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MGT 721 International Management</td>
<td>3</td>
</tr>
<tr>
<td>Elective (graduate business or nonbusiness course)</td>
<td>3</td>
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<table>
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<tr>
<th>Logistics Management</th>
<th>18</th>
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<tbody>
<tr>
<td>Required Concentration Courses</td>
<td>12</td>
</tr>
<tr>
<td>MKT 713 Logistics Systems</td>
<td>3</td>
</tr>
<tr>
<td>MS 760 Logistics Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>Two courses from the following: MS 650, 755, 757, 759, 765</td>
<td>6</td>
</tr>
</tbody>
</table>
Concentration Electives
Two 3-hour business economics or nonbusiness graduate courses must be selected.

Management 18

Required Concentration Course
MGT/LAW 695 Ethics in an Industrial Society 3

Concentration Electives 15

The management concentration is highly flexible. The general structure the student must follow is that of the 15 elective concentration credit hours; at least 6 but not more than 9 credit hours must be management (MGT) course work. Also, at least 6 credit hours must be nonmanagement courses.

Sample Management Curricula
Personnel/Organizational Behavior
MGT 703, 705, 706, 763
Production/Operations
MGT 763; MS 755, 757
Systems/Research and Development
Management
MGT 711, 763

Students may choose a specific program as illustrated or follow a program that suits individual or organizational needs in consultation with a faculty advisor.

Management Science (Operations Management) 18

A total of six courses must be selected as described below.

Required Concentration Courses 9–12
A minimum of three from the following:
MS 753 Inventory Management 3
MS 755 Quality Management 3
MS 757 Production Planning and Control 3
MS 759 Procurement Management 3

Concentration Electives 3–9
A minimum of one course from the following:
MS 650 Systems Simulation in Business and Economics 3
MS 760 Logistics Systems Design 3
MS 771 Strategic Logistic Planning 3
MIS 760 Management Information Systems, Analysis, and Design 3
If less than six courses are selected from the above groupings, students must select, in consultation with their faculty advisor, enough elective courses to total six.

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*

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.

Project Management 18

MGT 770 Fundamentals of Project Management 3
MGT 771 Human Resources in Project Management 3
MGT 772 Project Contract Management 3
MIS 760 Management Information Systems, Analysis, and Design 3
MS 760 Logistics Systems Design 3
MS 791 Project Planning, Evaluation, and Control Techniques 3

Dual Degree 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 degree 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 18 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 an M.B.A. degree from schools other than Wright State. For further information, contact the director of graduate programs in business and logistics management and director of M.S. in economics program.

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. Candidates should consult with the director of graduate programs in business and logistics management for further details concerning policies and programs.

The program for the M.S. in logistics management requires the completion of 48 credit hours of Stage II work. Stage I courses that are required may be completed prior to or during the first 15 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 advisor in accordance with university and college policy. Students must coordinate with a graduate advisor prior to commencing Stage II core and concentration work and prior to meeting with their faculty advisor.

Of the 48 credit hours required for Stage II curriculum, 24 hours are core courses, 12 hours are required concentration courses, and 12 hours are concentration electives (6 elective credit hours may be master's thesis).

Stage II 48

Core Courses 24
MS 715 Statistical Methods for Business Decisions 3
MS 717 Quantitative Methods for Business Decisions 3
MS 730 Operations Research Techniques for Business Decisions 3
MGT 700 Organizational Behavior and Theory 3
MS 741 Operations Management 3
MS 757 Production Planning and Control 3
ACC 741 Managerial Accounting 3
MIS 760 Management Information Systems, Analysis, and Design 3

Concentration Courses 24

Required Concentration Courses 12
MS 760 Logistics Systems Design 3
MKT 713 Logistics Systems 3
MS 759 Purchasing and Materials Management 3
MS 771 Strategic Logistics Planning 3

Concentration Electives 12
MS 650 Systems Simulation in Business and Economics 3
MS 765 Inventory Management 3
MS 770 Selected Topics in the Management Sciences 3
MS 755 Quality Management 3
MGT 763 Systems Management 3
MGT 799 Thesis 6
ACC 753 International Accounting 3
MKT 714 Management of Logistics Systems 3

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 or for advanced degree study. 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 (chair), inorganic and bioinorganic chemistry
William A. Feld, organic and polymer chemistry
Ivan J. Goldfarb, polymer chemistry
Vladimir Katovic, analytical, inorganic, and environmental 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
John J. Fortman, inorganic chemistry and chemical education
George G. Hess, organic, analytical, and polymer chemistry
James J. Kane, organic and polymer chemistry
Daniel M. Ketcha, organic and natural products chemistry
Kenneth Turnbull, organic chemistry

Assistant Professors
Daniel D. Bombick, analytical chemistry and mass spectrometry
David A. Dolson, physical chemistry and laser spectroscopy
David A. Grossie, inorganic chemistry and X-ray crystallography

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 50 quarter hours (33
Degree Requirements

In order to qualify for the Master of Science degree, candidates must fulfill the requirements of the School of Graduate Studies, complete 30 credit hours of course work and a minimum of 15 credit hours of thesis research, submit an acceptable thesis, and pass a written or an oral examination.

Courses

Candidates for the Master of Science degree must complete 30 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, students 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 advisor approved by the chemistry graduate studies committee. An acceptable thesis based on a minimum of 15 credit hours of laboratory or theoretical research (CHM 899) must be submitted to the thesis advisory committee (chaired by the candidate’s advisor and selected by the advisor, student, and 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.

Computer Science and Computer Engineering

The Department of Computer Science and Engineering offers programs of graduate study leading to the Master of Science degree in computer science, the Master of Science in Computer Engineering degree, and the Doctor of Philosophy degree in computer science and engineering. The Ph.D. degree is awarded for demonstrated, scholarly excellence in study and research that provides a significant contribution to the fields of computer science or computer engineering.

Both masters and doctoral programs balance theory, software, hardware, and practice. Computer science degree requirements are concentrated in the areas of theory and software, while computer engineering requirements are concentrated in the areas of computer design and analysis. A strong faculty in the computer science and engineering department is assisted by qualified faculty in mathematics, statistics, and electrical engineering.

Most courses are offered in the late afternoon to allow practicing computer professionals to begin the program on a part-time basis.

The Graduate Faculty

Professors

James E. Brandeberry (dean), digital electronics, microprocessors, system theory
Larry A. Crum, microprocessors, distributed computing, hardware design, computer communications
Henry W. Davis, artificial intelligence, algorithm analysis
Robert D. Dixon (Emeritus), software design, real-time systems, computer organization
Alastair D. McAulay (chair), parallel algorithms and architectures, optical computation, neural networks
Terry A. McKee (Department of Mathematics and Statistics), graph theory, logic
Kuldip S. Rattan (Department of Electrical Engineering), digital control systems, robotics, computer-aided design, microprocessors

Associate Professors
Joseph Kohler (Emeritus), compilers, software design, languages, microcomputers
Prabhaker Mateti, software systems
Mateen M. Rizki, modeling, simulation, biological information processing
Charles B. Ross, digital systems design, data communications
Robert C. Shock, software engineering, data analysis and data base systems, expert systems
Raymond E. Siferd (Department of Electrical Engineering), integrated circuits, signal processing, robotics
Thomas A. Sudkamp, intelligent systems, automated reasoning, mathematical logic

Assistant Professors
A. A. Awwal, optical computing
C. L. Philip Chen, robotics with artificial intelligence and neural network applications
Jer-Sen Chen, vision and artificial intelligence
Soon M. Chung, data and knowledge bases, computer architecture, parallel processing
Venugopala R. Dasigi, artificial intelligence, natural language, expert systems, neural networks
Charles Farnum, compiler construction and design
Gurdeep S. Hura, Petri net modeling, concurrent systems, computer communication networks
Jack Jean, parallel algorithms and architectures
Kevin Kirby, neural networks
Krishnaprasad Thirunarayan, knowledge representation, logic programming, databases, programming languages

Admission
Students may be admitted to the graduate programs in computer science and engineering with a baccalaureate degree in computer science, computer engineering, or a related area and appropriate experience, satisfaction of the admission requirements as set forth by the School of Graduate Studies, and a record that indicates potential for a career in computer science and/or computer engineering research.

For the Master of Science in computer science program, students should come to the program with a knowledge of a higher-level language, data structures, concurrent programming, computer organization, operating systems, and digital hardware design. It may be possible to make up minor background deficiencies after admission to the program by taking appropriate courses.

The Master of Science in Computer Engineering program requires students to have a knowledge of a higher-level language, data structures, concurrent programming, computer organization, operating systems, digital hardware design, electronic circuits, linear systems, and electronic devices. It may be possible to make up minor background deficiencies after admission to the program by taking appropriate courses.

All Ph.D.-seeking students who come to Wright State University without a master's degree will complete the requirements for the M.S. degree as a first phase of their Ph.D. program. The thesis will be used in part to judge the student's potential for independent research. Eligibility to continue the program will be based in part on performance in the M.S. program. Students should, however, anticipate the total requirements of the Ph.D. program when choosing their M.S. program of study. Students entering the program with a Master of Science degree will be required to demonstrate potential for independent study. The mechanism for this will be specified by the department and the General Examination Committee on an individual basis.

Facilities
The program is supported by a Hitachi EX44, a VAX 6420, a VAX 8550, a DEC System 5810, and many SUN and DEC UNIX workstations connected to the campus network with international connectivity. PCs are used for some courses. Access to the Ohio Supercomputer Center’s Cray Y-MP is also available. The program has laboratories that support studies in systems programming, artificial intelligence, control/robotics, graphics, operating systems, VLSI design, digital hardware design, digital communications, software engineering, vision, and optics.

Research
A steadily increasing number of funded research projects support modern graduate research laboratories in such areas as software systems, database, artificial intelligence, robotics, neural networks, and optical computing. A strong research faculty in the Department of Computer Science and Engineering is assisted by qualified research faculty in mathematics, statistics, and electrical engineering.

Research at Wright State University is not limited to on-campus laboratory facilities. Several industrial laboratories, Wright-Patterson Air Force Base laboratories, and the Center for Artificial
Intelligence Applications are involved in joint research efforts with the university. Computer science and engineering research activities are located at the Wright State University Research Center, along with major high-technology companies at the Miami Valley Research Park in Kettering, Ohio.

Graduate Assistantships

Teaching assistantships are available on a competitive basis for students who have established strong academic credentials and can demonstrate good communication skills and teaching potential. The availability of research assistantships is dependent upon program and faculty research grants and contracts. Students in the Ph.D. program will usually be supported on a research assistantship only after they have passed the General Examinations.

An industrial assistant is a Ph.D. student sponsored by an external organization. The sponsoring organization supports the student by funding tuition and compensation for approximately 20 hours of work per week. The organization will also fund the student during the residency period when the student is working full time on the dissertation. Industrial assistants are recommended for appointment by the organization, but must meet the program's admission standards and continue to make satisfactory progress in the program.

Degree Requirements

Master of Science Degree in Computer Science

Requirements for the Master of Science degree in computer science are a department-approved program that must include the following:

Thesis Option

Students employed as teaching or research assistants through the School of Graduate Studies are expected to choose the thesis option.

1. A minimum of 48 graduate credit hours in an approved program of study, excluding required prerequisites. The 48 hours include items 2 through 4 listed below.

2. Completion of the following core courses:
   - CS 740 Theory and Analysis of Algorithms
   - CS 780 Compiler Design and Construction
   - CS 730 Systems Programming
   - CEG 760 Software Engineering

3. Satisfactory completion of a thesis. A maximum of 12 hours of thesis may be included in the program of study.

4. In addition to the core courses, completion of at least 20 graduate credit hours of 600/700-level computer science and engineering course work, excluding CS/CEG 700 and CS/CEG 795. This must include a minimum of 8 hours at the 700 level. One graduate credit hour of CS 891 or CEG 891 may be counted in the degree program.

Nonthesis Option

1. A minimum of 48 graduate credit hours in an approved program of study, excluding required prerequisites. The 48 hours include items 2 through 4 listed below.

2. Completion of the following core courses:
   - CS 740 Theory and Analysis of Algorithms
   - CS 780 Compiler Design and Construction
   - CS 730 Systems Programming
   - CEG 760 Software Engineering

3. Completion of at least two of the following courses:
   - CS 741 Theory and Analysis of Algorithms II
   - CS 781 Compiler Design and Construction II
   - CS 731 Systems Programming II
   - CEG 761 Software Engineering II

4. In addition to items 2 and 3 above, completion of at least 24 graduate credit hours of 600/700-level computer science and engineering course work, including a minimum of 12 hours at the 700 level, excluding CS/CEG 700 and CS/CEG 795. At least 12 hours of the 24 hours must be taken from one computer science and engineering nonthesis option package. One graduate credit hour of CS 891 or CEG 891 may be counted in the degree program.

Package 1 Programming Languages
   - CS 774, 776, 781, 782, 784, 785

Package 2 Robotics and Vision
   - CEG 724, 756, 757, 759, 720, 721, 728

Package 3 Systems
   - CS 701, 702, 731, CEG 761, 763, 720, 721, 728

Package 4 Artificial Intelligence
   - CS 710, 711, 712, 714, 771, 772, 774;
   - CEG 724, 759, 765

Package 5 Theory and Analysis
   - CS 716, 717, 718, 735, 741; MTH 725

No courses taken to satisfy the core course sequences (items 2 and 3, nonthesis option) may be used to satisfy the 12-hour package requirement.

The Department of Computer Science and Engineering maintains a three C policy for graduate students. A graduate student who receives 9 or more credit hours of grades C, D, F, or U in computer science and computer engineering graduate courses will be recommended for dismissal from the degree program. Dismissal action will be taken by the School of Graduate Studies. The rule includes
prerequisite courses taken for graduate credit (500/600 level), independent study, and thesis research. Note that repeating a course replaces the grade in the calculation of the GPA, but does not remove it from consideration of this rule. A maximum of 12 graduate credit hours may be transferred after admission to the computer science degree program by petitioning the graduate study committee.

**Master of Science in Computer Engineering Degree**

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

1. Completion of a minimum of 45 graduate credit hours in an approved program of study, excluding required prerequisites.
2. Completion of at least 22 credit hours of nonthesis credit in courses restricted to graduate students only (700-800 level courses, except CEG/CS 700 will not count in these 24 credit hours).
3. Completion of the following core courses:
   - CS 730 Systems Programming
   - CEG 634 Concurrent Software Design
   - CEG 720 Computer Architecture
   - CEG 750 Microprocessors
   - EE 649 Pulse and Digital Circuits
   - EE 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. A maximum of 10 credit hours of CEG/CS 700 (Principles of Instruction in Computer Science), CEG/CS 699/795/895 (Independent Study), and CEG/CS 799 (Thesis) can be counted within the 45 credit hours required for the degree. However, once a student has registered for CEG/CS 799, he or she is required to register for 4 credit hours of thesis each quarter until the thesis is completed.
7. The Department of Computer Science and Engineering maintains a three C policy for graduate students. A graduate student who receives 9 or more credit hours of grades C, D, F, or U in computer science or computer engineering graduate courses will be recommended for dismissal from the degree program. Dismissal action will be taken by the School of Graduate Studies. The rule includes prerequisite courses taken for graduate credit (500/600 level), independent study, and thesis research. Note that repeating a course replaces the grade in the calculation of the grade point average but does not remove it from consideration of this rule.

8. A maximum of 12 graduate credit hours may be transferred after admission to the computer engineering degree program by petitioning the graduate study committee.

**Doctor of Philosophy Degree in Computer Science and Engineering**

The Ph.D. program consists of two phases. The first phase, which may be taken on a part-time basis, requires approximately two years of study beyond the baccalaureate degree and culminates with the General Examinations. Those who pass the exams may then begin the research phase, which requires another two years. The requirements of the program are as follows:

1. Completion of 80 graduate credit hours of formal courses in an approved program of study including:
   - A. 60 hours in courses available to graduate students only (700/800 level).
   - B. 12 hours of graduate courses in mathematics and statistics (600 level or above).
   - C. Core courses in computer architecture, systems programming, software engineering, theory, and either programming languages or analysis.
2. A concentration that provides adequate preparation to conduct state-of-the-art research in a chosen dissertation area and to practice continuing research in computer science and engineering.
3. At least 6 credit hours of computer science and engineering Ph.D. seminars.
4. Satisfactory completion of a master's thesis. The student will be examined orally by a committee concerning the thesis. The quality of the student's thesis work will be a primary factor in determining his or her potential for acceptable dissertation work.
5. Passing the Ph.D. Qualifying Examinations. Students may take the Ph.D. Qualifying Examinations after completing the master’s thesis. The written examination consists of a four-hour test in each of the following four areas: computer architecture, software systems, and either a computer science option (programming languages and theory) or a computer engineering option (linear systems and stochastic analysis).
6. Passing the Ph.D. Candidacy Examination. The student must file a written plan of study, submit a written proposal for a dissertation topic, and pass an oral examination on a specific area of study and recognized support areas.

7. Ph.D. candidates must spend at least four quarters in two consecutive years in residence enrolled full time for dissertation work.


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 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, urban and regional economics, economic policy
Rudy Fichtenbaum, labor economics, macroeconomics, health economics
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
G. Thomas Sav (chair), microeconomics, public finance, energy economics, property rights
James A. Swaney, history of economic thought, methodology, environmental and resource economics
John J. Treacy, economic theory, public finance, socioeconomic data bases

Associate Professors
Kwabena Gyimah-Brempong, economic development, econometrics, economics of crime, macroeconomics
Tran Huu Dung, microeconomics, international economics, physical economics

Assistant Professors
Paulette Olson, labor economics, history of economic thought, methodology, economics of gender
Thomas Traynor, forecasting, econometrics, industrial organization, microeconomics

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- 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 48 credit hours in courses numbered 600 or above, exclusive of prerequisite survey courses. Of the total 48 hours, 39 must be taken in the department (27 credit hours of courses plus 12 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 9 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 12 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, students should have completed a minimum of 24 credit hours (including MS 715 and EC 609). Approval by the student's advisor 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 the M.S. in economics program.

Prerequisites

Students do 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, students 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: MS 621 (for calculus), MS 622 (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 Applied Microeconomics 3
EC 717 Applied Macroeconomics 3
EC 721 Contemporary Political Economy 3
EC 725 Economic and Social Systems I 3
MS 715 Statistical Methods for Business Decisions 3
EC 709 Applied Econometrics 3
EC 780 Economic Problems Seminars 6
EC 760 Internship* 12
Electives 12
Economics 6–12
Noneconomics 0–6
Total 48

*Students 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 Degree 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 degree 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 18 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 an M.B.A. degree from schools other than Wright State. For further information, contact the director of graduate programs in business and logistics management or director of M.S. in economics program.
Education and Human Services

The College of Education and Human Services is conducting a comprehensive review of all graduate program offerings. This review may have implications for changes in programs listed in this catalog. Once you are admitted to a program in the College of Education and Human Services, confer with your faculty advisor to prepare a program of study.

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.); educational leadership, with programs in curriculum and supervision (M.A., M.Ed.); teacher leader (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 educational specialist (Ed.S.) degree. In addition, Wright State has a cooperative arrangement with Bowling Green State University for the Ph.D. in educational administration and supervision.

The Graduate Faculty

Professors
Gary C. Barlow, art therapy, art education
Carl V. Benner, mathematics education
William E. Brown, evaluation, educational psychology
Robert D. Earl (Emeritus), science education
Diane E. Frey, counselor education
Frederick J. Gies, educational leadership
William M. Gordon, educational leadership
Glenn T. Graham, education statistics/research
T. Stevenson Hansell, reading, language arts
Larry D. Issacs, physical education
Benjamin J. Leake, science education
Charles B. Leonard, educational leadership
Robert Medcalf, educational leadership
L. Tyrone Payne, educational psychology
Charles W. Ryan, educational leadership, counselor education
Lewis K. Shupe, art therapy and communications
James K. Uphoff, social studies education, curriculum, supervision

Associate Professors
Gregory R. Bernhardt, counselor education
Larry L. Chance, reading, language arts
Donna Cole, teacher education and foundation
S. Joseph Emanuel, Jr., counselor education
Stephen D. Frederick, physical education
Samuel T. Harris, early childhood education
Phyllis A. Henderson, counselor education
Alyce E. Jenkins, rehabilitation education
Mary Ann Jones, counselor education
Jan La Forge, rehabilitation counseling
Will E. McCarther, teacher education, educational leadership
Phillip E. Messner, educational leadership
Bonnie K. Mathies, educational technology
Roberta L. Pohlman, physical education
Vincent Presno, curriculum
James D. Ricks, educational leadership
Ruth B. Schumacher, educational psychology, counselor education
Gerald P. Sturm, curriculum, supervision
Eugene Wade, (Emeritus) teacher education
Richard Wantz, counselor education
Michael A. Williams, special education

Assistant Professors
Michael L. Barnhart, educational leadership, teacher education
Michael W. Campanelli, art therapy
Donna S. Courtney, business education, vocational education
Winnie J. Ferguson, art therapy
G. William Gayle, physical education
Betty K. Hathaway, early childhood
Wilma J. Henry, counselor education
June A. Kisch, educational leadership
Patricia Kleine, educational leadership
Luisa Lang Owen, art education
Marjorie Pappas, library media
Eileen F. Self, counselor education

Instructor
Darryl Reach, science education
Admission

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

All students 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 students be increasingly self-directed. Students are not guaranteed a master’s degree by attending and completing courses. Exit requirements must be met in all programs.

Admission to the College of Education and Human Services is based on the candidate’s written statement of purpose, consideration of 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.

Candidates for admission to the Department of Human Services must meet additional requirements, which include letters of reference, a personal interview, a writing sample, and for art therapy applicants an art portfolio. Candidates for admission to certain programs in the Department of Teacher Education must meet additional requirements.

Conditional

Students who have an undergraduate grade point average of 2.5 or better, or who have an average between 2.3 and 2.5 with 2.7 or better in the last half of undergraduate work, are granted conditional admission.

Regular admission to the College of Education and Human Services is granted after successful completion of 12 hours of course work with a grade of B or better in each course.

Unclassified Undergraduate

Under this alternative admission procedure, students must successfully complete 12 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 12 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. The M.A. degree requires a thesis with a minimum of 45 credit hours, including 9 hours of thesis credit.

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

Successful completion of a written departmental comprehensive examination is required at the end of the program of study.

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, students have a choice of three program exit options: a thesis, a project, or extended clinical hours. A minimum of 600 clinical hours is included in the M.A.T. program.

Successful completion of a written departmental comprehensive examination is required at the end of the program of study. This program’s curriculum was under review in 1992 as this catalog went to press. Please contact the department for program information.

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 require the individual to take 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 completing one of three patterns: (a) a minimum of 48 credit hours of course work, (b) a minimum of 40 credit hours of course work, plus 5 credit hours of a research project, or (c) 72-74 credit hours to receive the M.Ed. in school counseling. An oral defense is required for students writing a research project. The examining committee will consist of two members of the graduate faculty selected by the student and advisor.

Each graduate degree student will be assigned an advisor upon admission to the college. The student is required to consult with the advisor to plan the program of study during the first quarter of graduate study and to review the procedure for admission to candidacy. Successful completion of a written departmental comprehensive examination is required at the end of the program of study.

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.

Admission requirements include a writing sample, three letters of recommendation, and an interview. The Master of Science degree may be obtained by following one of two patterns: either by completing: (a) a minimum of 60 credit hours of course work, or (b) a minimum of 55 credit hours plus 5 hours of a research project.

Each graduate degree student will be assigned an advisor upon admission to the college. The student is required to consult with the advisor to plan the program of study during the first quarter of graduate study and to review the procedure for admission to candidacy. Successful completion of a written departmental comprehensive examination is required at the end of each program of study.

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 students may choose to specialize in either the rehabilitation of the severely disabled or the rehabilitation of the chemically dependent. M.R.C. students must complete an internship with a minimum grade of B. Students electing the rehabilitation of the severely disabled concentration may choose to do an internship with a special population of intensive study.

Each graduate degree student will be assigned an advisor upon admission as a degree student. The student is required to consult with the advisor to plan the program of study during the first quarter of graduate study and to review the procedure for admission to candidacy. Successful completion of a written departmental comprehensive examination is required at the end of the program of 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, supervision, and higher education.

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 advisor.

Students in the M.Ed., M.S., M.R.C., M.A.T., and M.A. programs must successfully complete a written departmental comprehensive examination. Should the student fail to pass the final written comprehensive examination, the student and advisor 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 EDL 751 and EDL 752.
2. Prepare a preliminary thesis or project
proposals. This proposal is to be developed with the assistance of the faculty advisor.

3. Establish a thesis or project committee. It is customary, although not required, for a student's advisor to be a member of the committee. The remainder of the committee may include persons in the College of Education and Human Services 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 one bound copy 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. 296, 298, and 299

Wright State University offers an advanced program leading to the Educational Specialist degree (Ed.S.) in educational leadership for individuals who have career interests in school administration, human resource development, higher education, and adult development. A planned program of study will typically require two years, with a minimum of 45 quarter hours of graduate work beyond the master's degree. The Ed.S. degree is an intermediate degree between the M.Ed. and the Ph.D. Ed.S. students may transfer course work to the doctoral program offered cooperatively with Bowling Green State University.

Purpose

The growing complexity of the educational enterprise has created a need for persons with additional training for public, private schools, federally and state-funded programs, human resource development, higher education, and adult development programs. This Ed.S. program is designed to enhance individual capabilities for leadership in the roles of superintendents, assistant superintendents, supervisors, principals, human resource specialists, higher education staff, and adult development personnel. The program emphasizes the achievement of competence in such areas 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 a 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.

Admission to the education specialist degree program is based on the following criteria:

1. Three letters of recommendation from persons who know your work
2. Graduate Record Examination
3. Appropriate professional experience
4. Interview with members of the Education Leadership faculty
5. A grade point average of 3.5 in previous graduate work
6. Minimum undergraduate grade point average requirement as specified by the School of Graduate Studies.

*Miller Analogies Test is accepted for students not planning to transfer to a doctoral program.

Sample Program

The planned program of study will be individually arranged and will consist of a minimum of 45 quarter hours of graduate work beyond the master's degree. Successful passing of a comprehensive examination is required for completion of the program.

Required Courses

- EDL 871 Management of the School 3
- EDL 872 Staff Personnel Administration 3
- EDL 873 Pupil Personnel Administration 3
- EDL 874 School Business Management and Facilities 3
- EDL 971 Superintendent/Staff/Board Relationships 3
- EDL 972 Ideas in Education 3
- EDL 986 Organizations as Social Systems 4
- EDL 987 Administrative Leadership Skills 3
- EDL 899 Thesis 3
- EDL 991 Advanced Seminar in Educational Leadership 3
- EDL 974 Seminar in Educational Leadership 3
- EDL 890 Practicum in School Administration 3
- EDL 988 Research and the Educational Leader 3

Cognates/Electives 5

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.
4. Those wishing to pursue the concentration in higher education administration, for example, must complete the six-course sequence. Please consult with the EDL department for advice (use Major No. 296).

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 four supervision programs, supervisor/special education, supervisor/computer coordinator, supervisor/media, and vocational supervisor in the Department of Educational Technology, Vocational Education, and Allied Programs, offer some specialty courses 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. Educational administrative specialist—special education is listed with programs in the Department of Educational Technology, Vocational Education, and Allied Programs. 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.

Standards for administrator certificates in the state of Ohio became effective September 1, 1985, and require a minimum of 68 quarter hours of graduate credit. Students will receive a master's degree at the end of 48 hours and will 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 off-campus settings and will provide hours that, when combined with experience, will aid student in qualifying for a professional teaching certificate. The program may be used as a basis for further work in educational leadership. Successful completion of a written departmental comprehensive examination is required at the end of the program of study.

Educational Leadership Program
Curriculum/Supervision Certification
Major No. 288

<table>
<thead>
<tr>
<th>May be taken in any sequence</th>
<th>11</th>
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<tbody>
<tr>
<td>ED 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 702 Social Foundations of Education or ED 703 Philosophy of Education</td>
<td>3</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
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Common Educational Leadership Courses

<table>
<thead>
<tr>
<th>Administrative Strand: Focus on Administrative Behavior</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 771 Educational Leadership Behavior</td>
<td>3</td>
</tr>
<tr>
<td>EDL 772 Educational Administrative Behavior</td>
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Curriculum Strand: Focus on Program Development

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<tr>
<th>EDL 773 Curriculum Theory and Practice</th>
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<tr>
<td>EDL 774 Curriculum Organization</td>
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Instruction Strand: Focus on Instructional Leadership

<table>
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<tr>
<th>EDL 775 Leadership for Instructional Improvement</th>
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<tbody>
<tr>
<td>EDL 776 Supervision of Instruction and Personnel</td>
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<tr>
<td>EDL 777 Prepracticum: Role and Function of Educational Leaders</td>
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Curriculum and Supervision Courses

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<thead>
<tr>
<th>EDL 782 School Law</th>
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<td>EDL 791 Curriculum Design and Evaluation</td>
<td>4</td>
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<tr>
<td>EDL 792 Models of Supervision and Staff Development</td>
<td>4</td>
</tr>
<tr>
<td>EDL 793 Computer Applications for Educational Leaders</td>
<td>3</td>
</tr>
<tr>
<td>EDL 790 Practicum in Instructional Leadership</td>
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</table>

Total 49
Educational Leadership Program: With Principalship Certification
Major No. 294

Introductory Course Work
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
EDL 751 Educational Statistics and Research 5

Common Educational Leadership Courses 21

Administrative Strand: Focus on Administrative Behavior
EDL 771 Educational Leadership Behavior 3
EDL 772 Educational Administrative Behavior 3

Curriculum Strand: Focus on Program Development
EDL 773 Curriculum Theory and Practice 3
EDL 774 Curriculum Organization 3

Instruction Strand: Focus on Instructional Leadership
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3
EDL 777 Prepracticum: Role and Function of Educational Leaders 3

Administrative Courses 15
EDL 780 Public Relations and Politics in Education 3
EDL 781 School Finance and Economics 3
EDL 782 School Law 3
EDL 793 Computer Application for Educational Leaders 3
EDL 790 Practicum in Instructional Leadership 3

Electives 2–3

Total 49–50

Post-Master’s Requirements (Certification)
Note: Before certification, students must pass the NTE Specialty area test, Educational Leadership: Administration and Supervision.

Concentration Courses 21
EDL 871 Management of the School 3
EDL 872 Staff Personnel Administration 3
EDL 873 Pupil Personnel Administration 3
EDL 874 School Business Management and Facilities 3
EDL 890 Practicum in School Administration 3
Cognates (Economics, Political Science, Finance, Communication) 6

Total 70–71

Educational Leadership Program: Educational Administrative Specialist with Instructional Service Certification
Major No. 280

Introductory Course Work
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
EDL 751 Educational Statistics and Research 5

Common Educational Leadership Courses 21

Administrative Strand: Focus on Administrative Behavior
EDL 771 Educational Leadership Behavior 3
EDL 772 Educational Administrative Behavior 3

Curriculum Strand: Focus on Program Development
EDL 773 Curriculum Theory and Practice 3
EDL 774 Curriculum Organization 3

Instruction Strand: Focus on Instructional Leadership
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3
EDL 777 Prepracticum: Role and Function of Educational Leaders 3

Administrative Courses 15
EDL 780 Public Relations and Politics in Education 3
EDL 781 School Finance and Economics 3
EDL 782 School Law 3
EDL 793 Computer Application for Educational Leaders 3
EDL 790 Practicum in Instructional Leadership 3

Electives 2–3

Total 49–50

Post-Master’s Requirements (Certification)
Note: Before certification, students must pass the NTE Specialty area test, Educational Leadership: Administration and Supervision.

Concentration Courses 17
EDL 872 Staff Personnel Administration 3
EDL 890 Practicum in School Administration 3
EDL 791 Curriculum Design and Evaluation 4
EDL 792 Models of Supervision and Staff Development 4
EDL 873 Pupil Personnel Administration 3

Total 70–71
Educational Leadership Program:
Educational Administrative Specialist with
Pupil Personnel Certification
Major No. 281

Introductory Course Work 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
EDL 751 Educational Statistics and Research 5

Common Educational Leadership Courses 21

Administrative Strand: Focus on Administrative Behavior
EDL 771 Educational Leadership Behavior 3
EDL 772 Educational Administrative Behavior 3

Curriculum Strand: Focus on Program Development
EDL 773 Curriculum Theory and Practice 3
EDL 774 Curriculum Organization 3

Instruction Strand: Focus on Instructional Leadership
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3
EDL 777 Prepracticum: Role and Function of Educational Leaders 3

Administrative Courses 15
EDL 780 Public Relations and Politics in Education 3
EDL 781 School Finance and Economics 3
EDL 782 School Law 3
EDL 793 Computer Application for Educational Leaders 3
EDL 790 Practicum in Instructional Leadership 3

Electives 2–3

Total 49–50

Post-Master's Requirements (Certification)

Note: Before certification, students must pass the NTE Specialty area test, Educational Leadership: Administration and Supervision.

Concentration Courses 20
EDL 873 Pupil Personnel Administration 3
EDL 890 Practicum in School Administration 3
EDL 874 School Business Management and Facilities 3
EDL 971 Superintendent/Staff/Board Relationships 3
CNL 765 Pupil Personnel Services in the School and Community Resources 4
RHB 701 Counseling Theory and Practice 4

Total 69–70

Educational Leadership Program:
Educational Administrative Specialist with Educational Research Certification
Major No. 282

Introductory Course Work 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
EDL 751 Educational Statistics and Research 5

Common Educational Leadership Courses 21

Administrative Strand: Focus on Administrative Behavior
EDL 771 Educational Leadership Behavior 3
EDL 772 Educational Administrative Behavior 3

Curriculum Strand: Focus on Program Development
EDL 773 Curriculum Theory and Practice 3
EDL 774 Curriculum Organization 3

Instruction Strand: Focus on Instructional Leadership
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3
EDL 777 Prepracticum: Role and Function of Educational Leaders 3

Administrative Courses 15
EDL 780 Public Relations and Politics in Education 3
EDL 781 School Finance and Economics 3
EDL 782 School Law 3
EDL 793 Computer Application for Educational Leaders 3
EDL 790 Practicum in Instructional Leadership 3
### Electives

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<tbody>
<tr>
<td></td>
<td>2–3</td>
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</table>

**Total** 49–50

### Post-Master’s Requirements (Certification)

**Note:** Before certification, students must pass the NTE Speciality area test, *Educational Leadership: Administration and Supervision.*

#### Concentration Courses

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<td>EDL 753</td>
<td>Advanced Educational Statistics</td>
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<tr>
<td>EDL 757</td>
<td>Student Appraisal Methods</td>
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<td>EDL 755</td>
<td>Research Projects or ED 899 Thesis</td>
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#### Electives

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**Total** 70–75

### Educational Leadership Program: Educational Administrative Specialist with School Community Relations Certification

**Major No. 284**

**Introductory Course Work** 11

May be taken in any sequence

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<th>Course Code</th>
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<td>EDL 751</td>
<td>Educational Statistics and Research</td>
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#### Common Educational Leadership Courses

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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDL 771</td>
<td>Educational Leadership Behavior</td>
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</tr>
<tr>
<td>EDL 772</td>
<td>Educational Administrative Behavior</td>
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#### Administrative Strand: Focus on Administrative Behavior

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDL 775</td>
<td>Leadership for Instructional Improvement</td>
<td>3</td>
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<tr>
<td>EDL 776</td>
<td>Supervision of Instruction and Personnel</td>
<td>3</td>
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<tr>
<td>EDL 777</td>
<td>Prepracticum: Role and Function of Educational Leaders</td>
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#### Instruction Strand: Focus on Instructional Leadership

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>EDL 780</td>
<td>Public Relations and Politics in Education</td>
<td>3</td>
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<tr>
<td>EDL 781</td>
<td>School Finance and Economics</td>
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#### Administrative Courses

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<td>EDL 793</td>
<td>Computer Application for Educational Leaders</td>
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<tr>
<td>EDL 790</td>
<td>Practicum in Instructional Leadership</td>
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#### Electives

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<th>Credits</th>
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<td>2–3</td>
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**Total** 49–50

### Post-Master’s Requirements (Certification)

**Note:** Before certification, students must pass the NTE Speciality area test, *Educational Leadership: Administration and Supervision.*

#### Concentration Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EDL 785</td>
<td>Introduction to Community Education</td>
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<tr>
<td>EDL 786</td>
<td>Community School</td>
<td>3</td>
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<tr>
<td>EDL 787</td>
<td>School and Community</td>
<td>3</td>
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<tr>
<td>EDL 890</td>
<td>Practicum in School Administration</td>
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<tr>
<td>EDL 971</td>
<td>Superintendent/Staff/Board Relationships</td>
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#### Electives

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<tr>
<th>Elective Course</th>
<th>Credits</th>
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<tr>
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**Total** 67–68

### Educational Leadership Program: Educational Administrative Specialist with Staff Personnel Certification

**Major No. 285**

**Introductory Course Work** 11

May be taken in any sequence

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ED 701</td>
<td>Advanced Educational Psychology</td>
<td>3</td>
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<tr>
<td>ED 702</td>
<td>Social Foundations of Education or ED 703 Philosophy of Education</td>
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<td>EDL 751</td>
<td>Educational Statistics and Research</td>
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#### Common Educational Leadership Courses

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EDL 771</td>
<td>Educational Leadership Behavior</td>
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<tr>
<td>EDL 772</td>
<td>Educational Administrative Behavior</td>
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#### Administrative Strand: Focus on Administrative Behavior

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
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<td>EDL 775</td>
<td>Leadership for Instructional Improvement</td>
<td>3</td>
</tr>
<tr>
<td>EDL 776</td>
<td>Supervision of Instruction and Personnel</td>
<td>3</td>
</tr>
<tr>
<td>EDL 777</td>
<td>Prepracticum: Role and Function of Educational Leaders</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Instruction Strand: Focus on Instructional Leadership

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 781</td>
<td>Public Relations and Politics in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDL 784</td>
<td>Curriculum Organization</td>
<td>3</td>
</tr>
<tr>
<td>EDL 786</td>
<td>School Law</td>
<td>3</td>
</tr>
<tr>
<td>EDL 793</td>
<td>Computer Application for Educational Leaders</td>
<td>3</td>
</tr>
<tr>
<td>EDL 790</td>
<td>Practicum in Instructional Leadership</td>
<td>3</td>
</tr>
<tr>
<td>EDL 797</td>
<td>Superintendent/Staff/Board Relationships</td>
<td>3</td>
</tr>
</tbody>
</table>

### Education and Human Services/Programs

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 781</td>
<td>School Finance and Economics</td>
<td>3</td>
</tr>
</tbody>
</table>
Administrative Courses 15
EDL 780 Public Relations and Politics in Education 3
EDL 781 School Finance and Economics 3
EDL 782 School Law 3
EDL 793 Computer Application for Educational Leaders 3
EDL 790 Practicum in Instructional Leadership 3
Electives 2–3
Total 49–50

Post-Master's Requirements (Certification)
Note: Before certification, students must pass the NTE Specialty area test, Educational Leadership: Administration and Supervision.

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

Educational Leadership Program: Educational Administrative Specialist with Business Management Certification Major No. 286
Introductory Course Work 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
EDL 751 Educational Statistics and Research 5
Common Educational Leadership Courses 21
Administrative Strand: Focus on Administrative Behavior
EDL 771 Educational Leadership Behavior 3
EDL 772 Educational Administrative Behavior 3
Curriculum Strand: Focus on Program Development
EDL 773 Curriculum Theory and Practice 3
EDL 774 Curriculum Organization 3
Instruction Strand: Focus on Instructional Leadership
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3
EDL 777 Prepracticum: Role and Function of Educational Leaders 3
Administrative Courses 17
EDL 873 Pupil Personnel Administration 3
EDL 890 Practicum in School Administration 3
EDL 791 Curriculum Design and Evaluation 4
EDL 792 Models of Supervision and Staff Development 4
EDL 793 Computer Applications for Educational Leaders 3
Electives 4
Total 53

Post-Master's Requirements (Certification)
Note: Before certification, students must pass the NTE Specialty area test, Educational Leadership: Administration and Supervision.

Concentration Courses 21
EDL 874 School Business Management and Facilities 3
EDL 890 Practicum in School Administration 3
EDL 871 Management of the School 3
EDL 872 Staff Personnel Administration 3
Cognates in Business 6
Electives 3
Total 74

Educational Leadership Program Teacher Leader Concentration Major No. 291
Teacher Leader Course Work 45
EDL 711 Leadership for School Improvement 4
EDL 740 Legal and Professional Issues 4
EDL 712 Philosophical and Curricular Foundations 4
EDL 731 Statistics and Appraisal in Education 4
EDL 713 Applied Psychological Learning Theory 4
EDL 730 Research on Teaching 4
EDL 720 Analysis of Teaching 4
EDL 722 Instructional Management and Evaluation 4
### Education and Human Services/Programs

#### Post-Master’s Requirements (Certification)

**Note:** Before certification, students must pass the NTE Specialty area test, *Educational Leadership: Administration and Supervision.*

<table>
<thead>
<tr>
<th>Concentration Courses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 871 Management of the School</td>
<td>3</td>
</tr>
<tr>
<td>EDL 872 Staff Personnel Administration</td>
<td>3</td>
</tr>
<tr>
<td>EDL 873 Pupil Personnel Administration</td>
<td>3</td>
</tr>
<tr>
<td>EDL 874 School Business Management and Facilities</td>
<td>3</td>
</tr>
<tr>
<td>EDL 890 Practicum in School Administration</td>
<td>3</td>
</tr>
<tr>
<td>Cognates (Economics, Political Science, Finance, Communication)</td>
<td>3</td>
</tr>
<tr>
<td>EDL 971 Superintendent/Staff/Board Relationships</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total (Principal Certificate; EAS Certificate)**

| 70–71 |

#### Educational Technology, Vocational Education, and Allied Programs

Technological advancements have redefined the role of educational technology personnel 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 Department of Educational Technology, Vocational Education, and Allied Programs offers majors in 15 areas. The classroom teacher program has concentrations in business, education, computer education, early childhood, educational media, and six concentrations in special education. There are programs in the area of supervision—computer coordinator, media, special education, and vocational supervision, and one major in educational administration specialist: special education.

Students must plan their programs in consultation with their faculty advisor. A written departmental comprehensive examination must be successfully completed at the end of the program.
### Classroom Teacher: Business

**Major No. 248**

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 704 Introduction to Foundations of Education</td>
<td>4</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research†</td>
<td>5</td>
</tr>
</tbody>
</table>

**Professional Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 720 Analysis of Teaching</td>
<td>4</td>
</tr>
<tr>
<td>EDT 749 Introduction to Instructional Media</td>
<td>4</td>
</tr>
<tr>
<td>EDT 820 Seminar in Secondary Education: Business Education‡</td>
<td>4</td>
</tr>
</tbody>
</table>

**Program Concentration**

**Business Education Core:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDT 724 Foundations of Business Education</td>
<td>3</td>
</tr>
<tr>
<td>VOE 824 Curriculum Development for Vocational Business and Office Education†</td>
<td>3</td>
</tr>
<tr>
<td>VOE 706 Survey of Vocational Education</td>
<td>3</td>
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</tbody>
</table>

**Business Education Program Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDM 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

Total: 48-49

*Courses are approved for vocational education supervisor's certificate.
†Courses are required for vocational education supervisor's certificate.
‡Required of all master's degree students; to be taken toward the end of the program.

### Classroom Teacher: Computer Education

**Major No. 244**

The intent of the Classroom Teacher: Computer Education program of study is to prepare teachers to make more effective use of computers in the classroom. The program covers computer-assisted instruction, selecting and evaluating appropriate computer software, developing lessons incorporating coursework, 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.

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>ED 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
</tr>
</tbody>
</table>

**Program Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 700 Principles and Applications of Educational Technology</td>
<td>2</td>
</tr>
<tr>
<td>EDT 739 Developing Materials for Instruction</td>
<td>4</td>
</tr>
<tr>
<td>EDT 786 Applications of Computers in Education</td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 48

### Classroom Teacher: Educational 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 890 Internship</td>
<td>4</td>
</tr>
<tr>
<td>EDT 799 Seminar in Educational Technology</td>
<td>2</td>
</tr>
</tbody>
</table>

**Educational Technology Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdisciplinary Electives</td>
<td>5-6</td>
</tr>
</tbody>
</table>

Total: 48-49

*Courses are approved for vocational education supervisor's certificate.
†Courses are required for vocational education supervisor's certificate.
‡Required of all master's degree students; to be taken toward the end of the program.

**Program Concentration**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDM 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>EDE 712 Advanced Study of Child Development</td>
<td>4</td>
</tr>
<tr>
<td>EDE 809 Seminar I</td>
<td>2</td>
</tr>
<tr>
<td>EDE 810 Seminar II</td>
<td>2</td>
</tr>
<tr>
<td>EDE 720 Advanced Program Planning I: Integrating Literacy and the Expressive Arts</td>
<td>4</td>
</tr>
<tr>
<td>EDE 721 Advanced Planning II: Fundamental Concepts in Mathematics and Science</td>
<td>4</td>
</tr>
<tr>
<td>EDE 730 Developmentally Appropriate Assessment in ECE</td>
<td>4</td>
</tr>
<tr>
<td>EDE 735 Individuality in the ECE Classroom</td>
<td>4</td>
</tr>
<tr>
<td>EDE 744 Current Issues in ECE</td>
<td>3</td>
</tr>
<tr>
<td>EDE 750 Administering Early Childhood Programs</td>
<td>2</td>
</tr>
<tr>
<td>EDE 751 Working with Parents of Young Children</td>
<td>2</td>
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</tbody>
</table>

**Electives (with advisor approval)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>8</td>
</tr>
</tbody>
</table>

Total: 48

*Courses are approved for vocational education supervisor's certificate.
†Courses are required for vocational education supervisor's certificate.
‡Required of all master's degree students; to be taken toward the end of the program.
Students with an educational media background have also found employment in the health sciences, religious organizations, business and industry, and training facilities.

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 701 Advanced Educational Psychology</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
</tbody>
</table>

**Program Concentrations**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 700 Principles and Applications of Educational Technology</td>
<td>2</td>
</tr>
<tr>
<td>EDT 746 Teaching Information and Research Skills</td>
<td>4</td>
</tr>
<tr>
<td>EDT 751 Educational Utilization of Video-Based Technology</td>
<td>4</td>
</tr>
<tr>
<td>EDT 786 Educational Applications of Computers</td>
<td>4</td>
</tr>
<tr>
<td>EDT 890 Internship</td>
<td>4</td>
</tr>
<tr>
<td>EDT 799 Seminar in Educational Technology</td>
<td>2</td>
</tr>
</tbody>
</table>

**Educational Technology Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
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</tbody>
</table>

**Interdisciplinary Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>5–6</td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>49–50</td>
</tr>
</tbody>
</table>

**Certification in Educational Media**

Students seeking certification in educational media through the College of Education and Human Services must hold a teaching certificate in either elementary or secondary education. Students who do not have a teaching certificate must complete the requirements for that certificate prior to the granting of certification in educational media.

Three certificates are available:

- Endorsement on an Elementary Certificate
- Educational Media Certification
- Educational Media Certification (K–12)

For specific information regarding courses and requirements, contact the certification officer of the Department of Educational Technology, Vocational Education, and Allied Programs.

**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 advisor in the Office of Student Services for the necessary prerequisites before beginning this program.

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 704 Introduction to Foundations of Education</td>
<td>4</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

**Professional Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 786 Applications of Computers in Education</td>
<td>4</td>
</tr>
<tr>
<td>EDS 700 Special Education Entrance Seminar</td>
<td>2</td>
</tr>
<tr>
<td>EDS 799 Special Education Exit Seminar</td>
<td>2</td>
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</tbody>
</table>

**Program Concentration**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS 651 Nature and Needs of the Multiply Handicapped (offered fall only)</td>
<td>3</td>
</tr>
<tr>
<td>EDS 655 Nature and Needs of the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDS 654 Administration and Interpretation of Educational Data</td>
<td>3</td>
</tr>
<tr>
<td>EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDS 656 Clinical Practice in Remediation</td>
<td>4</td>
</tr>
<tr>
<td>EDS 644 Instructional and Behavioral Management of Exceptional Individuals</td>
<td>3</td>
</tr>
<tr>
<td>EDS 659 Communication and Consultation Skills for Special Educators</td>
<td>3</td>
</tr>
<tr>
<td>EDS 645 Career Education and Occupational Training for Exceptional Individuals</td>
<td>3</td>
</tr>
<tr>
<td>EDS 658 Practicum in Education: Developmentally Handicapped</td>
<td>5–6</td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>53–54</td>
</tr>
</tbody>
</table>

**Classroom Teacher K–12 Special Education/Gifted Major No. 260**

This program leads to validation in gifted education to the holder of an Ohio teaching certificate.

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 711 Leadership Skills for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>ED 704 Introduction to Foundations of Education</td>
<td>4</td>
</tr>
</tbody>
</table>

**Program Concentration**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS 722 Gifted Children and Youth (offered fall only)</td>
<td>3</td>
</tr>
<tr>
<td>Select one course in computer education</td>
<td>3</td>
</tr>
<tr>
<td>(EDT 786, 788, or 781)</td>
<td>4</td>
</tr>
<tr>
<td>EDS 723 Teaching the Gifted (offered winter only)</td>
<td>3</td>
</tr>
<tr>
<td>EDS 720 Creative Problem Solving in Classrooms (offered spring only)</td>
<td>3</td>
</tr>
<tr>
<td>CNL 961 Counseling the Gifted (offered alternating fall quarters)</td>
<td>3</td>
</tr>
</tbody>
</table>
### Programs/Education and Human Services

**ED 658 Practicum in Education** 3–6  
**EDS 700 Special Education Entrance Seminar** 2  
**EDS 799 Special Education Exit Seminar** 2

**Content Concentration** 9–12  
Courses developing a concentration in advanced instruction/curriculum, educational technology, counseling, education of gifted/handicapped or research selected by student and advisor

**Total** 48

**Classroom Teacher: Special Education**  
**Multiply Handicapped**  
**Major No. 259**

This concentration emphasizes the moderately, severely, and profoundly retarded (MSPR), trainable mentally retarded, the autistic, and children and youth with severe physical and mental impairments. It fulfills current standards for certification in MH and the QMRP certification.

Persons interested in this program who are not certified elementary teachers should consult with a teacher certification advisor in the Office of Student Services.

**Introductory Course Work** 13  
ED 704 Introduction to Foundations of Education 4  
EDL 711 Leadership Skills for School Improvement 4  
EDL 751 Educational Statistics and Research 5

**Professional Requirements** 12  
EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped 4  
EDT 786 Applications of Computers in Education 4  
EDS 700 Special Education Entrance Seminar 2  
EDS 799 Special Education Exit Seminar 2

**Program Concentration** 30–31  
EDS 651 Nature and Needs of the Multiply Handicapped (offered fall only) 3  
EDS 652 Education of Individuals with Physical, Sensory, and Motor Disorders (offered winter only) 3  
EDS 653 Curriculum, Methods, Materials, and Adaptive Equipment for Multiply Handicapped (offered spring only) 3  
EDS 659 Communication and Consultation Skills for Special Education 3  
EDS 645 Career Education and Occupational Training for Exceptional Individuals 3  
EDS 643 Introduction to Augmentative Communication 3  
HPR 710 Physical Education for Children with Special Needs 4  
EDS 644 Instructional and Behavioral Management of Exceptional Individuals 3  
ED 658 Practicum in Education: Multiply Handicapped (Students without prior student teaching must do 6 hours of student teaching and 6 hours of practicum) 5–6

**Total** 55–56

**Classroom Teacher: Special Education**  
**Orthopedically Handicapped (OH)**  
**Major No. 272**

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

**Introductory Course Work** 13  
ED 704 Introduction to the Foundations of Education 4  
EDL 711 Leadership Skills for School Improvement 4  
EDL 751 Educational Statistics and Research 5

**Professional Requirements** 12  
EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped 4  
EDT 786 Applications of Computers in Education 4  
EDS 700 Special Education Entrance Seminar 2  
EDS 799 Special Education Exit Seminar 2

**Program Concentration** 30–31  
EDS 651 Nature and Needs of the Multiply Handicapped (offered fall only) 3  
EDS 652 Education of Individuals with Physical, Sensory, and Motor Disorders (offered winter only) 3  
EDS 653 Curriculum, Methods, Materials, and Adaptive Equipment for Multiply Handicapped (offered spring only) 3  
EDS 659 Communication and Consultation Skills for Special Educators 3  
EDS 645 Career Education and Occupational Training for Exceptional Individuals 3  
EDS 643 Introduction to Augmentative Communication 3  
EDS 655 Nature and Needs of the Mildly Handicapped 4  
EDS 644 Instructional and Behavioral Management of Exceptional Individuals 3  
ED 658 Practicum in Education: Orthopedically Handicapped 5–6

**Total** 55–56
Classroom Teacher: Special Education Severe Behavior Handicapped (SBH) Major No. 269

This program leads to certification in severe behavior handicapped education for the holder of an elementary education teaching certificate. Persons interested in this program who are not certified elementary teachers should consult with a teacher certification advisor in the Office of Student Services.

### Introductory Course Work

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 704 Introduction to the Foundations of Education</td>
<td>4</td>
</tr>
<tr>
<td>EDL 711 Leadership Skills for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

### Professional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 786 Applications of Computers in Education</td>
<td>4</td>
</tr>
<tr>
<td>EDS 700 Special Education Entrance Seminar</td>
<td>2</td>
</tr>
<tr>
<td>EDS 799 Special Education Exit Seminar</td>
<td>2</td>
</tr>
</tbody>
</table>

### Program Concentration

<table>
<thead>
<tr>
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<tbody>
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<td>EDS 651 Nature and Needs of the Multiply Handicapped (offered fall only)</td>
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</tr>
<tr>
<td>EDS 655 Nature and Needs of the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDS 654 Administration and Interpretation of Educational Data</td>
<td>3</td>
</tr>
<tr>
<td>EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDS 656 Clinical Practice in Remediation</td>
<td>4</td>
</tr>
<tr>
<td>EDS 644 Instructional and Behavioral Management of Exceptional Individuals</td>
<td>3</td>
</tr>
<tr>
<td>EDS 659 Communication and Consultation Skills for Special Educators</td>
<td>3</td>
</tr>
<tr>
<td>EDS 645 Career Education and Occupational Training for Exceptional Individuals</td>
<td>3</td>
</tr>
<tr>
<td>ED 658 Practicum in Education: Specific Learning Disabilities</td>
<td>5-6</td>
</tr>
</tbody>
</table>

**Total: 59-60**

Classroom Teacher: Special Education Specific Learning Disabilities (SLD) 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 advisor in the Office of Student Services.

### Introductory Course Work

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 704 Introduction to the Foundations of Education</td>
<td>4</td>
</tr>
<tr>
<td>EDL 711 Leadership Skills for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

### Professional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 786 Application of Computers in Education</td>
<td>4</td>
</tr>
<tr>
<td>EDS 700 Special Education Entrance Seminar</td>
<td>2</td>
</tr>
<tr>
<td>EDS 799 Special Education Exit Seminar</td>
<td>2</td>
</tr>
</tbody>
</table>

### Program Concentration

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS 655 Nature and Needs of the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDS 654 Administration and Interpretation of Educational Data</td>
<td>3</td>
</tr>
<tr>
<td>EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDS 656 Clinical Practice in Remediation</td>
<td>4</td>
</tr>
<tr>
<td>EDS 644 Instructional and Behavioral Management of Exceptional Individuals</td>
<td>3</td>
</tr>
<tr>
<td>EDS 659 Communication and Consultation Skills for Special Educators</td>
<td>3</td>
</tr>
<tr>
<td>EDS 645 Career Education and Occupational Training for Exceptional Individuals</td>
<td>3</td>
</tr>
<tr>
<td>ED 658 Practicum in Education: Specific Learning Disabilities</td>
<td>5-6</td>
</tr>
</tbody>
</table>

**Total: 50-51**

Educational Leadership Program: Educational Administrative Specialist with Special Education Certification Major No. 283

### Introductory Course Work

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 702 Social Foundations of Education</td>
<td>3</td>
</tr>
<tr>
<td>ED 703 Philosophy of Education</td>
<td>3</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

May be taken in any sequence

### Administrative Strand: Focus on Administrative Behavior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 771 Educational Leadership Behavior</td>
<td>3</td>
</tr>
<tr>
<td>EDL 772 Educational Administrative Behavior</td>
<td>3</td>
</tr>
</tbody>
</table>

### Curriculum Strand: Focus on Program Development

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>EDL 774 Curriculum Organization</td>
<td>3</td>
</tr>
</tbody>
</table>

### Instruction Strand: Focus on Instructional Leadership

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 775 Leadership for Instructional Improvement</td>
<td>3</td>
</tr>
</tbody>
</table>
Programs/Education and Human Services

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 776 Supervision of Instruction and Personnel</td>
<td>3</td>
</tr>
<tr>
<td>EDL 777 Prepracticum: Role and Function of Educational Leaders</td>
<td>3</td>
</tr>
<tr>
<td>Administrative Courses</td>
<td>15</td>
</tr>
<tr>
<td>EDL 780 Public Relations and Politics in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDL 781 School Finance and Economics</td>
<td>3</td>
</tr>
<tr>
<td>EDL 782 School Law</td>
<td>3</td>
</tr>
<tr>
<td>EDL 793 Computer Application for Educational Leaders</td>
<td>3</td>
</tr>
<tr>
<td>EDL 790 Practicum in Instructional Leadership</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>2–3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>49–50</td>
</tr>
</tbody>
</table>

**Post-Master's Requirements (Certification)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration Courses</td>
<td>23</td>
</tr>
<tr>
<td>CNL 765 Pupil Personnel Services in the School and Community Resources</td>
<td>4</td>
</tr>
<tr>
<td>EDL 890 Practicum in School Administration</td>
<td>3</td>
</tr>
<tr>
<td>CNL 661 Principles of Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 857 Practicum in School Psychology</td>
<td>4</td>
</tr>
<tr>
<td>EDL 791 Curriculum Design and Evaluation</td>
<td>4</td>
</tr>
<tr>
<td>EDL 792 Models of Supervision and Staff Development</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>72–73</td>
</tr>
</tbody>
</table>

**Curriculum and Supervision: Computer Coordinator**

**Major No. 292**

The intent of the Curriculum and Supervision: Computer Coordinator 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.

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>ED 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 702 Social Foundations of Education or 703 Philosophy of Education</td>
<td>3</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td><strong>Professional Requirements</strong></td>
<td>21</td>
</tr>
<tr>
<td>EDL 771 Educational Leadership Behavior</td>
<td>3</td>
</tr>
<tr>
<td>EDL 772 Educational Administrative Behavior</td>
<td>3</td>
</tr>
<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>EDL 774 Curriculum Organization</td>
<td>3</td>
</tr>
<tr>
<td>EDL 775 Leadership for Instructional Improvement</td>
<td>3</td>
</tr>
<tr>
<td>EDL 776 Supervision of Instruction and Personnel</td>
<td>3</td>
</tr>
<tr>
<td>EDL 790 Practicum in Instructional Leadership</td>
<td>3</td>
</tr>
<tr>
<td><strong>Supervision Concentration</strong></td>
<td>8</td>
</tr>
<tr>
<td>EDT 795 Administration and Supervision of the Audiovisual Program</td>
<td>3</td>
</tr>
<tr>
<td>EDT 700 Principles and Applications of Educational Technology</td>
<td>2</td>
</tr>
<tr>
<td>EDL 799 Seminar in Educational Technology</td>
<td>3</td>
</tr>
<tr>
<td><strong>Educational Technology Electives</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>Interdisciplinary Electives</strong></td>
<td>4–6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>49</td>
</tr>
</tbody>
</table>

**Supervisor/Media**

**Major No. 289**

This concentration is primarily for students who desire a curriculum and/or supervision position in media. They must have 27 months of teaching experience under a standard certificate in the field (educational media) for which the supervisor's certificate is sought.

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 702 Social Foundations of Education or 703 Philosophy of Education</td>
<td>3</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td><strong>Professional Requirements</strong></td>
<td>21</td>
</tr>
<tr>
<td>EDL 771 Educational Leadership Behavior</td>
<td>3</td>
</tr>
<tr>
<td>EDL 772 Educational Administrative Behavior</td>
<td>3</td>
</tr>
<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>EDL 774 Curriculum Organization</td>
<td>3</td>
</tr>
<tr>
<td>EDL 775 Leadership for Instructional Improvement</td>
<td>3</td>
</tr>
<tr>
<td>EDL 776 Supervision of Instruction and Personnel</td>
<td>3</td>
</tr>
<tr>
<td>EDL 790 Practicum in Instructional Leadership</td>
<td>3</td>
</tr>
<tr>
<td><strong>Supervision Concentration</strong></td>
<td>8</td>
</tr>
<tr>
<td>EDT 795 Administration and Supervision of the Audiovisual Program</td>
<td>3</td>
</tr>
<tr>
<td>EDT 700 Principles and Applications of Educational Technology</td>
<td>2</td>
</tr>
<tr>
<td>EDL 799 Seminar in Educational Technology</td>
<td>3</td>
</tr>
<tr>
<td><strong>Educational Technology Electives</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>Interdisciplinary Electives</strong></td>
<td>4–6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>49</td>
</tr>
</tbody>
</table>
Educational Leadership Program: Supervisor/Special Education Major No. 290

Introductory Course Work 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
EDL 751 Education Statistics and Research 5

Common Educational Leadership Courses 18
Administrative Strand: Focus on Administrative Behavior
EDL 771 Educational Leadership Behavior 3
EDL 772 Educational Administrative Behavior 3
Curriculum Strand: Focus on Program Development
EDL 773 Curriculum Theory and Practice 3
EDL 774 Curriculum Organization 3
Instruction Strand: Focus on Instructional Leadership
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3

Curriculum and Supervisor Courses 20
EDL 791 Curriculum Design and Evaluation 4
EDL 792 Models of Supervision and Staff Development 4
EDL 793 Computer Applications for Educational Leaders 3
EDL 790 Practicum in Instructional Leadership 3
CNL 751 Counseling Skills for Educators 3
EDS 659 Communication and Consultation Skills for Special Educators 3

Total 49

Vocational Supervisor
The graduate program for the preparation of vocational educational supervisors is designed to provide schools with competent instructional leadership. The program contains a foundations core, a supervision core, a curriculum and instructional leadership core, and a vocational core. In addition, school law, computer applications for educational leaders, and a clinical field experience are integral program components. Students completing the program will receive a M.Ed. and be eligible to receive a vocational supervisors certificate if they have completed 27 months of successful teaching experience under the appropriate certificates.

Vocational Supervisor Major No. 287

Introductory Course Work 13
May be taken in any sequence
ED 704 Introduction to Foundations in Education 4
EDL 711 Leadership for School Improvement 4
EDL 751 Educational Statistics and Research 5

Vocational Core 18
VOE 706 Survey of Vocational Education 3
VOE 725 Administration and Supervision in Vocational Education 3
VOE 824 Curriculum for Vocational Education 3
VOE 825 Facilities and Management of Vocational Education 3
VOE 826 Coordination Techniques for Vocational Education 3
EDL 790 Practicum in Instructional Leadership 3

Supervision Core 6–7
EDL 776 Supervision of Instruction and Personnel or EDL 792 Models of Supervision and Staff Development 4
EDL 782 School Law 3

Curriculum and Instruction Core 6
EDL 773 Curriculum Theory and Practice 3
EDL 793 Computer Applications for Educational Leaders 3

Electives 4–5

Total 48

Health, Physical Education, and Recreation (HPR) Programs

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

Master of Education (M.Ed.)
This major 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 physiological 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 or to apply athletic training procedures. Physical education teachers and coaches who currently have a master's degree may want to take individual courses to meet special needs. Successful completion of a written departmental comprehensive examination is required at the end of the program of study.

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 701 Advanced Educational Psychology and Human Development</td>
<td>4</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

**Professional Requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twelve hours to be arranged or EDL 720 Analysis of Teaching</td>
<td>4</td>
</tr>
<tr>
<td>EDL 781 Curriculum Design and Evaluation</td>
<td>4</td>
</tr>
<tr>
<td>EDL 740 Legal and Professional Issues</td>
<td>4</td>
</tr>
</tbody>
</table>

**Program Concentration**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPR 710 Physical Education for Children with Special Needs</td>
<td>4</td>
</tr>
<tr>
<td>HPR 720 Motor Development and Acquisition of Motor Skills</td>
<td>4</td>
</tr>
<tr>
<td>HPR 740 Administration of Interscholastic Athletics or HPR 760 Advanced Athletic Training Techniques</td>
<td>4</td>
</tr>
<tr>
<td>HPR 750 Scientific Foundations for Conditioning</td>
<td>4</td>
</tr>
<tr>
<td>HPR 753 Assessment of Physical Activity</td>
<td>4</td>
</tr>
<tr>
<td>HPR 780 Research in Physical Education</td>
<td>5</td>
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</tbody>
</table>

**Thesis**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
</tr>
</tbody>
</table>

**Human Services (Counseling) Programs**

The Department of Human Services programs share a common curriculum of courses associated with six different counseling concentrations. Students 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; gerontology; marriage and family counseling; student personnel services in higher education; counseling exceptional children; or students 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 department 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 advisor and elective courses may be chosen as appropriate.

Students must pass a written comprehensive examination at the conclusion of their plan of study.

The Council for Accreditation of Counseling and Related Educational Programs (CACREP) has conferred accreditation to the following program areas in the department: school counseling (M.Ed.) and community counseling—mental health.
The degree program in rehabilitation counseling with a concentration in severe disabilities has accreditation by the Council on Rehabilitation Education (CORE).

Licensure Requirements for Licensed Professional Counselors (LPC)

Students wishing to pursue eligibility for licensure as a counselor in the state of Ohio must earn a master's degree in counseling, with a minimum of 60 credit hours in counseling, and complete supervision and examination requirements. In addition, a supervised field experience and each of the following courses are required: RHB 701, 705; CNL 667 or 767, 762, 863, 971, 972, 973; and EDL 751.

Business and Industrial Management Counseling
Major No. 265

<table>
<thead>
<tr>
<th>Introductory Course Work</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701 Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863 Techniques of Counseling*</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

Professional Requirements | 40 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 667 Group Background and Theory</td>
<td>4</td>
</tr>
<tr>
<td>CNL 762 Career Development and Information Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 864 Practicum I: Individual</td>
<td>4</td>
</tr>
<tr>
<td>CNL 971 Counseling for Life-Span Development</td>
<td>4</td>
</tr>
<tr>
<td>CNL 972 Legal, Professional, and Ethical Issues in the Human Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 973 Social and Cultural Foundations in Counseling</td>
<td>4</td>
</tr>
<tr>
<td>MGT 621 Graduate Survey in Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 700 Organizational Behavior and Theory</td>
<td>3</td>
</tr>
<tr>
<td>MGT 703 Seminar in Personnel Administration</td>
<td>3</td>
</tr>
<tr>
<td>MGT 705 Seminar in Industrial Relations</td>
<td>3</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
</tbody>
</table>

Electives | 8 |

Total | 60 |

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.

Gerontology
Major No. 266

<table>
<thead>
<tr>
<th>Introductory Course Work</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701 Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863 Techniques of Counseling*</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
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</tbody>
</table>

Professional Requirements | 39 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 667 Group Background and Theory</td>
<td>4</td>
</tr>
<tr>
<td>CNL 762 Career Development and Information Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 865 Individual Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 866 Advanced Individual and Group Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 971 Counseling for Life-Span Development</td>
<td>4</td>
</tr>
<tr>
<td>CNL 972 Legal, Professional, and Ethical Issues in the Human Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 973 Social and Cultural Foundations in Counseling</td>
<td>4</td>
</tr>
<tr>
<td>RHB 702 Medical Assessment/Gerontology</td>
<td>4</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
<tr>
<td>SW 662 Social Gerontology</td>
<td>4</td>
</tr>
</tbody>
</table>

Electives | 8 |

Total | 61 |

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.

Mental Health Counseling
Major No. 267

<table>
<thead>
<tr>
<th>Introductory Course Work</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701 Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863 Techniques of Counseling*</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

Professional Requirements | 57–58 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 663 Mental Health I</td>
<td>4</td>
</tr>
<tr>
<td>CNL 664 Crisis Intervention Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 667 Group Background and Theory or CNL 767 Group Process in Counseling and Guidance</td>
<td>3–4</td>
</tr>
<tr>
<td>CNL 762 Career Development and Information Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 773 Mental Health II</td>
<td>4</td>
</tr>
<tr>
<td>CNL 779 Marriage and Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 865 Individual Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 866 Advanced Individual and Group Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 867 Internship: Mental Health Counseling</td>
<td>10</td>
</tr>
<tr>
<td>(Minimum 220 hours with 75 direct client hours per each 5-hour unit. This has a minimum total of 440 hours with 150 direct client contact hours. A minimum total of 25 direct client contact hours will be spent leading a group.)</td>
<td></td>
</tr>
<tr>
<td>CNL 971 Counseling for Life-Span Development</td>
<td>4</td>
</tr>
<tr>
<td>CNL 972 Legal, Professional, and Ethical Issues in the Human Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 973 Social and Cultural Foundations in Counseling</td>
<td>4</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
</tbody>
</table>
Electives  
4–5

Total  
75

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.

**Marriage and Family Counseling**

**Major No. 268**

**Introductory Course Work**  
13

- RHB 701 Counseling Theory and Practice  
- CNL 863 Techniques of Counseling*  
- EDL 751 Educational Statistics and Research  

**Professional Requirements**  
55

- CNL 762 Career Development and Information Services  
- CNL 779 Marriage and Family Counseling  
- CNL 780 Systems Theory and Family Counseling  
- CNL 781 Advanced Techniques of Family Counseling  
- CNL 782 Techniques of Marital Counseling  
- CNL 670 Counseling Workshop: Human Sexuality and Counseling  
- CNL 663 Mental Health I  
- CNL 971 Counseling for Life-Span Development  

**Total**  
72

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.

**Rehabilitation Counseling: Chemical Dependency**

**Major No. 271**

**Introductory Course Work**  
13

- RHB 701 Counseling Theory and Practice  
- CNL 863 Techniques of Counseling*  
- EDL 751 Educational Statistics and Research  

**Professional Requirements**  
44–45

- CNL 667 Group Background and Theory or CNL 767 Group Processes in Counseling and Guidance  
- CNL 762 Career Development and Information Services  
- CNL 971 Counseling for Life-Span Development  
- RHB 700 Counseling: Severe Disability Foundations of Vocational Rehabilitation  
- RHB 702 Medical Assessment  
- RHB 704 Psychological Adjustment: Severe Disability  
- RHB 705 Behavioral Assessment  
- RHB 711 Vocational Evaluation and Job Placement Techniques  
- RHB 720 Counseling: Severe Disability Case Management for Vocational Rehabilitation  
- RHB 801 Internship: Severe Disability  

**Electives**  
4

**Total**  
61–62

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.

**LPC**—Students wishing to pursue licensure in Ohio as a counselor must also take CNL 972 and 973.
### Student Personnel in Higher Education

**Major No. 274**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701</td>
<td>Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863</td>
<td>Techniques of Counseling*</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751</td>
<td>Educational Statistics and Research</td>
<td>5</td>
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</table>

**Professional Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701</td>
<td>Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863</td>
<td>Techniques of Counseling*</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751</td>
<td>Educational Statistics and Research</td>
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</table>

**Professional Requirements (Special Education)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701</td>
<td>Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863</td>
<td>Techniques of Counseling*</td>
<td>4</td>
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</tbody>
</table>

**Choose one of the following tracks:**

#### Counseling Track

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 663</td>
<td>Mental Health I</td>
<td>4</td>
</tr>
<tr>
<td>CNL 971</td>
<td>Counseling for Life-Span Development</td>
<td>4</td>
</tr>
<tr>
<td>CNL 972</td>
<td>Legal, Professional and Ethical Issues in Human Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 867</td>
<td>Internship</td>
<td>10</td>
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</table>

#### Student Personnel Track

<table>
<thead>
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<th>Course Title</th>
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<tbody>
<tr>
<td>CNL 860</td>
<td>Advanced Seminar in Counseling</td>
<td>4</td>
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<tr>
<td>CNL 871</td>
<td>Internship in Student Personnel Services in Higher Education</td>
<td>10</td>
</tr>
<tr>
<td>Advised Electives</td>
<td></td>
<td>8</td>
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**Total**

<table>
<thead>
<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>73–74</td>
</tr>
</tbody>
</table>

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.*

### Counseling Exceptional Children

**Major No. 278**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701</td>
<td>Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863</td>
<td>Techniques of Counseling*</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751</td>
<td>Educational Statistics and Research</td>
<td>5</td>
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**Professional Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CNL 662</td>
<td>Problems in Student Personality and Development or</td>
<td>19–20</td>
</tr>
<tr>
<td>CNL 663</td>
<td>Mental Health I</td>
<td>4</td>
</tr>
<tr>
<td>CNL 667</td>
<td>Group Background and Theory or</td>
<td>3–4</td>
</tr>
<tr>
<td>CNL 767</td>
<td>Group Processes in Counseling and Guidance</td>
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### Recommended Electives

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>15–19</td>
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</table>

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.*

### Education and Human Services/Programs

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 769</td>
<td>Techniques of Child Counseling or</td>
<td></td>
</tr>
<tr>
<td>CNL 778</td>
<td>Techniques of Play Therapy</td>
<td></td>
</tr>
<tr>
<td>CNL 865</td>
<td>Individual Practicum</td>
<td></td>
</tr>
<tr>
<td>RHB 705</td>
<td>Behavioral Assessment</td>
<td></td>
</tr>
</tbody>
</table>

### 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, or school social worker. 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 advisor. 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 and complete an exit evaluation, which is a written comprehensive examination.

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 advisor and file a planned program of study; demonstrate proficiency with specified counseling behaviors during CNL 863;
- 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.

State certification requirements were adopted January 1, 1986. Students should contact the chair of the Department of Human Services for information.

### School Counseling

**Major No. 275**

<table>
<thead>
<tr>
<th>Introductory Course Work</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701 Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 863 Techniques of Counseling*</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional Requirements</th>
<th>55–56</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 662 Problems in Student Personality and Development</td>
<td>4</td>
</tr>
<tr>
<td>CNL 667 Group Background and Theory or CNL 767 Group Processes in Counseling and Guidance</td>
<td>3–4</td>
</tr>
<tr>
<td>CNL 762 Career Development and Information Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 765 Pupil Personnel Services in the School and Community Resources</td>
<td>3</td>
</tr>
<tr>
<td>CNL 779 Marriage and Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 972 Legal, Professional, and Ethical Issues in Human Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 973 Social and Cultural Foundations in Counseling</td>
<td>4</td>
</tr>
<tr>
<td>ED 655 Nature and Needs of the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>ED 773 Curriculum Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
<tr>
<td>CNL 865 Individual Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 866 Advanced Individual and Group Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 867 Internship: School Counseling</td>
<td>10</td>
</tr>
</tbody>
</table>

(A minimum total of 440 hours with 150 direct client contact hours; minimum 220 hours with 75 direct client contact hours per each 5-hour unit.)

<table>
<thead>
<tr>
<th>Recommended Electives</th>
<th>4–5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 971 Counseling for Life-Span Development</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total** 73

*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.

**Exit Requirement:** A written comprehensive exam.

**Thesis:** Students may also choose to complete a thesis. This involves 9 hours of thesis credit and EDL 752.

**Licensure:** Students considering pursuing licensure in Ohio should consider taking CNL 971.

### School Social Worker

**Major No. 277**

<table>
<thead>
<tr>
<th>Introductory Course Work</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHB 701 Counseling Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>CNL 863 Techniques of Counseling</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional Requirements</th>
<th>54</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 662 Problems in Student Personality and Development</td>
<td>4</td>
</tr>
<tr>
<td>ED 701 Advanced Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
<tr>
<td>CNL 765 Pupil Personnel Services in the School and Community Resources</td>
<td>4</td>
</tr>
<tr>
<td>CNL 779 Marriage and Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 972 Legal, Professional, and Ethical Issues in the Human Services</td>
<td>4</td>
</tr>
<tr>
<td>ED 787 School and Community</td>
<td>3</td>
</tr>
<tr>
<td>SOC 532 Juvenile Delinquency</td>
<td>4</td>
</tr>
<tr>
<td>CNL 773 Mental Health II</td>
<td>4</td>
</tr>
<tr>
<td>CNL 865 Individual Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 866 Advanced Individual and Group Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 864 Crisis Intervention Counseling</td>
<td>4</td>
</tr>
<tr>
<td>PSY 633 Exceptional Child</td>
<td>4</td>
</tr>
<tr>
<td>CNL 667 Group Background and Theory</td>
<td>4</td>
</tr>
</tbody>
</table>

| Electives | 1 |

Electives are coordinated with the candidate’s individualized background of experience and training. Please see advisor for elective approval.

**Total** 68

*Note: Students may elect to complete a thesis. This involves 9 hours of thesis credit and ED 752. Total hours remain the same. The program was scheduled for revision in 1992. Please contact the department chair for information.*

### 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 students preparing to become art therapists, for art teachers desiring specialized courses, and for people in the human services professions.

Art therapists work with people 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, and work in art media. 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. A written comprehensive examination is required at the end of the student's program of study. This program was under review in 1992 as this catalog went to press. Please contact the department for information.

Professional Course Sequence

Introductory Course Work 12
May be taken in any sequence
AT 730 Art Therapy 3
EDL 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 Art for the Disabled and 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 Seminar in Art Therapy 1

Art Therapy Program Exit Options 5–9
Selected from the following:
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

Total (minimum requirement) 60

Note: This curriculum was under review in 1992 as this catalog went to press. Contact the department for the current program.

Classroom Teacher: Art Education
Major No. 250

Introductory and Professional Courses 25
AED 731 Theories and Philosophies in Art Education 4
AED 752 Research in Art Education 4
ED 747 Leadership for School Improvement 4
EDL 751 Educational Statistics and Research 5
EDL 791 Curriculum Design and Evaluation 4
ED 734 Analysis of Teaching 4

Developmental Courses 4

Select one of the following:
EDL 710 Introduction to Professional Development
EDL 784 Legal and Professional Issues
EDT 749 Developing Materials for Instruction

AED Program Specific Courses 19

Total 48

Teacher Education Programs

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.

Successful completion of a written departmental comprehensive examination is required at the end of the program of study.

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 15 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. Additional entry and exit requirements apply. Please contact the Office of Student Services.

**Introductory Course Work**

To be taken concurrently during the first quarter in the program (offered fall quarter only)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 666 Introduction to Schooling</td>
<td>3</td>
</tr>
<tr>
<td>ED 702 Social Foundations of Education</td>
<td>3</td>
</tr>
<tr>
<td>ED 710 Classroom Strategies for Atypical Populations</td>
<td>4</td>
</tr>
<tr>
<td>ED 662 Studies in the Psychological Foundations of Education</td>
<td>6</td>
</tr>
</tbody>
</table>

**Professional Requirements: Phase II**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 663 Teaching Skills and Strategies</td>
<td>3</td>
</tr>
<tr>
<td>ED 603 Child Development</td>
<td>3</td>
</tr>
<tr>
<td>ED 615 Improvement of Elementary Reading Instruction</td>
<td>3</td>
</tr>
<tr>
<td>ED 616 Improving Science Instruction in the Elementary School</td>
<td>3</td>
</tr>
<tr>
<td>ED 617 Elementary Social Studies: Curriculum and Materials*</td>
<td>3</td>
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<tr>
<td>ED 637 Elementary School Mathematics: Curriculum and Materials*</td>
<td>3</td>
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<tr>
<td>ED 664 Evaluation</td>
<td>3</td>
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<tr>
<td>ED 721 Literature for Elementary Children</td>
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**Professional Requirements: Phase III**

<table>
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<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ED 665 Supervised Teaching: Elementary</td>
<td>13</td>
</tr>
<tr>
<td>EDL 740 Legal and Professional Issues</td>
<td>4</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>EDL 791 Curriculum Design and Evaluation</td>
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**Total**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
</tr>
</tbody>
</table>

*Course numbers to be revised summer 1990. See advisor for additional information.

**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. Additional entry and exit requirements apply. Please contact the Office of Student Services.

**Introductory Course Work**

To be taken concurrently during the first quarter in the program (offered fall quarter only)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 666 Introduction to Schooling</td>
<td>3</td>
</tr>
<tr>
<td>ED 702 Social Foundations of Education</td>
<td>3</td>
</tr>
<tr>
<td>ED 710 Classroom Strategies for Atypical Populations</td>
<td>4</td>
</tr>
<tr>
<td>ED 662 Studies in the Psychological Foundations of Education</td>
<td>6</td>
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</table>

**Professional Requirements: Phase II**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ED 604 Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>ED 632 Improving Reading in Secondary Schools</td>
<td>3</td>
</tr>
<tr>
<td>ED 663 Teaching Skills and Strategies</td>
<td>3</td>
</tr>
<tr>
<td>ED 664 Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>Specified Curriculum and Material Courses</td>
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</table>

**Professional Requirements: Phase III**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ED 667 Supervised Teaching: Secondary</td>
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<tr>
<td>EDL 740 Legal and Professional Issues</td>
<td>4</td>
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<tr>
<td>EDL 711 Leadership for School Improvement</td>
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<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>EDL 791 Curriculum Design and Evaluation</td>
<td>4</td>
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**Total**

<table>
<thead>
<tr>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>58–66</td>
</tr>
</tbody>
</table>

**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. 12 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.
### Introductory Course Work

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 704 Introduction to Foundations of Education</td>
<td>4</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
</tbody>
</table>

### Professional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 720 Analysis of Teaching</td>
<td>4</td>
</tr>
<tr>
<td>EDL 791 Curriculum Design and Evaluation</td>
<td>4</td>
</tr>
<tr>
<td>ED 710 Teaching Strategies for Culturally Diverse Settings</td>
<td>4</td>
</tr>
<tr>
<td>EDL 740 Legal and Professional Issues</td>
<td>4</td>
</tr>
<tr>
<td>EDT 749 Introduction to Instructional Media</td>
<td>4</td>
</tr>
<tr>
<td>ED 820 Seminar in Secondary Education or ED 810 Seminar in Elementary Education*</td>
<td>3</td>
</tr>
</tbody>
</table>

### Program Electives

12 hours to be chosen by student and advisor. 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 fields.

**Total** 48

*To be taken near the end of the program

### 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>ED 711 Foundations of International Education</td>
<td>3</td>
</tr>
</tbody>
</table>

### Professional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 720 Analysis of Teaching</td>
<td>4</td>
</tr>
<tr>
<td>EDL 791 Curriculum Design and Evaluation</td>
<td>4</td>
</tr>
<tr>
<td>ED 721 Literature for Elementary Children or EDT 663 Literature for Adolescents and Young Adults</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total** 48

*To be taken near the end of the student's 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 (EDL 776, Supervision of Instruction and Personnel, 3 credit hours), and evidence of at least 27 months of successful classroom teaching experience under a standard teacher's certificate, a person may qualify for an Ohio provisional reading supervisor's certificate.

* Introductory Course Work 13
  - ED 704 Introduction to Foundations of Education 4
  - EDL 711 Leadership for School Improvement 4
  - EDL 751 Educational Statistics and Research 5

*Professional Requirements 11
  - EDL 720 Analysis of Teaching 4
  - EDL 791 Curriculum Design and Evaluation 4
  - ED 716 Foundations of Reading Instruction 3

*Program Concentration 19
  - ED 721 Literature for Elementary Children or EDT 663 Literature for Adolescents and Young Adults 3
  - ED 654 Administration and Interpretation of Educational Data 3
  - ED 656 Clinical Practice in Remediation 4
  - ED 815 Teaching Children to Write 3
  - ED 769 Content Reading Instruction Grades 4-12 3
  - ED 810 Seminar in Elementary Education: Reading 3

*Electives 5

**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.

*Introductory Course Work 13
  - ED 704 Introduction to Foundations of Education 4
  - EDL 711 Leadership for School Improvement 4
  - EDL 751 Educational Statistics and Research 5

*Professional Requirements 11
  - EDL 720 Analysis of Teaching 4
  - EDT 749 Introduction to Instructional Media 4
  - ED 820 Seminar in Secondary Education* 3

**Program Electives 24**

24 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

**Elementary Education**

See Education and Human Services

**Engineering**

See Systems Engineering

**English Language and Literatures**

The Department of English Language and Literatures 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 writing, 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 writing; TESOL, which includes linguistics; and women's studies. Full-time or part-time study is possible.

**The Graduate Faculty**

**Professors**

William D. Baker (Emeritus), American literature, creative writing

Peter S. Bracher, Victorian literature, English novel

Eugene B. Cantelupe (Emeritus), Renaissance literature, iconography

Norman R. Cary, world literature in English, non-Western 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 either an undergraduate major in English from an accredited college or university with a major average of 3.0 or better (on a 4.0 scale), or three appropriate upper-division courses with an average of 3.3 or better. Applicants must also present an overall undergraduate grade point average of 2.7 or better. Applicants with deficiencies in their undergraduate preparation may be 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 other 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 (12 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 of 250 or above on the Test of Spoken English, which can be taken on the same date as the TOEFL test.

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 quarter with the director of graduate studies in English, the department’s graduate advisor. 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 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 Language and Literatures 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 by scoring 600 on TOEFL and 300 on the Test of Spoken English.

**Degree Requirements**

The master's program in English comprises two emphases. The emphasis in literature enables students to increase their knowledge of English and American literature and to improve their critical skills and their grasp of scholarly method. The emphasis in writing and language provides training in writing theory and pedagogy, applied linguistics, and TESOL. 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, critical theory, writing pedagogy, and linguistics.
- The 700-level core courses provide students with the necessary scholarly and critical skills for graduate-level work. All students in the emphasis in literature are required to take both ENG 701 and 702; all students in the emphasis in writing and language are required to take both ENG 700 and 711.
- 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 literature, language, and writing. All students are required to take the M.A. exam.

**Program of Study: Emphasis in Literature**

**Core Courses** 8

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 701 Methods and Materials of Research in Literature</td>
<td>4</td>
</tr>
<tr>
<td>ENG 702 History of Literary Criticism</td>
<td>4</td>
</tr>
</tbody>
</table>

**Additional Courses** 20

Five 700-level courses, at least three of which must be seminars: ENG 720, 730, 740, 750, 760 (prerequisite ENG 701)

**Program of Study: Emphasis in Writing and Language**

**Core Courses** 8

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 700 Methods and Materials of Research in Writing and Language</td>
<td>4</td>
</tr>
<tr>
<td>ENG 711 Rhetoric</td>
<td>4</td>
</tr>
</tbody>
</table>

**Additional Courses** 20

Five 700-level courses: at least three must be seminars, and at least two must be seminars in writing and/or language: ENG 770, 780 (prerequisite ENG 700)

**Elective Options (see below)** 20–22

**Total** 48–50

**Elective Options**

Students may satisfy the Elective Option requirement in either emphasis above by taking any one of the following groups of courses:

**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 Options**

**Organizational Communication Option**

This track is designed to develop or enhance applied communications skills appropriate to work in organizations in the public and private sectors.

**Required** 16

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 741 Principles and Application of Communication Theory</td>
<td></td>
</tr>
<tr>
<td>COM 643 Interviewing</td>
<td></td>
</tr>
<tr>
<td>COM 647 Organizational Communication</td>
<td></td>
</tr>
<tr>
<td>COM 651 Communication Consulting and Training</td>
<td></td>
</tr>
</tbody>
</table>

**Elective(s)** 4–6

One or two communication courses chosen by the student and approved by the departmental advisor.
Mass Communication Option
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
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 communication courses chosen by the student and approved by the departmental advisor.

Communications Studies Option
This track is designed to allow students to design a program of study that coherently complements the English curriculum and allows for the development of applied communication skills or the enhancement of theoretical sophistication in the communicative arts.

Required
COM 741 Principles and Application of Communication Theory

Elective(s) 16–18
Communication courses chosen by the student and approved by the departmental advisor.

Option in Teaching Writing and Literature
ENG 716 The Study of Literature 4
One of the following: 4
ENG 703/704 Teaching College Composition
ENG 717 The Study of Writing
One of the following: 4
ENG 711 Rhetoric
ENG 712 Style in Writing
ENG 717 The Study of Writing
One of the following: 4
ENG 721 Teaching Gender Studies
ENG 731 Teaching Major Writers
ENG 741 Teaching Literary Genres
ENG 751 Teaching Cultural Periods
ENG 761 Teaching Literary Problems

Supervised Classroom Teaching Experience: 4
ENG 795 Internship in Teaching
or another course chosen in consultation with the graduate director

Thesis Option
Three additional courses at the 600 or 700 level 12
ENG 799 Thesis (total of 8 credits required) 8

Creative Writing Option
ENG 694 Creative Writing Seminar 4
ENG 799 Thesis (total of 8 credits required) 8
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
HST 710, 714 Archival Administration 6
HST 712, 713 Historical Administration 6
HST 711 State and Local History 2
ENG 795 Internship and Apprenticeship 5
MGT 621 Graduate Survey in Management or MKT 720 Service and Nonprofit Organization Marketing 3
One of the following: LCS 621 Cataloging; LCS 635 or 649 Instructional Materials; LCS 740 History of Books and Printing; ACC 621 or ACC 622 Graduate Survey of Accounting 3

Professional Writing Option
ENG 718 The Study of Professional Writing 4
Three of the following courses: 9–12
ENG 600 Advanced Technical Writing
ENG 602 Technical Editing
ENG 605 Topics in Technical Writing
ENG 654 Feature Story Writing (also COM 654)
ENG 658 Editing for the Media (also COM 658)
ENG 712 Style in Writing
ENG 717 The Study of Writing
One of the following courses: 3
LAW 611 Graduate Survey of Law and the Legal Environment
MGT 621 Graduate Survey in Management
MIS 621 Introduction to Management Information Systems
MKT 621 Graduate Survey in Marketing
ENG 795 Internship and Apprenticeship 4

Women's Studies Option
ENG 720 Women's Studies through Literature 4
Two additional graduate-level courses in English or other departments focusing on women (e.g., Virginia Woolf; HST 685 History of American Women; GEO 599 Women's Role in Spatial Organization of Society) 8
Two or three more graduate-level courses as described immediately above or four to 8 hours in ENG 799 Thesis 8

TESOL (Teaching English as a Second Language) Option*
ENG 679 History of the English Language 4
ENG 680 Theory of ESL 4
ENG 685 Studies in English Education: 4
100 Programs/English Language and Literatures

TESOL Methods and Materials
(also ED 620) 4
ENG 680 Grammatical Structures of English 4
ENG 680 Sociolinguistics 4
ED 660 Practicum 2

*The above 22 hours constitute a certificate program in TESOL as well as an option in the English M.A. program.

Examination
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.

Thesis
Students who elect the thesis option or the creative writing option are required to enroll for 8 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 advisor approved by the director of graduate studies in English. This thesis will be read and approved by the candidate's committee, which will be chaired by the candidate's thesis advisor.

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 that certifies competence at the third-year level.

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 (chair), structural geology, geophysics
Paul Pushkar, isotope 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, basin analysis tectonics
Paul J. Wolfe, exploration geophysics

Associate Professor
Kenneth F. Kramer, geochemistry, mineralogy, optical crystallography, hydrogeochemistry

Assistant Professors
Cindy Carney, carbonate petrology, carbonate sedimentology
Songlin Cheng, hydrogeology, hydrogeochemistry, isotope hydrology
David Dominic, clastic sedimentology, stratigraphy
Robert W. Ritzi, Jr., hydrogeology, hydrogeological modeling

Finance, Insurance, and Real Estate
See Business and Administration

Financial Administration
See Business and Administration

Facilities and Research
The Department of Geological Sciences is housed in the Brehm Laboratory with some segments in Oelman and Fawcett Halls. Department facilities include 12 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 exceptional 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. Two technicians are employed to maintain and improve equipment capability of both field and laboratory equipment.

The mineralogy/crystallography/petrology laboratories feature reference and display collections of minerals and rocks, 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 ground waters 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 the Department of Mechanical Engineering), a Wild stereomicroscope with drawing attachment, Nuclide Cathodoluminescence Luminoscope, Zeiss Universal R Pol petrographic microscopes, Nikon 35mm macrophotography equipment, UV luminescence 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 Mississippian oolitic limestones in the central Appalachian Basin, and Pleistocene and Holocene carbonate rocks and sediments in the Bahamas.

Several laboratories serve the needs of hydrogeology and environmental geology. The environmental field laboratory supports equipment for sampling or insitu determination of both the physical and the chemical properties of hydrogeologic systems, including three drilling rigs with numerous support vehicles, sample extraction apparatus, insitu sampling probes with automated digital data acquisition systems, and downhole geophysical logging tools. Through the hydrogeochemistry laboratories, access is possible to a complete line of analytical instrumentation for the analysis of aqueous chemical parameters, including ion chromato-

Current research includes the theory and the application of ground-water flow and pollution modelling, hydrogeochemical modelling, theory and application of environmental isotopes for ground-water age dating and for the investigation of hydrologic systems, insular water resource planning and management, ground-water buffering of acid precipitation, acid-mine drainage, hydrogeology and diagenesis of carbonates (at the San Salvador, Bahamas research station), non-point source pollution (at the Sycamore Farms Experimental Watershed), wetland hydrogeology and hydrogeochemistry, hydraulics of fractured rocks, and the characterization of hazardous waste repositories. Cooperative research projects, including some of those mentioned above, exist with the Wright State University Center for Ground Water Management.

The Laboratory of Applied Sedimentology has facilities for close-interval sieve and large settling tube size analysis. The latter includes a digital output and computer interface for data storage, retrieval, 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. Both PC- and Macintosh-based software is available for creating maps and cross-sections and for statistical analysis. A new database of subsurface well logs is also being created. Current research projects include facies analysis of Paleozoic fluvial sandstones as well as Pleistocene glacial sediments and the quantitative modeling of sedimentary structures, textures, and facies distributions.

The geophysics laboratory has field equipment for seismic, gravity, magnetic, radar, and electrical resistivity surveys. The seismic equipment consists of 96-channel and 48-channel digital recording systems, a 12-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. A ground-penetrating radar system provides the capacity of detailed shallow subsurface 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 variety of microcomputers are available for running applications programs and data storage. A SUN workstation is used for seismic data processing and interpretation. The computers are linked to the IBM and VAX mainframes 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 a minimum of 45 graduate credit hours apportioned in the following way: a maximum of 12 credit hours in the College of Education and Human Services, 3 to 6 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 thesis topic, 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.

The Graduate Faculty

Professors
Carl Becker, Ohio, Civil War
Charles R. Berry, Latin American, oral
Jacob H. Dorn, twentieth-century, United States intellectual
Edward F. Haas (chair), American South, American urban and public history
Paige E. Mulhollan, United States diplomatic, oral
Judith A. Sealander, United States social and labor, twentieth-century United States, quantitative
Andrew P. Spiegel, European intellectual, German, British constitutional

Associate Professors
Martin Arbagi, Roman and Byzantine
Allan Spetter, United States diplomatic
Tsing Yuan, East Asian

Assistant Professors
Barbara Green, African-American, American South Civil War, and Reconstruction
Edgar Melton, Russian
F. Richard Swann, nineteenth- and twentieth-century British, Canadian
Harvey M. Wachtel, 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 12 credit hours of graduate history courses must consult with an advisor 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 students 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 C's 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. A concentration will consist of at least 16 hours of course work in a designated field of study. 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

Electives in History and Related Subjects

At least 12 credit hours must be taken in history. Related subjects must be approved by the curriculum committee.

History 799 Thesis

Students will be required to demonstrate a reading knowledge of a language if, in the opinion of the thesis advisor, such knowledge will be necessary for thesis research. There is an oral examination at which time students must defend the thesis.

Total

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. A concentration will consist of at least 20 hours of course work in a designated field of study. 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.

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 graduation requirements.

Professional Core

HST 710, 714 Archival Administration
HST 712, 713 Historical Administration
HST 715 Internship and Report
HST 727 Introduction to Public History
HST 730 Archival Preservation
HST 740 Archival Automation

History Core

Seminars in U.S. history
600-level U.S. history courses

Electives

To be chosen from the following courses:
HST 711 State and Local History
HST 716 American Architectural History
HST 717 Practicum
LCS 635 Production of Instructional Materials
LCS 665 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
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 graduate 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 three seminars that introduce students to the scope and methodologies of the humanities. In cooperation with the program director, students will design the rest of the curriculum to meet their 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.

A program handbook detailing policies and requirements is available upon request in the Humanities Office.

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. A list of affiliated faculty and their respective areas of expertise is available upon request in the Humanities Office.

Director

David M. Orenstein, associate professor of sociology

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 30 semester or 45 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 12 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 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 will be filed with the office of the School of Graduate Studies. At the appropriate time the director, in consultation with the student, will also appoint a project 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 full-time students but also for part-time students; therefore, it incorporates a minimum of prerequisites and sequences and a variety of options. As a result, it is flexible enough to accommodate part-time students who must combine education with the demands of a full-time job.

The culminating project for the Master of Humanities degree can be either a traditional thesis or a creative project. Those who choose to complete a creative project also write an essay that explains the humanities context of the project. Such creative projects may involve (but are not limited to) developing a novel, an exhibition of paintings, poetry, a textbook, or a curriculum.
Programs/Humanities

Program of Study

HUM 701, 702, and 707 12
Humanities courses from at least two departments* 16
Related and/or elective courses* 12
Thesis or creative project (HUM 703) 8

*No more than 12 hours of 500-level liberal arts courses may be taken to fulfill program requirements.

Before commencing work on a thesis 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 or creative 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.

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 Information Systems

See Business and Administration

Management Science

See Business and Administration

Marketing

See Business and Administration

Math Education

See Education and Human Services

Mathematics

The Department of Mathematics and Statistics offers the Master of Science degree in mathematics. 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 individual preferences. Two options are available: mathematics and applied mathematics. The mathematics option is designed for students with an undergraduate degree in mathematics or the equivalent. 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 department makes provision for part-time degree candidates by offering all required courses in the late afternoon or evening. The department also awards the Master of Science degree in applied statistics (see Statistics) and participates in a one-year, interdisciplinary quality assurance certificate program (see Quality Assurance).

Graduate students are assigned an advisor from the graduate faculty on the basis of their proposed area of study. Early consultation with the advisor is recommended since the advisor works closely with the student in every phase of the program.

The Graduate Faculty

Professors
Joanne M. Dombrowski, functional analysis
Gerd H. Fricke, complex analysis
Krishan K. Gorowara, numerical analysis, computer graphics
Tapas Mazumdar, partial differential equations (abstract methods)
Terry A. McKee, graph theory, logic
Edgar A. Rutter (chair), algebra

Associate Professors
K. T. Arasu, combinatorics
Anthony B. Evans, finite geometry, graph theory
Lop-Fat Ho, optimal control, duality theory
Marc E. Low (dean), number theory
Carl C. Maneri, algebra, finite geometry
Gerald E. Meike, foundations
Richard Mercer, operator algebras, mathematical physics
David F. Miller, optimization
Manley Perkel, algebra, combinatorics
Larry Turyn, differential equations, multiparameter problems
James T. Vance, Jr., Fourier analysis

Assistant Professors
Jerry Bradford, mathematics education
Robert Craighead, complex analysis
Ann M. Farrell, mathematics education
Jyun-Horng Fu, control theory
Xiang-Dong Hou, algebra, coding theory
Steven Hofmann, Fourier analysis
Alexander Kaplan, functional analysis
Steen Pedersen, operator theory
Thomas P. Svobodny, partial differential equations
Alphonso L. Smith, analysis
Masahiro Yamashita, dynamical systems

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 two 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. The duties of an assistant normally include classroom teaching, which is a meaningful aspect of the education of graduate students in the mathematical sciences.

Degree Requirements
The Master of Science degree may be earned by satisfying the requirements of the mathematics or the applied mathematics options. The mathematics option is a flexible program emphasizing sound, fundamental, mathematical training. Students may either complete a traditional curriculum in mathematics or develop, with a graduate advisor, a plan of study that is tailored to their individual needs. The applied mathematics option is more structured but still allows students considerable latitude in designing a course of study. This option focuses on the computational tools of modern applied mathematics and the mathematical theory underlying these tools. Either option can provide a solid foundation for doctoral study in mathematics or for careers in teaching, industry, or government.

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
This program offers sound mathematical training in the traditional areas of mathematics, yet is flexible enough to allow students to pursue interests in related areas of mathematics. Students may select courses in algebra, analysis, combinatorics, and geometry, as well as differential equations, graph theory, numerical analysis, probability, and statistical theory. Individual interests and future goals determine the actual course of study, within the guidelines given below.

Applicants for this program should have completed a minimum of 21 credit hours in mathematics beyond calculus. Courses in analysis (advanced calculus), linear algebra, and modern algebra are particularly important. However, courses in other areas of mathematics may also provide the foundation needed for graduate work in mathematics.

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 45 credit hours of courses that have prior approval of the department. Departmental approval is normally given by the student's advisor. At least 24 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 24 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 10 hours of credit. The thesis must be approved by the student's advisor 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 ability to analyze and solve a variety of mathematical problems and to increase the understanding of specific 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 undergraduate courses in multivariable calculus, linear or matrix algebra equivalent to MTH 355, and ordinary differential equations. Students should also have knowledge of a high-level programming language. Courses in complex analysis, partial differential equations, and physics are recommended.

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. Students who have not, prior to admission, completed two quarters or one semester of real variables course work comparable to MTH 431 and 432 are required to take MTH 631 and 632 as program electives. Full-time students normally take two years to complete this program.

Advanced Courses

Two of the following pairs of courses, at least one chosen from Group I.

**Group I**

**Numerical Analysis:** MTH 716 Numerical Analysis I: Applied Linear Algebra*, and MTH 717 Numerical Analysis II: Finite Difference Methods for Partial Differential Equations, or
MTH 718 Numerical Methods III: Finite Element Methods for Partial Differential Equations

**Advanced Analysis:** MTH 730 Principles of Analysis, and MTH 731 Real Analysis I, or MTH 777 Applied Analysis I

**Group II**

**Advanced Algebra:** MTH 751 Algebra I, and MTH 752 Algebra II

**Computational Logic and Logic Programming:**
MTH 725 Computational Logic, and CS 774 Logic Programming

Applied Analysis; MTH 777 Applied Analysis I, and MTH 778 Applied Analysis II, if MTH 730 and 731 are chosen from Group I.

**Applied Mathematics Courses**

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Three courses from one of the following groups:

**Continuous Applied Mathematics**
MTH 606 Mathematical Modeling
MTH 607 Optimization Techniques
MTH 680 Methods of Applied Mathematics: Geometric Methods
MTH 681 Methods of Applied Mathematics: Differential Equations
MTH 682 Methods of Applied Mathematics: Integral Methods

**Discrete Applied Mathematics**
MTH 607 Optimization Techniques
MTH 616 Matrix Computations*
MTH 619 Cryptography and Data Security
MTH 650 Discrete Algebraic Structures
MTH 658 Applied Graph Theory
MTH 659 Combinatorial Tools for Computer Science

**Probability and Stochastic Processes**
STT 661 Theory of Statistics I
STT 662 Theory of Statistics II
STT 611 Applied Time Series
STT 702 Applied Stochastic Processes

At least one additional course chosen from the following and the courses in advanced and applied mathematics listed above.
MTH 633 Real Variables III
MTH 634 Introduction to Complex Analysis
MTH 732 Real Analysis II

**Electives**

12–14

Additional approved graduate courses, other than MTH 655, including one of the following:
At least 8 hours of courses from outside the Department of Mathematics and Statistics.
At least two statistics courses.
Two MTH/STT courses, other than MTH 631 and 632, at least one of which must be taken at the 700 level.

**Total** 45

*Credit not permitted for both MTH 616 and MTH 716.
Medicine
A catalog may be obtained from the School of Medicine.

Microbiology and Immunology
The program leading to the Master of Science degree in microbiology and immunology prepares students for careers as professional microbiologists/immunologists in industry, government, education, and research organizations, or for further professional training.

Areas of concentration in the Department of Microbiology and Immunology include molecular genetics, microbial physiology, immunology, pathogenic bacteriology, reproductive immunology, and virology. Seminars and journal clubs concentrate on each of these areas, exposing the students to the entire discipline.

The M.S. degree in microbiology and immunology requires the submission and oral defense of a thesis based on original research performed while enrolled as a graduate student at the university. Candidates are required to obtain a major advisor and an advisory committee. The advisory committee will help formulate a study program to include a minimum of 24 quarter credits of graduate-level course work and 21 quarter credits of research (which could include journal clubs, seminars, or special topics). The advisory committee will also provide counseling and evaluate student progress. If a student is uncertain of a major area of concentration, the department graduate committee will assign a temporary advisor until the student selects an area and is accepted by an advisory professor.

The Graduate Faculty
Microbiology and Immunology
Professors
Nancy J. Bigley, immunology
David J. Giron, virology
Neal S. Rote (chair), immunology
Associate Professor
Donald C. Thomas, viral genetics

Admission
Applicants must fulfill the requirements for admission established by the School of Graduate Studies. Preference is given to students with a grade point average of 3.0 or better on a 4.0 grading scale. Letters of recommendation are also considered.

Facilities
The Department of Microbiology and Immunology has excellent ancillary facilities which include cold rooms, constant temperature rooms, animals rooms, and darkroom capabilities. Major available research equipment includes scintillation counters, spectrophotometers, ultracentrifuges, and computer services.

Financial Assistance
Two graduate teaching assistantships are available on a competitive basis. These carry a waiver of most tuition and instructional fees. Appointments are made for one year and may be renewed for a second year.

Degree Requirements
1. Candidates must complete a minimum of 45 quarter credits. Candidates must participate in graduate seminars for at least 3 credit hours.
2. Candidates must maintain a 3.0 cumulative average with no more than 9 credit hours of C grades applicable to the degree.
3. A maximum of 10 credits of graduate courses may be transferred from other institutions.

Music
The Master of Music degree in music education is a professionally oriented program, designed to serve teachers in the public schools, as well as 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 that suit their professional goals and take into account their backgrounds and experience.

The Graduate Faculty
Professors
Leland D. Bland, music theory, music history and literature
William J. Steinohrt, music theory, composition
J. Alan Whiston (chair), music education
Admission

In addition to meeting the admission requirements of the School of Graduate Studies, applicants 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. Applicants must take a placement examination in music history, the results of which will be used in planning their programs. Applicants also must take a music theory proficiency examination. This examination must be successfully completed before any graduate music theory courses are taken. Students who wish to study applied music must audition for the appropriate Applied Music Board.

In addition to completing the normal program, students not holding a standard teaching certificate will be required to earn Ohio certification before graduation. Exceptions may be made for reasonable cause; such exceptions may require action by the Department of Music Graduate Committee.

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 advisors 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 advisor who, together with the director of graduate studies in music, will 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.

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 (21 to 27 credit hours), music history and literature, music theory, and performance (12 to 18 credit hours), and thesis (maximum of 6 credit hours) for a minimum total of 45 credit hours. Students will prepare a thesis under the supervision of a thesis director, who is 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 (24 to 30 credit hours) and music history and literature, music theory, and performance (15 to 21 credit hours) for a minimum total of 45 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, students 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, students 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 (24 to 30 credit hours) and music history and literature, music theory, and performance (15 to 21 credit hours) for a minimum total of 45 credit hours. In addition, students will present a project. Students 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 and a second reader.

**Note:** In any of the options the student may, with the approval of the director of graduate studies in music and the advisor, 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 that 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 or 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.

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**Nursing**

The School of Nursing offers a graduate program leading to a Master of Science degree with a major in nursing. The program prepares nurses for advanced leadership roles in practice, education, and administration, as well as for doctoral study in nursing. The curriculum is being revised to offer students the opportunity to individualize the nursing major by selecting from options in client systems, areas of clinical specialization, and roles (clinical specialist, nurse educator, or nurse administrator). Also under development are specialized options for family nurse practitioner and nurse anesthetist roles. 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 flexible. Full-time students may complete the program within one calendar year. Part-time students must complete all requirements for the degree within five years.

**The Graduate Faculty**

**Professors**

Donna M. Deane, administration, research, nursing education

Jane C. Swart (dean), administration, research, nursing education, vulnerable populations, gerontology

**Associate Professors**

Virginia Nehring, community health, nursing education

Susan G. Praeger, parent-newborn nursing, adolescent health, nursing education

**Assistant Professors**

Donna Miles Curry, pediatric nursing

Barbara Fowler, community health, adolescent health, nursing education

Margaret Clark Graham, family nurse practitioner, community health

Mary Jane Reinhart, nursing administration, informatics, women's health

Phyllis B. Risner, community health, nursing administration, nursing education

Brenda Stevenson, medical-surgical nursing, gerontology

**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, or be a registered nurse with a bachelor's degree in a field other than nursing, which will require selected support and professional nursing bridge courses in addition to regular graduate curriculum requirements.

• An overall grade point average in undergraduate work of 3.0, or 2.7 with 3.0 or better in the upper division coursework in the major.

• Completion of a statistics course and a nursing research course, required on admission or prior to enrollment in NUR 707.

• Completion or documented expertise in physical/health assessment, required on admission or prior to enrollment in advanced assessment.

• Evidence of registered nurse licensure in Ohio.

• Evidence of liability insurance, health insurance, CPR certification, and other necessary health information as required by clinical agencies, prior to clinical courses and practice.

All students are required to adhere to the policies and procedures set forth in the Wright State University Graduate Catalog and the School of Nursing Graduate Student Handbook.

It is recommended that all application materials for fall quarter be submitted by April 15. Applications received after that date are considered on a space-available basis.

Degree Requirements

The 48 credit hour program is divided into core and advanced practice options. The core includes courses in theoretical foundations, research, concepts of advanced practice, and thesis or scholarly project. Core courses are required of all students.

Advanced practice specialty options include the choice of clinical or organizational systems. Students interested in nursing administration would select organizational systems. Students who select clinical systems choose a client focus with individuals or community, then select a role system of educator or clinical specialist. All specialty area course requirements are being revised. Current available clinical specialties include adult health and illness, and community health nursing. Areas under development include gerontology and parent-child nursing. (Call the School of Nursing for information about specialty requirements and start-up of new areas.)

Candidates for the master's degree must meet all of the following requirements:
1. Completion of 48 credit hours
2. Completion of the program within five years
3. Maintenance of a 3.0 cumulative grade point average with no more than 9 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

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<th>Category</th>
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<td>Thesis or scholarly project</td>
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<td>Advanced Practice Options</td>
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</tr>
<tr>
<td>Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

Facilities

The School of Nursing is housed on the fourth floor of Allyn Hall. Clinical instructional facilities are abundant and varied. Since June 1984, the school has had a collaborative agreement with the Division of Nursing at Miami Valley Hospital to form a Center for Excellence in Nursing. This agreement affords opportunities for research, clinical practice, and education for students and faculty. In addition, the school has contracts with over 200 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.

For research, the University Library and the Fordham Health Sciences Library are available. The University Library provides media production services and facilities. The university's Statistical Consulting Center provides support for data analysis.

Physics

The Department of Physics offers two programs of graduate study leading either to the Master of Science or 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 that 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 advisors 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*

Gust Bambakidis (chair), theoretical physics, solid state
Harvey M. Hanson, atmospheric physics
John S. Martin, plasma physics
Paul J. Wolfe, geophysics

*Research Professors*

David C. Look, semiconductor and device physics
Phil W. Yu, semiconductor and device physics

*Associate Professors*

Jerry D. Clark, atomic physics
Gary C. Farlow, solid state, ion implantation
Joseph W. Hemsky, solid state and materials
Thomas W. Listerman, solid state and materials
David R. Wood, atomic spectroscopy

*Research Associate Professors*

Zhaoqiang Fang, semiconductor and device physics
Gregory Kozlowski, superconductivity and materials

**Facilities and Research**

The Department of Physics is involved in six major areas of research: solid state physics and materials, plasma physics and lasers, atomic spectroscopy, albedo measurements, exploration geophysics, and medical 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, and II-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 positive ion Van de Graaff accelerator, a Polaron modular DLTS system, a photo reflectance 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. Metallurgical 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. 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 a 96-trace digital seismic system, an engineering seismograph, three gravimeters, ground-penetrating radar, 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 of global radiation.

The program in medical physics concerns radiological, magnetic resonance, and positron emission diagnostics. The facilities available include a 2.0T whole-body Philips MR imager/spectrometer, an 8.5T 9-cm bore MR imager/spectrometer, and a positron emission tomography (PET) system that includes an 11 MEV negative ion cyclotron, chemistry synthesis modules, and a Siemens Model 951 whole-body scanner.

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, nuclear magnetic resonance apparatus, and a Zeiss electron microscope. Computer service is provided through Academic Computer Resources.

**Master of Science in Physics**

**Admission Requirements**

For admission to graduate study in physics leading to the M.S. degree, candidates must:

1. Meet the requirements of the School of Graduate Studies.
2. Hold a B.S. or B.A. in physics from an accredited institution in the United States, or hold a B.S. or B.A. in an allied field and provide scores from the GRE-Physics or other comprehensive exam in physics.
3. Be recommended for admission by the graduate studies committee of the physics department.
4. Complete an orientation exam administered by the physics department for use in determining the program of study.

**Degree Requirements**

To be awarded the M.S. degree in physics, candidates for the degree must:

1. Meet the degree requirements of the School of Graduate Studies.
2. Complete 45 credit hours of course work listed as available for graduate credit. Thirty-six hours must be physics courses numbered 680 and above, including hours from PHY 680, 681, 682, 710, 711, and 712, and no more than 15 hours from PHY 899 (Research).
3. For the medical physics option, complete at least 45 credit hours, including PHY 681, 682, 710, 711, 712, BMS 762; BME 665; and no more than 15 hours of PHY 899 (Research). Suggested electives include BME 731, 732, 734; and BMS 958. In addition, the university radiation safety course is required.
4. Complete EGR 153 or demonstrate equivalent computer experience and ability.
5. Pass a thesis defense administered by the advisory committee over research work and any topics in the core physics curriculum the committee may deem appropriate.
6. Present an approved thesis to the graduate school.

Details concerning program selection, student evaluation, thesis requirements, and orientation 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 12 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. Students whose average is below 3.0 after 18 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 leading to the M.S.T. degree, candidates must:

1. Meet the requirements of the graduate school.
2. Present evidence of completion of an introductory physics sequence equivalent to the PHY 250 through 260 sequence at Wright State.
3. Have received certification to teach. Prior teaching experience is not required but is strongly recommended.

**Degree Requirements**

To be awarded the M.S.T. degree in physics, the candidate must:

1. Meet the requirements of the graduate school for award of a degree.
2. Complete 45 credit hours of course work listed for graduate credit, 36 hours of which must be for physics courses numbered 620 and above.
3. Submit a report on a research project that was approved by an advisory committee.
4. Successfully complete an examination on the research project administered by an advisory committee.

Research Project
Each student, under the direction of the advisory committee and an advisor 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. Research into more effective means for the presentation of physics in the classroom
2. Development of groups of classroom experiments or demonstrations
3. Writing texts or other classroom materials
4. Original experimental or theoretical research in an area of physics

Physiology and Biophysics
The Department of Physiology and Biophysics offers programs of graduate study leading to the Master of Science degree in physiology and biophysics. The programs provide students with both a broad knowledge of physiology and biophysics as well as concentrated experience in one specific area of specialization.

The Graduate Faculty
Professors
Peter K. Lauf (chair), molecular physiology and biophysics of membrane transport in erythrocytes
Roger M. Glaser, exercise physiology, cardiopulmonary stresses of wheelchair locomotion, rehabilitation medicine

Associate Professors
Melvyn D. Goldfinger, neuroscience and biophysics of somatosensory afferents and relay nuclei
Noel S. Nussbaum, skeletal tissue cell dynamics, endocrinology of osteogenesis
Robert W. Putnam, regulation of intracellular pH, membrane localization of transport systems
Anne Walter, membrane fusion, viral entry, membrane protein reconstitution

Assistant Professors
Adrian M. Corbett, biophysical and biochemical properties of voltage-gated ion channels
Luo Lu, molecular biology and expression of ionic channels

Admission Requirements
The requirements for admission are:
1. B.A., B.S., or equivalent degree
2. Overall GPA of 3.00-plus, or GRE total of 1100 (minimum 500 verbal, 500 mathematics)
3. The following prerequisite courses: general biology (1 year), general chemistry (1 year), general physics (1 year), mathematics (1 year through introductory calculus), and one year of advanced study in biology, chemistry, physics, or computer science.

Degree Requirements
In order to qualify for the Master of Science degree, students must satisfy the requirements of the School of Graduate Studies as well as program requirements. The first four quarters involve 35-37 credit hours which include required departmental and other courses determined in consultation with the student's advisor. Research activities begin in the summer of the first year. The second program year involves 18-30 credit hours with emphasis on research. Completed research is presented in written thesis form at the end of the second year, with a public oral defense.

A nonresearch program option provides for extensive course work in preparation for a comprehensive written examination.

Courses
The department offers a variety of graduate courses in cellular, transport, and membrane physiology and biophysics, general systems and medical physiology, cardiovascular physiology, endocrinology, exercise physiology, gastrointestinal physiology, and neurophysiology, as well as seminar and special topics courses.

Residency
Full-time students generally complete a program in two years. Students may participate in the program on a part-time basis, but all requirements must be fulfilled in not more than seven years.

Political Science and Urban Affairs
See Applied Behavioral Science
Professional Psychology

Program information may be obtained from the School of Professional Psychology.

Psychology

The Department of Psychology offers programs of graduate study leading to the Master of Science (M.S.) degree and the Doctor of Philosophy (Ph.D.) degree in the areas of human factors and industrial/organizational psychology. Human factors, also called ergonomics or engineering psychology, deals with human-machine or human-computer interactions or with the design of specific tasks. It focuses on improving system performance and developing effective interfaces through the application of knowledge of the operator's perceptual and cognitive processes. It emphasizes the technical aspects of a situation, looking for ways to modify the physical environment in order to improve performance. Aerospace-related applications are common at Wright State University because it is adjacent to Wright-Patterson Air Force Base, a major center of human factors research and development. Applications in consumer products, training, and computer systems are also important. Industrial/organizational psychology is primarily concerned with individual, group, and organizational behavior in work settings. It deals with "interfaces" of people with people (either individuals or groups). It focuses on improving system performance and improving organizational design and staffing through the application of knowledge of human personality structure and social-motivational processes. It emphasizes the social side of an environment, looking for ways to modify the set of people who interact in and with a system by selecting people who fit an environment, by training, or by designing organizational structures to motivate performance.

Students may enter a terminal M.S. degree program, specializing in either human factors or industrial/organizational psychology. Students may also enter the Ph.D. program, specializing in either human factors or industrial/organizational psychology, but the program will foster an understanding of both areas and the importance of considering both aspects in the design of industrial, aerospace, and other systems. The area of specialization will be considered the major focus area while the other area will serve as a minor focus area.

The Graduate Faculty

Human Factors

Professor
Helen A. Klein, developmental, home design for aged

Associate Professors
Herbert A. Colle (Chair), mental work load, keyboard interfaces
Allen L. Nagy, color displays, visual science
Daniel L. Weber, psychoacoustics, alarm recognition

Assistant Professors
Richard Backs, psychophysiological assessment of human performance
Kevin B. Bennett, human-computer interaction, training
John Flach, ecological approaches to perception-action systems
Robert H. Gilkey, binaural displays, masking, psychoacoustics
Pamela S. Tsang, time sharing performance, aviation, aging

Industrial/Organizational Psychology

Professor
Warner R. Wilson, social evaluation, group interaction

Associate Professor
Jean M. Edwards, personality assessment, stress

Assistant Professors
Maryalice Citera, group behavior, workplace interactions
Theodore L. Hayes, job analysis, personnel issues for the disabled
Joan R. Rentsch, organizational meanings, self-esteem

Admission

Students may be admitted into either the terminal M.S. program or into the Ph.D. program. Students admitted to the Ph.D. program should have a baccalaureate degree from an accredited institution with a major in psychology or at least 24 quarter credit hours of psychology, including courses in cognition or human learning, sensation and perception, social or organizational psychology, personality or test and measures or abnormal, experimental design/statistics, and experimental methods. Students should also have completed a year of physical or biological
science, courses in mathematics including calculus, and computer science. Students who are missing one or more prerequisite courses will be expected to complete appropriate remedial course work at the onset of the program in addition to degree requirements. Students admitted to the terminal M.S. program should have a baccalaureate degree from an accredited institution and must have completed most of the specified course work.

All prospective students must submit an official transcript from each institution attended. Scores on Graduate Record Examination (verbal, quantitative) also must be submitted. Three letters of recommendation should be received from previous university professors or relevant professionals. Applicants also must submit an essay describing his or her professional goals and current academic interests in human factors or industrial/organizational psychology.

All admissions are competitive. Applications will be evaluated to determine the likelihood of success in the program and potential for a career in human factors or industrial/organizational psychology. Evaluation criteria will include: cumulative grade point average, verbal and quantitative Graduate Record Examination scores, performance in relevant course work, letters of recommendation, previous research experience, relevant job experience, and other information about writing and quantitative skills.

Department and Facilities

The programs in human factors and industrial/organizational psychology are a major focus of departmental activity; two-thirds of the faculty in the department specialize in one of the two program areas. Two regular faculty also have joint appointments at the U.S. Air Force Armstrong Laboratory. Students enter a program with a critical mass of faculty and students and a wide variety of research opportunities. Program faculty have active and productive research programs and maintain laboratories to support their research. These research facilities are well equipped for behavioral research. Human-computer interaction research is conducted using SUN 4 and Macintosh computers. Flight simulation research uses an XSTAR high-performance graphics workstation. Color display research uses calibrated Barco monitors and special color interface devices as well as a microprocessor-controlled Maxwellian viewing system. Two DEC PDP-11 minicomputers together with relevant amplifiers, attenuators, and mixers control psychoacoustic research. A Psychophysiological Display System and three Grass polygraph machines process and store bioelectric data. Eye positions can be measured using electrode or infrared reflection techniques. Mental work load and human performance laboratories also exist for dual-task studies. A communication test suite studies group interactions and decision making over various media (telephone, computer) with audio and video recording capability. Equipment includes oscilloscopes, Gamma radiometer/photometer, Minolta Chronometer, Pritchard Photometer, automated analmoscope, B&K artificial ear and sound level meter, signal analyzer, tachistoscopes, Kay Sound Spectrographic analyzer, a NCS Sentry Scanner, and laptop computers for field research. Several general purpose laboratories also exist including two PC labs, each with 20 PCs on a 3-COM local area network, a nine-station Macintosh lab, and a six-station perception-cognition lab. Research is also conducted in off-campus facilities. Dayton is a major center for human factors research. The Department of Psychology has a Memorandum of Agreement with the U.S. Air Force Armstrong Laboratory which facilitates utilization of its sophisticated behavioral laboratories such as flight simulators and the Auditory Localization Facility for free field binaural research. Dayton is also an area of considerable industrial and corporate strength. Industrial/organizational research is conducted in conjunction with local firms. Faculty and students interact with many colleagues in government and the private sector.

Financial Assistance

The department awards both graduate teaching assistantships and graduate research assistantships. These appointments carry a waiver of tuition and instructional fees for both residents and nonresidents. Incoming students should express their interest as a part of the application process. Appointments are made for academic year and may be renewed. Teaching assistants will have instructional responsibilities and research assistants will be responsible for supporting research under the supervision of a faculty member. For additional information on financial aid, see the Financial Assistance, Fees, and Tuition chapter of the graduate catalog.

Degree Requirements

Master of Science

In order to qualify for a Master of Science degree, students must complete all of the following requirements in addition to satisfying requirements of the School of Graduate Studies. All course work and program options may be used to satisfy requirements only if officially approved on the Program of Study. Students must declare either human factors or industrial/organizational as their major focus. Additional information may be obtained from the Department of Psychology.
1. A minimum of 55 quarter-hours must be completed.
2. Complete course work in the following areas:
   Eight credit hours of basic science psychology courses.
   Eight credit hours of major focus courses and four credit hours of minor focus courses.
   Three-course sequence in research design, methods, and statistics.
3. Complete first-year research requirement.
4. Complete an acceptable research-based thesis, including a written proposal and thesis and a defense of both.

Doctor of Philosophy

In order to qualify for a Doctor of Philosophy degree, students must complete all of the following requirements in addition to satisfying requirements of the School of Graduate Studies. All course work and program options may be used to satisfy requirements only if officially approved on the Program of Study. Students must declare either human factors or industrial/organizational as their major focus. Additional information may be obtained from the Department of Psychology.
1. A minimum of 136 quarter-hours must be completed.
2. Complete course work in the following:
   At least three basic science psychology courses.
   Twenty-four credit hours of major focus courses.
   Twelve credit hours of minor focus courses.
   Three-course sequence in research design, methods, and statistics, and at least one advanced course.
   Course in history and systems in psychology.
3. Complete first-year research requirement.
4. Complete an acceptable M.S. thesis, including a written proposal and thesis and a defense of both.
5. Pass the qualifying exam.
6. Meet residency requirements.
7. Meet practical experience requirements.
8. Complete a Ph.D. dissertation and successfully defend the dissertation in an oral exam conducted by a dissertation committee.

Certificate Requirements

The following six courses must be completed with a cumulative grade point average of at least 3.0 to earn a certificate.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>STT 624</td>
<td>Quality Control</td>
<td>4</td>
</tr>
<tr>
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<td>Reliability</td>
<td>4</td>
</tr>
<tr>
<td>STT 669</td>
<td>Experimental Design</td>
<td>4</td>
</tr>
<tr>
<td>MS 741</td>
<td>Operations Management*</td>
<td>3</td>
</tr>
<tr>
<td>MS 755</td>
<td>Quality Management</td>
<td>3</td>
</tr>
<tr>
<td>EGR 633</td>
<td>Reliability Analysis</td>
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</tr>
<tr>
<td>Total</td>
<td></td>
<td>22</td>
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</table>

*Students with sufficient background may substitute STT 764 for STT 669 or any of MS 753, 757, and 759 for MS 741.

The Graduate Faculty

Statistics

Professors

Won J. Park, stochastic processes, reliability
Makarand V. Ratnaparkhi, mathematical statistics, biostatistics

Associate Professors

Shumei Guo, biostatistics
Harry J. Khamis, contingency table analysis, goodness of fit tests
Barbara L. Mann, statistical applications
Munsup Seoh, nonparametric statistics, mathematical statistics

Quality Assurance

The quality assurance certificate program is administered by the Department of Mathematics and Statistics and offered jointly with the Department of Management Science and Information Systems and the College of Engineering and Computer Science. The program provides extended training in the theory and methodology of reliability, quality control, and design of experiments, as well as thorough grounding in production and operations management. These skills and techniques have become essential for those businesses and industries striving for a competitive edge in quality and productivity. Program courses are offered in late afternoon and evening, and the program can be completed in three quarters.

Admission

Applicants for admission are expected to meet the general requirements for admission to the School of Graduate Studies with nondegree status. All applicants should have completed a year sequence in calculus (equivalent to MTH 229, 230, 231), have a background in statistics equivalent to STT 360/560 and 361/561, and have introductory management courses or background equivalent to MGT 301 and 302.

Certificate Requirements

The following six courses must be completed with a cumulative grade point average of at least 3.0 to earn a certificate.

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<td>22</td>
</tr>
</tbody>
</table>

*Students with sufficient background may substitute STT 764 for STT 669 or any of MS 753, 757, and 759 for MS 741.
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

Statistics
The Department of Mathematics and Statistics offers the Master of Science degree in applied statistics. The graduate program is designed primarily to prepare graduates for careers in business, industry, or government, but can be tailored to provide a solid foundation for doctoral studies in statistics. Degree requirements are flexible, allowing considerable latitude to students' individual preferences and needs. The graduate program in applied statistics is open to persons with bachelor's degrees in a variety of fields besides mathematics and statistics. The prior mathematical training needed for entrance into the program 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. The department also participates in a certificate program (see Quality Assurance).

Early consultation with the statistics graduate advisor is recommended since the advisor works closely with the student in every phase of the program.

The Graduate Faculty
Professors
Won J. Park, reliability, stochastic processes
Makarand V. Ratnaparkhi (Program Director), mathematical statistics, biostatistics

Associate Professors
Shumei Guo, biostatistics
Harry J. Khamis, contingency table analysis, goodness of fit tests
Barbara L. Mann, nonparametric statistics, biostatistics  
Munsup Seoh, nonparametric statistics, mathematical statistics  
Daniel T. Voss, design of experiments  

**Assistant Professor**  
Evelyn Pickering, biostatistics

### Admission

Applicants for admission are expected to meet the general requirements for admission to graduate study as established by the School of Graduate Studies. Applicants should have completed a calculus sequence that includes multivariate calculus and a course in linear or matrix algebra. Some experience in computer programming and a background in probability and statistics to begin basic graduate courses in statistics is also required. This normally means one or two prior courses in probability and statistics, depending on content and level. 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 include classroom teaching, which is a meaningful aspect of the education of graduate students in the mathematical sciences. Also, an assistantship in the Statistical Consulting Center is awarded to a second-year student. This assistantship exposes the student to various aspects of statistical consulting.

### Degree Requirements

The Master of Science degree in applied statistics may be earned by satisfying the degree requirements described below. The applied statistics program allows students considerable latitude in designing a course of study. This program is primarily intended to prepare students for professional employment in business, industry, or government; however, it can also form a solid foundation for doctoral study.

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.

In addition to the requirements of the School of Graduate Studies, the following departmental requirements must be met to earn a degree in applied statistics. Full-time students normally take two years to complete this program.

#### Required Courses

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>STT 661, 662 Theory of Statistics I and II*</td>
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<tr>
<td>STT 666, 667 Statistical Methods I and II*</td>
</tr>
<tr>
<td>STT 764 Design of Experiments</td>
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<tr>
<td>STT 791 Statistical Consulting</td>
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</tbody>
</table>

#### Advanced Statistics Courses

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Three courses chosen from the following:</td>
</tr>
<tr>
<td>STT 702 Applied Stochastic Processes</td>
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<tr>
<td>STT 721 Sampling Design</td>
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<tr>
<td>STT 740 Contingency Table Analysis</td>
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<tr>
<td>STT 744 Applied Multivariate Analysis</td>
</tr>
<tr>
<td>STT 761 and 762 Linear Models I and II</td>
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<tr>
<td>STT 767 Applied Regression Analysis</td>
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</table>

#### Electives

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Three courses chosen from the following:</td>
</tr>
<tr>
<td>STT 601 Nonparametric Methods</td>
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<tr>
<td>STT 611 Applied Time Series</td>
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<tr>
<td>STT 624 Statistical Control Methods for Quality and Productivity</td>
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<tr>
<td>STT 626 Reliability and Life Data</td>
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<tr>
<td>STT 628 Queueing Theory</td>
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<tr>
<td>STT 696 Topics in Statistics and Probability</td>
</tr>
<tr>
<td>MTH 606 Mathematical Modeling</td>
</tr>
<tr>
<td>MTH 607 Optimization Techniques</td>
</tr>
<tr>
<td>MTH 631–633 Real Variables I–III</td>
</tr>
<tr>
<td>CS 670 Systems Simulation</td>
</tr>
</tbody>
</table>

With the prior approval of the statistics advisor, 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.

### 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 students the opportunity to concentrate in either electrical, mechanical, biomedical, human factors, or materials course areas. Incoming students will be asked to indicate a primary area of interest so that an appropriate academic advisor 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
Anthony J. Cacioppo, human factors engineering, human-machine interfacing involving aircraft control, instrumentation, and displays
Parviz Dadras, solid mechanics, manufacturing processes, carbon-carbon composites
Amir Faghri, heat and mass transfer, fluid mechanics and analysis
Wilbur L. Hankey, computational fluid dynamics, aerodynamics, aerothermodynamics
Harry A. Lipsitt, materials engineering, high-temperature materials, intermetallics
Chandler A. Phillips, biomedical engineering, muscle biomechanics
Kuldip S. Rattan, computer-aided design, digital signal processing and control, bioengineering, robotics
Malcolm L. Ritchie (Emeritus), human factors engineering, engineering psychology
Blair A. Rowley, biomedical engineering, rehabilitation engineering, computer applications to augmentation and communication, instrumentation, bioelectrical effects of low-level electrical currents on tissue growth and healing
Belle A. Shenoi, network theory, active and digital filters, communication circuits, digital signal processing
Joseph F. Thomas, Jr., materials engineering, mechanical behavior
Isaac Weiss, materials engineering, thermomechanical processing, powder metallurgy

Associate Professors
Richard J. Bethke, signal and systems modeling, analysis and control, stochastic processes
Ramana V. Grandhi, structural optimization, finite element methods, mechanical vibrations
Thomas N. Hangartner, biomedical engineering, medical imaging, CAT scanning, instrumentation, computers
Russell A. Hannen, electronic systems, control theory, stochastic processes
Ping He, biomedical engineering, medical imaging, ultrasonics, instrumentation, computers
Shane Y. Hong, manufacturing systems, precision engineering
Marian K. Kazimierczuk, electronic circuit analysis, high frequency tuned power amplifiers, power electronics
William S. McCormick, communication theory, bioengineering, electromagnetics, electro-optics
Gopal M. Mehrotra, materials engineering, ceramics, materials chemistry
L. Rai Pujara, multivariable control systems, systems analysis, robust control theory
David B. Reynolds, biomedical engineering, biofluid mechanics, engineering approaches to respiratory/pulmonary physiology
Raymond E. Siferd, VLSI, robotics and systems identification
George R. Spalding, systems identification, robotics, dynamics and control

Assistant Professors
Chien-In Chen, VLSI design, design testability, computer-aided design automation
Kenneth C. Cornelius, fluid mechanics, turbulent flow
William C. Eppers, Jr., microwave circuits and measurements, lasers and electro-optics, electromagnetic theory
Billy W. Friar, thermodynamics, heat transfer, fluid mechanics
Jennie Jo Gallimore, human factors engineering, visual display systems
Fred D. Garber, decision theory and pattern recognition with applications to automatic target recognition, communication theory with emphasis on modulation techniques for multipath fading channel communications
Lang Hong, stochastic control systems, computer vision, image processing and pattern recognition, robotics, multiple sensor integration and target tracking
Junghsen Lieh, dynamics and controls of mechanical systems
Pradeep Misra, multivariable control theory, decentralized system theory, robotics and applied numerical analysis, two-dimensional discrete-time systems and robust control theory
Krishna Naishadham, electromagnetics, antennas and microwaves, high-frequency asymptotic techniques, numerical methods for wave propagation, scattering and radiation problems and microwave characterization of materials
Arnab K. Shaw, communication theory and stochastic processes, estimation and detection, signal modeling and signal processing, simulation of communication systems
Y. C. Shiu, computer vision, robotics, biomedical image processing
Raghavan Srinivasan, materials engineering, high-temperature deformation, materials behavior modeling
Kefu Xue, image processing and computer vision, stochastic processes and filtering, computer and communication systems, control and estimation theory

Nong Ye, human factors engineering, expert systems

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. Additional departmental requirements may also apply. 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 research programs in the general areas of electrical, mechanical, biomedical, human factors, and materials engineering. Some specific areas of emphasis include flight control systems, VLSI design, spacecraft cooling, optimization of structures, turbine engine materials, carbon-carbon composites, augmented communications, and medical imaging. Programs in artificial intelligence and robotics have college-wide interest and several faculty participate in the Edison Materials Technology Center and the Center for Artificial Intelligence Applications. Graduate student research support is available in many of these programs.

Graduate students have access to a wide range of computer systems interconnected by local and wide-area networks. Access is available to a Hitachi EX44, an Encore Multimacs 320, a DEC Vax 8550 and 6420, a DECsystem 5810, numerous Sun and DEC file servers and workstations, X-windowing terminals, and personal computers. Access is also available to the Ohio Supercomputer via the Ohio Academic and Research Network (OARNET).

Research in mechanical engineering spans several exciting areas. There is a large thermal science program in the analysis and application of heat pipes. A program in computational fluid dynamics involves studies of hypersonic flow and uses the newest supercomputers. There is an active program in optimization of large-scale structures including finite-element analysis. Mechanical design studies also are applied to characterization of carbon-carbon composites. Joint programs in manufacturing science include robotics and computer-vision studies which use well-equipped laboratories and modern computer facilities.

Research in materials engineering emphasizes processing and high-temperature materials. Current programs include studies of ceramics and ceramic composites, intermetallics, nickel-based and titanium turbine engine alloys, and carbon-carbon composites. There are two high-temperature mechanical testing facilities, a thermogravimetric apparatus, an ultra high temperature furnace (2800°C) for studying equilibrium and chemical reactions of ceramics, and a scanning-transmission electron microscope. Related facilities for microscopy, heat treatment, mechanical testing, and data acquisition are excellent.

Research in biomedical engineering (BME) currently encompasses two main areas. These are medical imaging and rehabilitation engineering. Included are neural prosthesis for spinal cord injured rehabilitation, muscle biomechanics, ultrasound scanners with emphasis on soft tissue characterization, specialized CAT scanners with emphasis on sensitivity and imaging of bone, computerized augmentative communications for the disabled, applied bioelectric phenomena, and implantable prostheses such as bladder control devices. Facilities include laboratories at the university and area hospitals. The Biomedical Imaging Laboratory and the Advanced Augmentative Communication Laboratory offer unique opportunities for research projects involving instrumentation, mechanics, and computers applied to medical and rehabilitation problems. Graduate students in BME work on real-life problems. A course of study depends upon the student's previous education and interests and may involve 45 to 60 quarter hours of study including a thesis for the M.S. degree.

Research in human factors engineering focuses on the generation of information related to human-system interface optimization. Typical activities include investigations of operator transition from automated to manual control; comparative evaluations of aircraft instrument training performance between a FAA-approved instrument trainer and PC-hosted programs; three-dimensional display designs; stereoscopic vision associated with virtual displays; human factors applications to rehabilitation; and the development of analytic techniques for assessment of expert system domains.

Research in electrical engineering is concentrated in the following areas: robotics and control systems, VLSI, power electronics, digital signal processing, microwaves, and antenna theory.

In the areas of robotics and control, faculty members are involved in conventional and fuzzy control of robot manipulators and robot calibration, robust control of uncertain systems, and computer-aided control design. Closely related fields of system identification, multisensor
integration, multidimensional filter design, and computer integrated manufacturing are also being actively pursued.

A number of faculty members are involved in research programs in the areas of signal and image processing, communications, and radar systems. Topics under investigation include real-time spectrum estimation, radar system analysis, real-time frequency and angle of arrival estimation, parametric modeling techniques, neural network based speech processing, color image processing, and automatic target recognition.

The activities in electronics include research in radio frequency power conditioning circuits involving hybrid circuit technology and power electronics. The research effort in microwaves and antennas is focused on CAD models for millimeter wave integrated circuits (MMIC), analytical and numerical techniques for arbitrarily shaped, high-frequency, printed circuits and conformal antennas.

VLSI research includes design of IC's for signal processing and computer architecture using NMOS and CMOS technologies as well as design for testability. New methods for built-in-self-test (BIST) of VLSI circuits is another area of research carried out by the faculty.

Research at Wright State is not limited to the laboratory facilities on campus. Several industrial companies, laboratories, and 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 advisor 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 12 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 45 graduate credit hours in courses that have prior approval by a systems engineering graduate advisor.
2. At least 36 of the total 45 graduate credit hours must be engineering or computer engineering courses. At least 24 of these must be engineering courses.
3. At least 12 of the 36 graduate credit hours of engineering and computer engineering must be courses numbered above 700, excluding 899, Thesis.
4. At least 6 of the total 45 graduate credit hours must be courses in mathematics, statistics, or computer science.
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 12 credit hours of 899, Thesis, may count toward degree requirements of 45 total graduate credit hours and 36 graduate credit hours in engineering or computer engineering.

Course Option: Students must complete 12 credit hours of courses numbered 700 or above in engineering in addition to the 12 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.

Students should consult their home department concerning specific degree requirements in the home department.

TESOL/Teaching of English to Speakers of Other Languages

See English Language and Literatures

Urban Administration

The Department of Urban Affairs offers a Master of Urban Administration Program designed to provide educational and professional training in public management, planning, and development for those seeking employment in local governments or public agencies primarily in the Miami Valley region and southwestern Ohio. In addition, the program provides the opportunity for present employees to increase their effectiveness and for local governments and public agencies to develop the capabilities of their staff. Therefore, the program emphasizes (1) the development of knowledge, skills, and expertise necessary to perform as a local public sector administrator; (2) opportunities to increase the proficiency of those who are already employed in the field of urban administration.
The Graduate Faculty

Professor
Perry D. Moore, public personnel and public management

Associate Professors
Robert Adams, urban decision making
Dan DeStephen, labor-management cooperation
Willard Hutzel, urban government and urban administration
Mary Ellen Mazey (chair), urban planning and spatial analysis

Assistant Professor
Jack Dustin, urban development, economic and technology policy

Admission
In addition to meeting the admission requirements of the School of Graduate Studies, applicants for regular standing in the Master of Urban Administration Program must present a baccalaureate degree, preferably in the social or behavioral sciences or business, with an overall undergraduate grade point average of 2.7 or better (on a 4.0 scale). Prospective graduate students must also submit Graduate Record Examination scores (aptitude test only), three letters of recommendation, and a 400-word essay that outlines personal and academic goals, professional objectives and preparation for graduate study, and the relationship of the applicant's goals and objectives to the program's curriculum.

Applicants who have not majored in the social sciences will be required to demonstrate to the graduate committee their familiarity with the basic knowledge and concepts of these sciences. Students lacking this knowledge will be required to take undergraduate courses to remedy deficiencies. No credit will be given in the graduate program for these courses.

Because of the sequencing of core courses and the Master of Urban Administration Program requirements, students will only be admitted for the fall quarter of each academic year.

Advising
Upon entering the urban administration program, the student will be assigned an advisor whose expertise matches the student's interests. As the student works to complete the degree requirements, a faculty committee composed of the student's graduate faculty advisor and at least two other graduate faculty members will review the student's work.

Financial Assistance
The Department of Urban Affairs awards a limited number of graduate assistantships annually to qualified students. All prospective full-time students are encouraged to apply for these positions, which are associated with the applied research activities of the Center for Urban and Public Affairs.

Degree Requirements
The curriculum for the Master of Urban Administration Program consists of eight core courses, two to four elective courses, plus an internship and/or thesis. All students must take the entire core, which provides the essential knowledge and skills for effective management in local governments and public agencies. Moreover, all courses in the core are specifically designed to develop analytical and communication skills. Case studies, data analysis, simulation, report writing, and presentation are used in all courses.

The thesis option is designed for students who are ultimately interested in research or a higher education degree such as a Doctor of Philosophy or a Doctor of Public Administration. The internship option is designed for students who are interested in more applied research and who seek practical managerial experience. Requirements for internships include at least one quarter of supervised experience in a local government or public agency and the submission of a final project report.

Program of Study

Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 710</td>
<td>Urban Legal and Political Environment</td>
<td>4</td>
</tr>
<tr>
<td>URS 711</td>
<td>Urban Organization Theory and Management Behavior</td>
<td>4</td>
</tr>
<tr>
<td>URS 712</td>
<td>Methods of Analysis for Urban Administrators*</td>
<td>4</td>
</tr>
<tr>
<td>URS 713</td>
<td>Urban Planning</td>
<td>4</td>
</tr>
<tr>
<td>URS 714</td>
<td>Urban Fiscal Management</td>
<td>4</td>
</tr>
<tr>
<td>URS 715</td>
<td>Urban Budgeting</td>
<td>4</td>
</tr>
<tr>
<td>URS 716</td>
<td>Urban Personnel Administration</td>
<td>4</td>
</tr>
<tr>
<td>URS 717</td>
<td>Urban Labor Relations</td>
<td>4</td>
</tr>
</tbody>
</table>

Elective Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 718</td>
<td>Urban Public Works Administration</td>
<td>4</td>
</tr>
<tr>
<td>URS 721</td>
<td>Urban Leadership*</td>
<td>4</td>
</tr>
<tr>
<td>URS 722</td>
<td>Directed Study in Urban Administration</td>
<td>4</td>
</tr>
<tr>
<td>EC 730</td>
<td>Regional and Urban Economics</td>
<td>3</td>
</tr>
<tr>
<td>MGT 706</td>
<td>Organizational Development and Change</td>
<td>3</td>
</tr>
</tbody>
</table>
MKT 720 Service and Nonprofit Organizational Marketing 3
PLS 643 Administrative Law Procedure 4

Additional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 723 Urban Internship†</td>
<td>4–8</td>
</tr>
<tr>
<td>URS 724 Urban Thesis or Research Project†</td>
<td>4–8</td>
</tr>
</tbody>
</table>

Total 54–56

*Course under development by catalog deadline; consult department for course description.
†Whether the student selects to complete the internship and report, the master’s thesis, or the research project, a faculty committee composed of the student’s graduate faculty advisor and at least two other graduate faculty members will review the student’s work.

Urban Planning

Contact the Department of Geography for information about this certification program.
GRADUATE COURSE DESCRIPTIONS
Course Abbreviations

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

ACC  Accountancy
ANT  Anatomy
ATH  Anthropology
ABS  Applied Behavioral Science
ART  Art and Art History
AED  Art Education
AT  Art Therapy
BCH  Biochemistry
BIO  Biological Sciences
BME  Biomedical Engineering
BMS  Biomedical Sciences
CHM  Chemistry
CLS  Classics
COM  Communication
CMH  Community Health
CME  Community Medicine
CEG  Computer Engineering
CS  Computer Science
CNL  Counseling
ECO  Economic Education, Center for
EC  Economics
ED  Education
EDE  Education—Early Childhood
EDS  Education—Special Education
EDL  Educational Leadership
EDT  Educational Technology
EE  Electrical Engineering
EGR  Engineering
ENG  English
FIN  Finance
FR  French
GEO  Geography
GL  Geological Sciences
GER  German
HPR  Health, Physical Education, and Recreation
HST  History
HFE  Human Factors Engineering
HUM  Humanities
LAT  Latin
LAW  Business Law
MGT  Management
MIS  Management Information Systems
MS  Management Science
MKT  Marketing
MTH  Mathematics
ME  Mechanical Engineering
M&I  Microbiology and Immunology
MUS  Music
NUR  Nursing
OA  Office Administration
PHA  Pharmacology
PHL  Philosophy
PHY  Physics
P&B  Physiology and Biophysics
PLS  Political Science
PSI  Professional Psychology
PSY  Psychology
RHB  Rehabilitation
RM  Rehabilitation Medicine and Restorative Care
REL  Religion
SW  Social Work
SOC  Sociology
SPN  Spanish
STT  Statistics
TH  Theatre
URS  Urban Studies
VOE  Vocational Education

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 normally 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 students 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.
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 52. Not all courses described here are offered every quarter or every year. For a more detailed listing of prerequisites, enrollment restrictions, and specific courses offered in a particular quarter, consult the Wright State class schedule published each fall, winter, spring, and summer quarter.

### Accountancy/ACC

**Note:** See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

- **621-3, 622-3 Graduate Survey of Accounting I, II**
  Survey courses in financial and managerial accounting respectively, for persons with no previous course work in accountancy. Prerequisite: for 622, ACC 621.

- **711-3 Financial Accounting Concepts I**
  Study of financial accounting concepts and theory relating to the nature, measurement, and reporting of business income and financial condition. Emphasis on controversial areas of asset definition, recognition, and measurement. Prerequisite: ACC 622.

- **712-3 Financial Accounting Concepts II**
  Continuation of ACC 711 including the definition, measurement, and reporting of liabilities and stockholder's equity. Emphasis on controversial areas in the preparation of financial statements. Prerequisite: ACC 711.

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

- **723-3 Managerial and Financial Information Systems**
  Fundamental concepts of information processing with emphasis on systems used by management. Covers design, implementation, and operation of systems for computer applications. Prerequisite: ACC 712, MIS 621.

- **741-3 Managerial Accounting**
  Develops an understanding of accounting concepts and the use of accounting in relation to management planning and control. Emphasis on cost analysis for guidance in decision making. Prerequisite: ACC 622, MIS 621.

- **753-3 International Accounting**
  Study of accounting from an international perspective, concentrating on differential developments among various nations. Accounting problems of an international nature are analyzed. Prerequisite: ACC 622.

- **781-3 Independent Studies**

### Anatomy/ANT

**Note:** See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

- **520-5 Anatomy of Human Motion**
  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. Prerequisite: BIO 105, 107.

- **691-4 Fundamentals of Human Neurobiology**
  (Also listed as BMS 913.) Development, structure, and function of the human nervous system as it relates to neuropsychology, clinical neurology, and behavioral science. Completion of general biology and/or general psychology courses and permission of instructor required.

- **699-1 to 4 Special Problems in Anatomy**
  Maximum of 4 credit hours applicable to degree requirements.

- **700-2 Topics of Instruction in Human Anatomy**
  Overview of gross anatomy, histology, neuroanatomy, embryology, and educational theory that enables students to be more effective in the teaching of undergraduate courses in anatomy. For first-year graduate teaching assistants in the Department of Anatomy only.
**Courses/Anatomy**

**701-1 to 5 Selected Topics in Anatomy**  
Selected topics in anatomy. Topics vary.

**711-8 Human Gross Anatomy**  
(Also listed as BMS 837.) Lectures and dissection of human cadaver; includes introductory embryology. 3.5 hours lecture, 9 hours lab.

**715-2 Advanced Human Embryology**  
Classical and contemporary issues in human developmental biology. Students are assigned a minimum of two oral presentations. Additional presentations are made by faculty and outside speakers. Prerequisite: ANT 711.

**721-6 Human Microanatomy**  
Detailed microanatomy of human cells, tissues, and organ systems. 3 hours lecture, 6 hours lab.

**731-5 Human Neurobiology**  
(Also listed as BMS 903.) 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.

**732-3 Cellular Neurobiology**  
Correlated ultrastructure, chemistry, and physiology of vertebrate neurons, neuroglia, and synapses under normal conditions and during development, degeneration, and regeneration.

**777-7 Medical Neuroscience**  
(Also listed as P&B 777 and BMS 854.) Interdisciplinary/interdepartmental course for graduate and medical students that integrates basic and clinical neurosciences. Structural and functional topics are combined with clinical information to address major neurological and psychiatric disorders.

**800-1 Graduate Seminar**  
Topics vary. 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 presentations of student projects involving contemporary anatomical issues based on selected journal articles.

**851-4 Scholarly Project II**  
Project culminates in a paper on a contemporary anatomical issue in which students integrate the primary objectives, results, and significance of selected journal articles and identify areas for potential research. Prerequisite: ANT 850.

**899-1 to 14 Graduate Research**  
Supervised thesis research.

**900-1 Graduate Seminar**  
Topics vary.

**Anthropology/ATH**

**Note:** See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

**542-4 Sex and Gender: Cross-Cultural Perspectives**  
Study of male and female roles and how they vary from one society to the next. Topics include sex and gender stereotypes, physical and behavioral differences, and cross-cultural differences in roles and status.

**546-4 Anthropology of Religion**  
(Also listed as REL 562.) 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. Prerequisite: ATH 368 or equivalent.

**599-1 to 4 Studies in Selected Subjects**  
Problems, approaches, and topics in the field of anthropology. Topics vary.

**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.

**648-4 Development of Ethnological Thought**  
Surveys historical development of ethnological thought; emphasizes theories of social and cultural change.

**650-4 Political Institutions in Primitive Societies**  
(Also listed as PLS 650.) Study of that part of the culture of primitive societies that is recognized as political organization. An attempt is made to show how in less complex, primitive societies, new local communities come into being through fission.

**655-4 Biomedical Anthropology**  
An anthropological perspective of health and illness in selected societies of the world that integrates physical, social, and cultural dimensions of disease, nutrition, fertility and population growth, health beliefs and practices, and the consequences of culture change and modernization.

**665-4 Seminar in Woodland Archaeology**  
Intensive review of the prehistoric Woodland period (600 BC–AD 900) of eastern North America. Regional cultures such as Adena and Ohio Hopewell. Trade, economy, political organization, and mortuary customs are considered.
692-2 to 4 Directed Studies in Anthropology
May be taken for letter grade or pass/unsatisfactory.

Applied Behavioral Science/ABS
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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

721-5 Quantitative and Research Methods in Applied Behavioral Science I
Analysis and interpretation of data in evaluation research with emphasis on the appropriate statistical techniques.

722-4 Quantitative and Research Methods in Applied Behavioral Science II
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.

723-4 Quantitative and Research Methods in Applied Behavioral Science III
Emphasis on evaluation techniques, measuring program implementation, and identifying and measuring progress toward program objectives.

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.

751-4 Organizational Training Development
Organizational training is examined in the area of applied communication behavior as a procedure for human resource development. Focuses on needs assessment procedures, instructional design, implementation, job performance analysis, and structured implementation of organizational feedback.

752-4 Process Consultation
Process consultation is examined from an applied communication-behavior framework. Topics include stages of consulting, models for process consultation, process observation and intervention, and process consultation outcomes. Students must serve as process consultants to a work group. Prerequisite: ABS 751.

753-4 Channel Design and Evaluation: Electronic Communication
Development of videotaped presentations designed to solve communication problems and test effectiveness of the presentations.

754-4 Message Design and Evaluation
Principles of verbal and visual communication as they relate to print media with an analysis of the resulting communication within research contexts, including uses and gratifications studies, content analysis, and structural criticism.

756-4 Human Factors in the Systems Development Process
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.

761-4 Seminar in Social Deviance
(Also listed as 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
In-depth exposure to theory and research of work motivation. Applications of work motivation theories to work situations are discussed and evaluated.

770-4 Seminar in Industrial/Organizational Psychology
(Also listed as PSY 740.) Provides an overview of the major topics in industrial and organizational psychology. Traditional as well as developing topics are surveyed. For applied behavioral science students or permission of program director.

771-4 Seminar on Criminal Justice
(Also listed as SOC 770.) An investigation of the criminal justice system in the United States and its relation to deviant adult and juvenile behavior.

777-1 to 5 Independent Research
Independent laboratory or field research under the sponsorship of a faculty supervisor. Graded pass/unsatisfactory.

779-2 to 6 Practicum in Applied Behavioral Science
On-site participation of students in selected behavioral science projects. Jointly supervised by faculty and on-site personnel. Completion of core courses required.

781-4 Seminar on Family Problems
(Also listed as SOC 760.) This course builds on the foundations of society and its institutions to examine contemporary problems facing American families.
788-1 to 4 Graduate Seminar in Applied Behavioral Science
In-depth coverage of special topics in applied behavioral science. Topics vary. May be taken for a letter grade or pass/unsatisfactory.

799-2 to 6 Graduate Thesis Research
Research for the master’s degree thesis.

Art and Art History/ART
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

600-1 to 4 Studio Workshop
Studio experience directly involving students with professional artists executing special projects. Covers a range of information from preliminary planning to final discussion on the projects.

601-1 to 4, 602-1 to 4, 603-1 to 4 Independent Study in Art
Special studies for qualified students. Intensive individually directed work in art with faculty consultation and supervision.

605-1 to 4 Studies in Art
Provides opportunities to explore special problems and approaches to art and includes cross-media and interdisciplinary studies. Titles vary.

609-4 Studies in Art Theory and Criticism
Historical surveys and intensive studies in art theory and criticism.

610-4 Studies in American Art
General surveys and intensive studies of periods, major movements, and artists in American art. Titles vary.

611-4 Studies in Ancient and Classical Art
(Also listed as CLS 540.) General surveys and intensive studies of the period, major movements, and artists of the time. Titles vary.

612-4 Studies in Medieval Art
General surveys and intensive studies of the period, major movements, and artists of the time. Titles vary.

613-4 Studies in Renaissance Art
General surveys and intensive studies of the period, major movements, and artists of the time. Titles vary.

614-4 Studies in Baroque Art
General surveys and intensive studies of the period, major movements, and artists of the time. Titles vary.

615-4 Studies in Nineteenth-Century Art
General surveys and intensive studies of the period, major movements, and artists of the time. Titles vary.

616-4 Studies in Twentieth-Century Art
General surveys and intensive studies of the period, major movements, and artists of the time. Titles vary.

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.

647-4, 648-4, 649-4 Painting
Emphasis on pictorial organization with increased attention to the individual student’s personal imagery.

658-4 Photography
Exploration of personal concepts and aesthetic expression in photography. Intensive individual work with faculty supervision.

667-4, 668-4, 669-4 Printmaking
Development of personalized concepts and individual aesthetic expression in printmaking.

678-4, 679-4 Sculpture
Development of personal concepts and aesthetic expression in sculpture. Emphasis on individualized approach to sculptural problems using media selected by the students.

701-1 to 4, 702-1 to 4, 703-1 to 4 Independent Study in Art History
Intensive individually directed work in art history with faculty consultation and supervision.

Art Education/AED
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

620-4, 621-4 Art Metal, Jewelry I
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.

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.
624-4 Weaving
Use of loom and other hand techniques in weaving. Experimental approaches explored in the completion of original ideas.

625-4 Textiles
Methods of silk-screen printing on fabrics; emphasis on silk-screen as it can be used in the public school program; and analysis of textile design in contemporary living.

626-4 Creative Stitchery
Study of the various methods and procedures used in stitchery and applied forms, and exploration of ways to work with flat and stitched fabrics that lead to wall hangings and other art forms.

628-4 Pupil Expression through Mural Painting
Development of individual creative expression through mural painting and the application of the mural technique to the public school program.

629-1 to 6 Workshop in Art Education
Workshop dealing with problems, processes, and techniques for the development of art activities in the elementary and secondary school. Work consists of the development of craft processes concerned with suitable projects for classroom work and public art education curricula.

660-3 Independent Reading in Art Education
Independent work that extends and amplifies students' knowledge of philosophy, aesthetics, and creative and mental growth as related to art teaching and art education curricula. Emphasis 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.

641-4 Art Appreciation and Criticism in the School
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.

643-4 Architectural and Environmental Awareness
Combination seminar and studio focusing on curriculum development for the public school in architectural space and environmental awareness. Emphasis on human behavior and resources, ecology and human needs, and aesthetics and history.

721-3 to 5 Graduate Study in Crafts
Individual problems in several craft areas to meet the needs of art teachers.

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.

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.

741-1 to 3 Art with the Gifted and Talented Student
(Also listed as EDS 723.) Orientation using art both theoretically and practically with students who are 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 on the study of current and past research, current problems, and the development of a problem using appropriate research techniques. Prerequisite: EDL 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.

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.

899-1 to 9 Thesis
Art Therapy/AT

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

629-1 to 6 Workshop in Art Therapy
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
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. 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 for 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.

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 audiostreaming methods 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
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
Orientation using art with a specific population such as learning disabled, mentally retarded, perceptually impaired, physically handicapped, culturally disadvantaged, multiple handicapped, or persons in correctional institutions and prisons. Prerequisite: AT 730 or permission of instructor.

746-3 Art Therapy with the Family
Includes the systemic, family therapy theory and the use of art therapy in strategic family intervention. Focuses on experiences in the practice of art therapy with a family, investigation of existing testing tools, and creative development of new tools. Clinical hours are included. Prerequisite: AT 730 or equivalent.

748-3 Multicultural Dimensions of Art Therapy
Explores the role of the arts in healing among various cultures. Examines how diverse cultural perspectives intersect in the therapeutic relationship. Includes exploration of personal and cultural values that undermine clinical work and cross-cultural implications for art evaluation and treatment. Prerequisite: AT 730 or equivalent.
753-1 to 3 Research in Art Therapy
Emphasis on 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, EDL 751, or permission of instructor.

766-1 to 5 Project in Art Therapy
Independent study intended for graduate students who elect to complete the program in art therapy with a major project. Graded pass/unsatisfactory. 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. Graded pass/unsatisfactory. 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. Prerequisite: AT 735.

772-1 to 9 Art Therapy Clinic II
Off-campus art therapy internship. Students are assigned to a specific school, agency, hospital, or institution for art therapy clinical experience under the supervision of a registered art therapist. Graded pass/unsatisfactory. Prerequisite: AT 771.

773-1 to 5 Art Therapy Clinic III
Extended on-campus or off-campus clinical experiences intended for students who elect to complete the degree with additional clinical hours. Graded pass/unsatisfactory. Prerequisite: AT 771, 772, or permission of instructor. Corequisite: AT 774.

774-1 to 3 Seminar in Art Therapy
Seminar for group discussion of students’ clinical art therapy experiences. Includes analysis of clinical case load assessment, therapy, and recommendations for patients or clients. Preparations for in-service presentation for clinical team members. Prerequisite: AT 771. Corequisite: AT 772, 773.

899-1 to 9 Thesis
Graded pass/unsatisfactory.

Biochemistry/BCH
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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 123.

699-1 to 4 Special Problems in Biological Chemistry
Graded pass/unsatisfactory.

701-1 to 5 Selected Topics in Biological Chemistry
702-2 Research Perspectives
Designed to acquaint new graduate students with the research being carried out by the faculty in the biochemistry program.

727-3 Enzymes
(Also listed as BMS 767.) Current concepts of the mechanism of enzyme catalysis including such topics as structure, kinetics, energetics, allosterism, coenzymes, and control of enzymes and multienzyme systems.

731-4 Biochemistry of Membranes
(Also listed as BMS 769.) Examines the biochemistry of membranes and provides basic information on membrane composition and processes. Prerequisite: BCH 421, 423.

750-1 to 8 Molecular Biochemistry I
(Also listed as BMS 750.) 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.

752-1 to 8 Molecular Biochemistry II
(Also listed as BMS 752.) 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.

753-3 Molecular Signaling-Molecular Cell Biology
(Also listed as BMS 753.) A molecular analysis of information transfer into and within cells. Topics include visual transduction, hormones, hormone receptors, second messengers, regulation of transcription, and oncogenes. Readings from current scientific literature. Prerequisite: BCH/BMS 750, 752.
Courses/Biochemistry

762-3 to 6 Fundamental Principles of Fourier Transform Nuclear Magnetic Resonance
(Also listed as BMS 762.) Covers the fundamental theory of nuclear magnetic resonance spectroscopy with emphasis on pulse Fourier transform methods.
Prerequisite: CHM 211, 212, 213; PHY 111, 112, 113 or equivalent; MTH 220, 230 or equivalent; or permission of instructor.

763-3 to 6 In Vivo Nuclear Magnetic Resonance Spectroscopy and Imaging
(Also listed as BMS 763.) Discusses the applications of NMR spectroscopy to the study of tissue metabolism in vivo. The fundamental theory of magnetic resonance imaging, with a survey of clinical applications, is also presented.
Prerequisite: BCH/BMS 762 or permission of instructor.

764-3 to 6 Nuclear Magnetic Resonance Techniques in Biomolecular Structure and Dynamics
(Also listed as BMS 764.) Describes the NMR methods used for the determination of biomolecular structure and dynamics. Emphasis on two-dimensional Fourier transform techniques.
Prerequisite: BCH/BMS 762 or permission of instructor.

771-3 Protein and Vitamin Nutrition
(Also listed as BMS 931.) 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 on these processes as they occur in birds and mammals.

800-1 Biochemistry Seminar
Topics vary. Graded pass/unsatisfactory.

899-1 to 15 Biochemistry Research

Biological Sciences/BIO

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

521-3 Human Genetics for Health Professionals
Describes mechanisms 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." For nonmajors only. Prerequisite: BIO 112 or equivalent or graduate standing.

603-3 Developmental Biology
(Also listed as BMS 839.) Describes underlying processes that initiate, in plants and animals, the development of tissue and whole organisms.

606-3 Evolutionary Biology
Historical development and current understanding of the principles of evolution.
Prerequisite: BIO 115, 112, 114, 302, or permission of instructor.

608-3 Writing in the Biological Sciences
Surveys grammatical and stylistic aspects of scientific writing and teaches how to organize, write, and submit a manuscript for publication in a biological journal. Writing grants are also discussed.
Prerequisite: BIO 115, 112, 114.

611-6 The Aquatic Environment
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.

613-5 Biological Problems of Water Pollution
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.

614-5 Terrestrial Communities
Organization, diversity, distribution, and abundance of animals in plant communities, with 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.

615-4 Environmental Toxicology
Covers toxicological problems encountered in the field of environmental health. Emphasis on monitoring, control, and regulation of toxic substances in air and water, and in industrial environments. 3 hours lecture, 1 hour recitation. Completion of a course in physiology and organic chemistry required.

617-4 Evolution
(Also listed as REL 687.) An introduction to the biological, philosophical, theological, and ethical aspects of the concept of evolution.

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. Completion of two biology courses at 300 level or above and one course in statistics required.

621-5 Vertebrate Embryology
Study of embryonic growth and development viewed at the organismic and cellular levels. The relationship of the principles and patterns of morphogenesis to evolutionary theory is stressed. Completion of a freshman-level biology course required.
623-3 Scientific Basis for Genetic Counseling
Provides an overview of the methods involved in genetic counseling such as risk analysis, linkage scores, and diagnostic/screening tests. Does not serve toward accreditation of certification in genetic counseling. Prerequisite: BIO 421/521, 426/626 or permission of instructor.

625-5 Microbial Ecology
(Also listed as BMS 793.) Microbes in soil, water, and air. Experiments on mineral cycles, physical and biological limiting factors, and symbiosis. Natural communities of microbes and microbes of special human environments. Includes field studies.

626-4 Human Genetics
(Also listed as BMS 780.) Nature of human genetic traits; methods of analysis of inheritance. Prerequisite: BIO 302, 402, or 403.

650-3 Behavior Genetics
(Also listed as BMS 786.) 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.

654-3 Microbial Genetics
(Also listed as BMS 791.) Basic concepts of production of microbial mutations, and their detection and analysis; the use of microbial genetics in elucidating cellular functions; and the construction of plasmids and their use in genetic engineering. Prerequisite: BCH 421 or 423 or BIO 402; BIO 202, 302, or permission of instructor.

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 microbiology course required.

666-3 Occupational Health and Safety
Introduction to accident recognition, evaluation, and control in the work environment, with emphasis on methods of hazard recognition and control management. Prerequisite: CHM 123, 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 123, MTH 130.

668-3 Industrial Hygiene I
Introduction to industrial hygiene. Emphasis is on routes of entry into the human body and physiological effects of industrial pollutants. Prerequisite: CHM 123, 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 123, 211, 215; MTH 130.

673-5 Biology of Selected Marine Environments
Biological aspects of marine environments. Sampling and observation of living marine specimens during week-long trip to a marine laboratory.

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 laboratory course in general microbiology required. Prerequisite: BIO 202 or M&L 220. Corequisite: BIO 664.

676-2 Human Parasitology
(Also listed as BMS 799.) 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 arthropodology. Designed primarily for medical technologists, biology teachers, and environmental health students.

677-3 Human Parasitology Laboratory
Laboratory course designed to examine and identify protozoan, helminthic, and arthropod parasites of humans. Corequisite: BIO 676.

678-4 Animal Behavior
(Also listed as PSY 678.) Physiology, phylogeny, and ontogeny of behavior. 3 hours lecture, 2 hours lab. Prerequisite: BIO 115, 112, 114, 305; or PSY 111, 112; and permission of instructor.

680-5 Biology of Fishes
Introduction to the evolution, ecology, and distribution of fresh water and marine fish. 3 hours lecture, 4 hours lab, and field trips. 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 115, 112, 306 or permission of instructor.
### Courses/Biological Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description/Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>699-1 to 4</td>
<td>Special Problems in Biology</td>
<td>For biology majors only.</td>
</tr>
<tr>
<td>700-3</td>
<td>Principles of Instruction in Biology</td>
<td>Survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction.</td>
</tr>
<tr>
<td>701-1 to 5</td>
<td>Selected Topics in Biology</td>
<td>Topics vary.</td>
</tr>
<tr>
<td>702-2</td>
<td>Introduction to Research</td>
<td>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.</td>
</tr>
<tr>
<td>720-4</td>
<td>Mammalian Cell Biology</td>
<td>(Also listed as 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.</td>
</tr>
<tr>
<td>734-3</td>
<td>Molecular Genetics</td>
<td>(Also listed as BMS 779.) Study of the replication, organization, and function of nucleic acids with emphasis on the role of nucleic acids in protein synthesis.</td>
</tr>
<tr>
<td>737-6</td>
<td>Recombinant DNA Methods</td>
<td>(Also listed as BMS 790.) Microbial and molecular techniques for producing, cloning, and characterizing recombinant DNA molecules; laboratory exercises in gene manipulation to give an understanding of the principles of genetic engineering. Graded pass/unsatisfactory. Prerequisite: BMS 750, 752; BIO 654 and BIO 734/BMS 779 or permission of instructor.</td>
</tr>
<tr>
<td>740-6</td>
<td>Electron Microscopy for Life Sciences</td>
<td>(Also listed as BMS 834.) Introduction to theoretical and practical aspects of transmission electron microscopy. Emphasizes 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.</td>
</tr>
</tbody>
</table>

#### Biomedical Engineering/BME

**Note:** See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>619-3</td>
<td>Biomedical Engineering Systems I</td>
<td>Derivation and use of the basic conservation laws underlying the fluid mechanical behavior of the cardiopulmonary system. Includes applications to the flows of blood, pulmonary air, and extracorporeal fluids. Prerequisite: ME 212, 315, MTH 233, or permission of instructor.</td>
</tr>
<tr>
<td>620-3</td>
<td>Biomedical Engineering Systems II</td>
<td>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: BME 619 and permission of instructor.</td>
</tr>
<tr>
<td>622-3</td>
<td>Engineering Biophysics</td>
<td>Application of mathematical and engineering techniques toward describing biophysical systems. Topics include cellular transport, electrical properties of membranes, and biophysics of muscle contraction. Prerequisite: EE 521 or permission of instructor.</td>
</tr>
<tr>
<td>628-3</td>
<td>Biomechanics and Biofluids</td>
<td>Application of solid mechanics and thermodynamics toward describing physiological systems. Topics include mechanics of the skeletal, cardiac, and pulmonary systems and analysis of the biothermal regulation system. Prerequisite: ME 212, 515, or permission of instructor.</td>
</tr>
<tr>
<td>639-4</td>
<td>Biotransport and Artificial Organs I</td>
<td>Introduces transport processes vital to the design of medical devices for artificial intervention into living systems. Topics include circulatory system dynamics, mathematical modeling of physiological systems, membrane transport, and biological/artificial organ design. Prerequisite: BME 620 and permission of instructor.</td>
</tr>
<tr>
<td>640-4</td>
<td>Biomaterials</td>
<td>Application of properties of materials and solid mechanics to problems and design of medical implants, external prostheses, and living tissues. Topics include mechanical properties of biologic and synthetic materials, stress-strain analysis, viscoelasticity, tissue response to implants and vice versa, and implant materials for interfacing with hard and soft tissues and blood. Prerequisite: BME 639 and permission of instructor.</td>
</tr>
</tbody>
</table>
655-3 Photon Radiation
Basic introduction to generation, effects, and
detection of ionizing radiation and its
application to medicine. Prerequisite:
PHY 252.

661-4 Bioinstrumentation I
Principles of design and analysis of electronic
instrumentation for medical applications.
Topics include various electrodes/
transducers for physiological measurement
and electrical stimulation, biological signal
acquisition and processing, various medical
imaging modalities/systems, and electrical
safety. 3 hours lecture, 2 hours lab.
Prerequisite: EE 601, 602, 613, 614.

662-4 Bioinstrumentation II
Continuation of principles of design and
analysis of electronic instrumentation for
medical applications. Topics include various
electrodes/transducers for physiological
measurement and electrical stimulation,
biological signal acquisition and processing,
various medical imaging modalities/systems,
and electrical safety. 3 hours lecture, 2 hours
lab. Prerequisite: BME 661.

663-3 Biomedical Computers I
Digital computer applications in medical
sciences involving medical research, patient
care, and physician assistance. Topics
include medical data cases, medical expert
systems, and data structures for patient care.

664-4 Biomedical Computers II
Principle, hardware structure, and
programming techniques of microprocessors.
Applications of microprocessor-based
systems in hospital, rehabilitation
engineering, and medical research. 3 hours
lecture, 2 hours lab. Prerequisite: BME 663.

665-3 Medical Imaging
An overview of the various methods used in
generating images in medicine. The basic
principles of the image-forming process and
the physical properties of the resultant
images are discussed. Prerequisite:
BME 655.

699-1 to 5 Special Problems in Engineering
Special problems in advanced engineering
topics. Titles vary.

700-3 Principles of Instruction in Engineering
Survey of available instructional materials and
discussion of educational theories and
techniques leading to more effective
instruction. For first-year graduate teaching
assistants only.

711-3 Cardiac Mechanics
Covers a variety of mathematical models that
have been developed to describe muscle
performance in health and disease.
Prerequisite: BME 428 or 628 or permission of
instructor.

712-3 Cardiopulmonary Modeling
(Also listed as BMS 951.) Acquaints students
with the analytical, numerical, and
experimental methods used in modeling the
quantitative behavior of physiological and
artificial organ systems, particularly the
circulation and the lungs. Prerequisite:
BME 439 (639), 440 (640).

713-3 Biocompatibility of Materials
(Also listed as BMS 952.) Acquaints students
with the concept of biocompatibility of
materials, including effects on biological
systems. Also deals with the general problem
of selection, qualification, and specification of
materials. Prerequisite: BME 440, BIO 209 or
equivalent.

731-3 Medical Ultrasonics
(Also listed as BMS 956.) Fundamentals of
medical ultrasonics: ultrasound generation,
propagation, scattering, and attenuation in
biological tissue. A-mode, B-mode, M-mode,
and Doppler imaging techniques. Ultrasound
tissue characterization and quantitative
imaging techniques. Prerequisite: BME 665.

732-3 Computed Tomography
(Also listed as BMS 957.) Principles of
generating images from projections.
Discussion of the various scanner
geometries, mathematical reconstruction,
correction procedures, and qualitative and
quantitative evaluation of images. Focuses on
the medical application of computed
tomography. Prerequisite: BME 665.

733-3 Nuclear Magnetic Resonance in Medicine
(Also listed as BMS 958.) Principles of
imaging and spectroscopy of nuclear
magnetic resonance in their applications to
medicine. Topics include magnetization
models, material encoding, spin interactions,
localized spectroscopy, and relaxation.
Prerequisite: BME 665.

734-3 Processing of Medical Images
(Also listed as BMS 959.) Digital image
processing in its application to medical
images. Topics include image display,
filtering, two-dimensional Fourier transform,
restoration, enhancement, and edge
detection. Some simple tools from the field of
mathematical morphology are also
introduced. Prerequisite: BME 665.
735-3 Photon Emission Imaging
(Also listed as BMS 960.) Principles of imaging procedures based on radioactive isotopes. Topics include radioactive isotopes, single-photon emission-tomography, and positron emission-tomography. Each topic covers instrumentation, image production, and major applications. Prerequisite: BME 665.

741-3 Neuromuscular Rehabilitation Engineering
(Also listed as BMS 961.) Teaches the design and application of neuromuscular assistive devices. Emphasizes biomathematics modeling and control theory. Prerequisite: BME 422 or 622 or permission of instructor.

742-3 Rehabilitation Assistive Systems
(Also listed as BMS 962.) Design and application of devices used in rehabilitation. Provides an understanding of the problems of disabled people and the variety of possible solutions to these problems.

790-1 to 5 Seminar in Biomedical Engineering
Topics vary. Graded pass/unsatisfactory.

880-3 Selected Topics in Systems Engineering
Selected topics in current research and recent developments in systems theory and engineering.

890-1 to 5 Special Problems
Special problems in advanced engineering topics. Topics vary.

899-1 to 5 Thesis

Biomedical Sciences/BMS

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

655-5 Matrix Algebra
(Also listed as 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
(Also listed as STT 664.) Review of the principles underlying statistical methodology and techniques available for analyzing biomedical data. Emphasizes the necessity for careful design of experiments and the structure of data.

668-2 Introduction to SAS
Introduces the use of the statistical analysis system (SAS), a statistical computing package widely used in industry, government, and academia. Prerequisite: BMS 664 or equivalent.

705-4 Linear Systems I
(Also listed as EE 701.) Signal representation, orthonormal bases, and generalized Fourier series. Description of linear, discrete, and continuous systems. Systems analysis via classical equations, convolution, and transform methods. Prerequisite: BMS 664, 698.

706-3 Linear Systems II
(Also listed as EE 702.) State variable representations of continuous and discrete systems. Linear vector spaces and similarity transformations; eigen-analysis, time and transform domain solutions of linear state equations; controllability, observability, and stability of linear systems. Prerequisite: BMS 705.

710-3 Control Systems I
(Also listed as EE 613.) Provides students with a general control background. Major topics include block diagrams and signal-flow graphs, electromechanical modeling including state variable representation, time response, root locus, and introduction to design. Prerequisite: BMS 664. Corequisite: BMS 711.

711-1 Control Systems I Laboratory
(Also listed as EE 614.) Applications and testing of control systems theory with electromechanical systems. Prerequisite: BMS 664. Corequisite: BMS 710.

712-3 Control Systems II
(Also listed as EE 615.) Using Control Systems I background, course concentrates on controller design, in both the time and frequency domains, using Nyquist, Bode, root locus and state variable techniques. Digital control concepts are introduced. Prerequisite: BMS 710 and 711. Corequisite: BMS 713.

713-1 Control Systems II Laboratory
(Also listed as EE 616.) Application and testing of control systems theory with electromechanical systems. Prerequisite: BMS 710 and 711. Corequisite: BMS 712.

725-3 Physical Polymer Chemistry
(Also listed as 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 Synthetic Polymer Chemistry
(Also listed as CHM 661.) Step-growth and chain-growth polymerization in homogeneous and heterogeneous media; properties of commercial polymers. Prerequisite: CHM 213 or 561.
727-1 to 2 Physical Polymer Chemistry Laboratory
(Also listed as CHM 667.) Laboratory illustrations of BMS 725 lecture material and techniques of polymer science. Prerequisite: CHM 213 or 561.

728-1 to 2 Polymer Synthesis Laboratory
Laboratory illustrations of BMS 726 lecture material and techniques of polymer science. Prerequisite: CHM 213 or 561.

733-3 Advanced Inorganic Chemistry I
(Also listed as 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.

734-4 Advanced Inorganic Chemistry II
(Also listed as CHM 721.) 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
(Also listed as 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
(Also listed as CHM 751.) 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, permission of instructor.

737-3 Chemical Thermodynamics
Fundamentals; first, second, and third laws; and application to solutions. Prerequisite: CHM 453 or equivalent, or permission of instructor.

738-3 Selected Topics in Physical Chemistry
(Also listed as 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.

750-4 to 10 Biochemistry and Molecular Biology I
(Also listed as BCH 750.) Survey course emphasizing an experimental and problem-solving approach to buffers, protein structure, enzymes, and carbohydrate and lipid metabolism.

752-3 to 10 Biochemistry and Molecular Biology II
(Also listed as BCH 752.) 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.

753-3 Molecular Signaling-Molecular Cell Biology
(Also listed as BCH 753.) A molecular analysis of information transfer into and within cells. Topics include visual transduction, hormones, hormone receptors, second messengers, regulation of transcription, and oncogenes. Readings from current scientific literature. Prerequisite: BMS 750, 752.

762-3 to 6 Fundamental Principles of Fourier Transform Nuclear Magnetic Resonance
(Also listed as BCH 762.) Covers the fundamental theory of nuclear magnetic resonance spectroscopy with emphasis on pulse Fourier transform methods. Prerequisite: BMS core curriculum.

763-3 to 6 In Vivo Nuclear Magnetic Resonance Spectroscopy and Imaging
(Also listed as BCH 763.) Discusses the applications of NMR spectroscopy to the study of tissue metabolism in vivo. The fundamental theory of magnetic resonance imaging, with a survey of clinical applications, are also presented. Prerequisite: BMS core curriculum.

764-3 to 6 Nuclear Magnetic Resonance Techniques in Biomolecular Structure and Dynamics
(Also listed as BCH 764.) Describes the NMR methods used for the determination of biomolecular structure and dynamics. Emphasis on two-dimensional Fourier transform techniques. Prerequisite: BMS core curriculum.

767-3 Enzymes
(Also listed as BCH 727.) 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
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.

769-4 Biochemistry of Membranes
(Also listed as BCH 731.) Examines the biochemistry of membranes and provides basic information on membrane composition and processes. Prerequisite: BMS 752, 835; or equivalent.

770-3 Physical Biochemistry
Structure-function analysis of biological macromolecules (particularly proteins and polynucleotides) based on chemical and physical properties. Prerequisite: BMS 752, 835 or equivalent.

771-2 Safe Use of Radionuclides
Principles of α, β, and γ radiation and methodology of counting with application to physical and biological problems.

776-1 to 6 Bioenergetics
Structure of energy-transducing membranes of mitochondria, chloroplasts, and bacteria. Emphasis 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
(Also listed as BIO 734.) Study of the replication, organization, and function of nucleic acids with emphasis on the role of nucleic acids in protein synthesis. Prerequisite: BMS core courses.

780-4 Human Genetics
(Also listed as 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
(Also listed as BIO 735.) Review of current literature in molecular or human genetics subjects. Presentation of reviews to other students. Prerequisite: BMS 780.

786-3 Behavior Genetics
(Also listed as BIO 650.) 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
(Also listed as 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 core curriculum.

791-3 Microbial Genetics
(Also listed as 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.

793-5 Microbial Ecology
(Also listed as 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 special human environments. Includes field studies.

799-2 Human Parasitology
(Also listed as 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 arthropodology.

802-5 Immunology and Basic Virology
(Also listed as M&I 726.) Fundamentals of immunobiology and basic virology. Emphasis on regulatory and cellular levels of host immune responses against microbial pathogens as well as mechanisms of immunopathology. Characteristics and molecular biology of virus pathogens. Prerequisite: BMS 752, 835; or equivalent.

803-5 Pathogenic Microbiology
(Also listed as M&I 727.) Study of microorganisms pathogenic for humans 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: BMS 752, 835 or equivalent.

807-3 Basic Virology
(Also listed as M&I 731.) Introduction to the field of virology with emphasis on animal viruses. Studies the intrinsic properties of viruses and their interaction with cells; multiplication, disease production, genetics, and tumor induction. Completion of BMS core courses required.
808-3 Molecular Virology
(Also listed as 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
(Also listed as M&I 833.) Understanding the process involved in cell transformation by oncogenic viruses. Prerequisite: BMS 752, 835.

812-5 Immunobiology
(Also listed as M&I 745.) Study of the biology of the immune system, as well as its function in health and disease. Specific diseases are used as models for immunologically mediated conditions. Prerequisite: BMS 752, 835; or equivalent.

813-2 to 8 Special Topics in Immunology
(Also listed as 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
(Also listed as M&I 846.) Deals with the effects of microbial and metazoan parasites on both host resistance and immunologically mediated disease processes. Prerequisite: BMS 752, 835.

834-6 Electron Microscopy for Life Sciences
(Also listed as 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 a course in histology or cell biology required.

835-4 to 10 Mammalian Cell Biology
(Also listed as BIO 720.) Interdisciplinary survey of cellular functions, including location of molecular events and functional compartmentation within the cell, recognition of structural and functional elements of the cell, and interaction of cells in specialized tissues.

837-8 Human Gross Anatomy
(Also listed as ANT 711.) Lectures and dissection of human cadaver.

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. Prerequisite: BMS 752, 835.

839-3 to 6 Developmental Biology
(Also listed as BIO 603.) Describes underlying processes that initiate the development of tissue and whole organisms in plants and animals.

840-3 Reproductive Anatomy and Physiology
Reproductive cycles and gametogenesis; intercourse and conception; events of pregnancy and parturition; contraception, sterility, and dysfunction. Completion of BMS core courses required.

850-4 to 10 Basic Human Physiology I
Basic course in structure, function, and interactions of human organ systems. Subject areas include musculoskeletal, neurological, cardiovascular, and respiratory systems. Prerequisite: BMS 752, 835, or permission of instructor.

851-4 to 10 Basic Human Physiology II
Basic course in structure, function, and interactions of human organ systems. Subject areas include endocrine, gastrointestinal, urinary, and reproductive systems. Prerequisite: BMS 850 or permission of instructor.

852-4 Cell Physiology and Biophysics
(Also listed as P&B 601.) Fundamentals of cellular homeostasis and the role of specialized cells in organismal homeostasis.

853-3 Ion Channels
(Also listed as P&B 722.) Explores the role of ion channels in a variety of cell types with an emphasis on both electrophysiological and biochemical methods for evaluation of channel function. Prerequisite: BMS 852 and/or permission of instructor.

854-7 Medical Neuroscience
(Also listed as ANT 777 and P&B 777.) Interdisciplinary/interdepartmental course for medical and graduate students that integrates basic and clinical neurosciences. Structural and functional topics are combined with clinical information to address major neurological and psychiatric disorders. Prerequisite: BMS core courses.

859-3 Gastrointestinal Physiology and Biophysics
(Also listed as P&B 761.) Principles of gastrointestinal physiology and biophysics emphasizing cellular mechanisms of secretion, absorption, and motility. Prerequisite: BMS core curriculum.

860-3 General Endocrinology
(Also listed as P&B 771.) Survey of endocrinological mechanisms and their role in integration of body function. Prerequisite: BMS 851 or permission of instructor.
864-5 Physiological Aspects of Exercise
(Also listed as P&B 783.) Integration of physiological mechanisms involved in exercise. Cellular, neuromuscular, cardiovascular, and respiratory changes are discussed with relationship to exercise performance.

865-3 Introductory Neurophysiology
(Also listed as P&B 642.) Physiological mechanisms that subserve the functions of the nervous system. Topics include the biophysics of neuronal information, intercellular communications, motor control, sensory systems, and development neurobiology. Prerequisite: BMS 852.

866-3 Cardiovascular Physiology
(Also listed as P&B 733.) Survey of the physiology of the human cardiovascular system; components and control, cell, organ, and system level. Both newborn and adult are included, as well as adjustments to exercise and non-exercise stress. Prerequisite: Enrollment in the BMS Ph.D. Program.

867-1 to 3 Fluorescence: Theory and Practice
(Also listed as P&B 704.) Covers the theoretical basis for fluorescence and instrument design in this methods-oriented course. Applications of interest to the physiological and biochemical sciences are discussed. Graded pass/unsatisfactory. Prerequisite: BMS 750, 752.

868-1 to 5 Molecular Basis of Secretion
(Also listed as P&B 751.) Explores current hypothesis for the formation, sorting, and release of secretory vesicles at a molecular level of integrating ideas from cell biology, neuroscience, and membrane biophysics. Methodology is emphasized. Prerequisite: BMS 852.

869-3 to 10 Quantitative Aspects of Membrane Transport
(Also listed as P&B 669.) Employs a quantitative approach to the properties of solutes, water, bio-electrical phenomena, transport systems that move solutes across biological membranes, and the interactions of these solutes with membranes. May be taken for letter grade or pass/unsatisfactory. Prerequisite: BMS 835, 852.

870-2 to 6 General Pharmacology I
(Also listed as PHA 879.) Introduces students to drug-receptor interactions, dose-response relationships, physiochemical principles of drug action and distribution, pharmacokinetics, mechanisms of action, and uses of drugs affecting both autonomic and central nervous system functions. Completion of BMS core courses or equivalent required.

880-4 General Pharmacology II
(Also listed as 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. Emphasis on antibiotics, chemotherapy of infectious diseases, antineoplasia, and immunosuppressants. An introduction to toxicology is provided. Prerequisite: BMS 879.

886-7 General Pathology
Introduces 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. Completion of BMS core courses, anatomy sequence, or equivalent required.

888-4 General Toxicology I
(Also listed as PHA 751.) Introduction to general toxicology covering the principles of intoxication and detoxication, classification of poisons, exposure characteristics, biotransformation and biokinetics of poisons, systemic toxicology including central nervous system, splanchnic organs, cardiovascular, hematopoietic, respiratory, reproductive, and skeletal systems. Prerequisite: BMS 879, 880.

888-4 General Toxicology II
(Also listed as PHA 752.) 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
(Also listed as PHA 750.) Covers the general basis of toxicology and therapeutics; pharmacokinetics, xenobiotic metabolism, and their effects on determination of the dose-response-time relationship. Completion of BMS core courses or equivalent required.

898-3 Neuropharmacology
(Also listed as PHA 898.) In-depth treatment of the anatomy, biochemistry, physiology, and function of neurotransmitter systems and the effects of drugs on the nervous system. Prerequisite: BMS 876 and core curriculum or equivalent, and permission of director.

902-3 Neurophysiology
(Also listed as P&B 720.) Survey of neurophysiology with emphasis on somatic and autonomic control of body function. Completion of BMS core courses required.

903-5 Human Neuroanatomy
(Also listed as ANT 731.) Detailed survey of the anatomy and physiology of the major fiber tracts and cell groups of the human central nervous system. Completion of BMS core courses required.

905-4 Information Processing
(Also listed as PSY 665.) Survey of experimental findings in animal and human memory with emphasis on their implications for current theories of memory. Completion of BMS core courses required.

910-4 Psychobiology of Stress
(Also listed as PSY 619.) Detailed examination of selected areas in cognition and learning. Prerequisite: BMS core curriculum.

913-4 Fundamentals of Human Neurobiology
(Also listed as ANT 691.) Development, structure, and function of the human nervous system as it relates to neuropathology, clinical neurology, and behavioral science. Completion of general biology and/or general psychology courses, and permission of instructor required.

914-4 Behavioral Neuroscience
(Also listed as PSY 891.) Covers neurobiological bases of behavior. Focuses on motor function, ingestion, mating, learning, memory, rhythmical influences, and emotion. Prerequisite: BMS core curriculum or equivalent.

931-3 Protein and Vitamin Nutrition
(Also listed as 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; emphasis on these processes as they occur in birds and mammals. Completion of BMS core courses required.

951-1 to 6 Cardiopulmonary Modeling
(Also listed as BME 712.) Acquaints students with the analytical, numerical, and experimental methods used in modeling the quantitative behavior of physiological and artificial organ systems, particularly the circulation and the lungs. Prerequisite: BMS core curriculum and/or permission of BMS program director.

952-1 to 6 Biocompatibility of Materials
(Also listed as BME 713.) Acquaints students with the concept of biocompatibility of materials, including effects on biological systems. Deals with the general problem of selection, qualification, and specification of materials. Prerequisite: BMS core curriculum and/or permission of BMS program director.

953-1 to 6 Human Factors Engineering Advanced Aerospace Systems Design
(Also listed as HFE 724.) Qualifies students to make significant human factors contributions to the design of state-of-the-art aerodynamic and space systems. Design of control-display integration, cockpit configuration, maintainability, and reliability emphasized. Prerequisite: BMS core curriculum and/or permission of BMS program director.

954-1 to 6 Human Factors Engineering Workload Analysis
(Also listed as HFE 725.) Provides students with tools required to accomplish a workload analysis as a requisite to a systems design or a redesign of an existing system. Prerequisite: BMS core curriculum and/or permission of BMS program director.

955-1 to 6 Human Factors Engineering: Crew Station Design
(Also listed as HFE 726.) In-depth treatment of human factors engineering principles applicable to design of crew command centers for aerodynamics, space, and maritime systems. Prerequisite: BMS core curriculum and/or permission of program director.

956-1 to 6 Medical Ultrasonics
(Also listed as BME 731.) Fundamentals of medical ultrasonics: ultrasound generation, propagation, scattering, and attenuation in biological tissue. A-mode, B-mode, M-mode, and Doppler imaging techniques. Ultrasound tissue characterization and quantitative imaging techniques. Prerequisite: BMS core curriculum and/or permission of BMS program director.
957-1 to 6 Computed Tomography
(Also listed as BME 732.) Principles of generating images from projections. Discussion of the various scanner geometries, mathematical reconstruction, correction procedures, and qualitative and quantitative evaluation of images. A major focus is the medical application of computed tomography. Prerequisite: BMS core curriculum and/or permission of BMS program director.

958-1 to 6 Nuclear Magnetic Resonance in Medicine
(Also listed as BME 733.) Principles of imaging and spectroscopy of nuclear magnetic resonance in their application to medicine. Topics include magnetization models, material encoding, spin interactions, localized spectroscopy, and relaxation. Prerequisite: BMS core curriculum and/or permission of BMS program director.

959-1 to 6 Processing of Medical Images
(Also listed as BME 734.) Digital image processing in its application to medical images. Topics include image display, filtering, two-dimensional Fourier transform, restoration, enhancement, and edge detection. Some simple tools from the field of mathematical morphology are introduced. Prerequisite: BMS core curriculum and/or permission of BMS program director.

960-1 to 6 Photon Emission Imaging
(Also listed as BME 735.) Principles of imaging procedures based on radioactive isotopes. Topics include radioactive isotopes, single-photon emission tomography, and positron-emission tomography. Instrumentation, image production, and major applications are covered. Prerequisite: BMS core curriculum and/or permission of BMS program director.

961-1 to 6 Neuromuscular Rehabilitation Engineering
(Also listed as BME 741.) Teaches students the design and application of neuromuscular assistive devices. Biomathematics modeling and control theory are emphasized. Prerequisite: BMS core curriculum and/or permission of BMS program director.

962-1 to 6 Rehabilitation Assistive Systems
(Also listed as BME 742.) Design and application of devices used in rehabilitation. Provides an understanding of the problems of disabled people and the variety of possible solutions to these problems. Prerequisite: BMS core curriculum and/or permission of BMS program director.

963-1 to 6 Application of Human Factors Engineering to Rehabilitation
(Also listed as HFE 743.) Teaches students application of human factors design concepts to the design of aids for the physically handicapped. In addition to aids for manipulation of locomotion, barrier-free designs are emphasized. Prerequisite: BMS core curriculum and/or permission of BMS program director.

964-3 Aerospace Medicine Human Factors
Designed for BMS students who are residents of the Aerospace Medicine Program. Seminar focuses on recent developments in human factors engineering. Addresses design principles, crew compartment technology and resource management, crew members performance and reliability. Prerequisite: BMS core and permission of program director.

966-3 Advanced Topics in Human-Computer Interaction
This graduate-level seminar exposes students to theoretical and research issues associated with human-computer interaction (HCI) and cognitive-oriented work from a human factors engineering standpoint. Prerequisite: BMS core.

990-1 to 3 Biomedical Sciences Seminar
(Also listed as P&B 808.) 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. Student presentations required.

991-1 to 15 Special Topics in Biomedical Sciences
Selected topics in biomedical sciences.

994-1 to 6 Introduction to Research
Introduces BMS students to the ongoing research activities within the five program tracks; involves presentations by BMS faculty. Graded pass/unsatisfactory.

995-1 to 15 Nondissertation Research
Supervised research other than laboratory rotations or dissertation research. May be taken for letter grade or pass/unsatisfactory.

996-1 to 15 Laboratory Rotation I
Independent study designed to develop proficiency in technology, instrumentation, research design, and data analysis in an area of concentration (advanced curriculum) different from a student's area of specialization.

997-1 to 15 Laboratory Rotation II
Independent study designed to develop proficiency in technology, instrumentation, research design, and data analysis in an area of concentration (advanced curriculum) different from a student's area of specialization.
998-1 to 15 Laboratory Rotation III
Independent study designed to develop proficiency in technology, instrumentation, research design, and data analysis in an area of concentration (advanced curriculum) different from a student's area of specialization.

999-1 to 15 Dissertation Research
Planning and execution of scholarly original research of a quality that is publishable in a refereed, scientific journal. Research must be communicated to the supervisory committee in written form and defended by public, oral examination.

Chemistry/CHM
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

512-3 Quantitative Analysis
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 123. 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

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
Principles and concepts of inorganic chemistry, including the periodic table, atomic structure, bonding, coordination compounds, and an introduction to group theory. Prerequisite: CHM 453 or permission of instructor.

551-3, 552-3, 553-3 Physical Chemistry
Theoretical aspects of chemistry including thermodynamics, chemical kinetics, molecular structure and spectra, and the structure of solids and liquids. Prerequisite: CHM 123, MTH 231, PHY 252 or permission of instructor.

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
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. Prerequisite: CHM 122.

588-1 to 3 Independent Reading

599-1 to 5 Special Problems in Chemistry

617-3 Applied Chemical Spectroscopy
Practical applications of various spectrophotometric techniques (mass spectroscopy, infrared spectroscopy, ultraviolet spectroscopy, and nuclear magnetic resonance) are integrated for the explanation of the structure of organic molecules. A problem-solving approach is used. Prerequisite: CHM 213, 312.

640-3, 641-3 Synthetic Medicinal Chemistry I, II
Various chemical aspects of drugs including the synthetic design, mode of action, and uses of various pharmaceuticals. Topics include cardiovascular agents, antibiotics, antitumor agents, and central nervous system drugs. Prerequisite: CHM 213.

643-3, 644-3 Chemical Toxicology I, II
Study of the basic principles of chemical toxicology. Chemicals that 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.

661-3 Synthetic Polymer Chemistry
(Also listed as BMS 726.) Step-growth and chain-growth polymerization in homogeneous and heterogeneous media; properties of commercial polymers. Prerequisite: CHM 213 or 561.
665-3 Physical Polymer Chemistry
(Also listed as 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.

667-1 to 2 Physical Polymer Chemistry Laboratory
(Also listed as BMS 727.) Laboratory illustrations of CHM 665 lecture material and techniques of polymer science. Corequisite: CHM 665.

669-4 Engineering Plastics: Materials, Processes, and Design
(Also listed as ME 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.

700-3 Principles of Instruction in Chemistry
Survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. For chemistry majors only.

720-3 Advanced Inorganic Chemistry I
(Also listed as BMS 733.) 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
(Also listed as BMS 734.) 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
(Also listed as BMS 735.) Survey of the applications of physical methods in the examination of inorganic compounds. Prerequisite: CHM 721 or equivalent, 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.

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.

740-3 Elements of Organic Reactions
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
Systematic treatment of organic reactions including, where applicable, some theoretical basis for the nature of the reaction. Emphasis on the uses of these reactions in organic synthesis. Prerequisite: CHM 740 or equivalent, or permission of instructor.

742-3 Structural Concepts in Organic Chemistry
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.

750-3 Introduction to Quantum Chemistry
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
(Also listed as BMS 736.) 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.

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.

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.
850-3 Quantum Chemistry
Principles and applications of quantum theory to chemical problems. Electronic structure of molecules and its correlation with the chemical and physical properties of substances. Prerequisite: CHM 750 or equivalent, or permission of instructor.

853-3 Group Theory
Introduction to group theory stressing its 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
(Also listed as BMS 738.) A selected topic in the field of physical chemistry such as molecular spectroscopy, advanced molecular structure, magnetic resonance, X-rays, crystal structure, statistical mechanics, and precision physical-chemical measurements.

899-1 to 18 Research
Research for the thesis.

Classics/CLS
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

530-4 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.

540-4 Studies in Ancient Art and Archaeology
(Also listed as ART 611.) Greece in the Bronze Age; classical Greece and Rome; and selected areas of Greek and Roman art and archaeology.

550-4 Studies in Ancient Culture and Society
Greek and Roman civilization with evidence from art, literature, archaeology, law, and other sources.

560-4 Studies in Ancient Mythology
Greek and Roman mythology; aspects and approaches to the study of myth; archaeological and nonliterary sources.

570-4 Studies in Law, Government, and Politics
Political problems of the ancient world; law and legal systems; and government and administration.

Communication/COM
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

611-4 Performance for the Media
Development of skills necessary for effective television and radio presentations. Study of criteria for selecting appropriate talent, and frequent practice in a wide range of media settings. Prerequisite: COM 111 or permission of instructor.

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.

639-4 Freedom of Speech
Study of the growth and development of free speech in the United States. Emphasis on the development of definitions of free speech and various communication strategies in different settings.

641-4 Advanced Interpersonal Communication
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 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.

645-4 Conference Leadership
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.

647-4 Organizational Communication
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.

649-4 Survey of Communication Research
Provides 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 447 or permission of instructor.

653-4 Communication and Conflict
In-depth study of the function of communication in conflict/crisis situations. Emphasis on the role that communication performs in conflict resolution in intrapersonal, interpersonal, group, and international situations.

654-4 Feature Story Writing
(Also listed as ENG 654.) 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.

657-4 Intercultural Communication
Study of communication in intercultural environments. Emphasis on research and theory to better understand the complexity of intercultural communication interactions.

658-4 Editing for the Media
(Also listed as ENG 658.) Editing of copy for mass media with emphasis on newspaper format, headline writing, rewriting, and general copy desk.

662-4 Mass Media Law and Regulation
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. Titles vary.

689-4 Communicating with the Elderly
Analysis of the unique communication behaviors of the elderly and the physical, social, and emotional changes that cause these behaviors. Development of interpersonal, interviewing, and reporting skills by direct interaction with this age group. 3 hours lecture, 1 hour off-campus interviewing.

691-1 Communication Techniques and Evaluation
Philosophy and techniques of conducting communication events. Includes the planning, initiating, and summarizing of communication activities, and evaluating written and oral performance.

741-4 Principles and Application of Communication Theory
Examines communication theory relevant to the role of the communication 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.

Community Health/CMH
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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. (Previously listed as CME 601.)

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. (Previously listed as CME 602.)

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; and introduction to demographic measurements. (Previously listed as CME 621.)
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 prepare research protocol on a given specific problem. Prerequisite: CME 621. (Previously listed as CME 622.)

641-3 Environmental Medicine I
Interaction of humans with special environments. Section one is an intensive study of respiration, the cardiovascular system, and the physics and physiology of gaseous environments. (Previously listed as CME 641.)

642-3 Environmental Medicine II
Interaction of humans 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. (Previously listed as CME 642.)

643-3 Environmental Medicine III
Interaction of humans 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. (Previously listed as CME 643.)

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. (Previously listed as CME 651.)

652-2 Aerospace Medicine II
Covers civil pilot medical case histories 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. M.D. degree required. May be taken for letter grade or pass/unsatisfactory. Prerequisite: CME 651. (Previously listed as CME 652.)

654-2 Introduction to Community Medicine
Familiarization with activities and services encompassed by community medicine, including public health, preventive medicine, prospective medicine, occupational medicine, geriatric health, handicapped services, and health promotion. May be taken for letter grade or pass/unsatisfactory. (Previously listed as CME 654.)

655-3 Introduction to Hyperbaric Medicine
Mechanisms of hyperbaric oxygen therapy, equipment, safety considerations, and limitations. 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 of pass/unsatisfactory. (Previously listed as CME 655.)

666-4 Clinical Aerospace Medicine
Introduction to and familiarization with clinical activities and operational experiences in aeromedical services such as flight medicine, occupational medicine, environmental health, bioenvironmental surveillance, and physiological training. May be taken for letter grade or pass/unsatisfactory. (Previously listed as CME 666.)

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. degree required. (Previously listed as CME 671.)

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. degree required. (Previously listed as CME 672.)

701-3 Special Topics in Community Medicine (Aerospace)
Provides the philosophy underlying each major aerospace medicine standard. It also explores the aerospace medical factors that convert safe flight into hazardous flight. M.D. degree and departmental approval required. (Previously listed as CME 701.)

711-3 Special Seminars in Aerospace Medicine
Participants discuss the influence and value of aerospace medicine on an international basis in light of new and proposed aeromedical technological developments. (Previously listed as CME 711.)

721-3 Aeromedical Concerns of the Operational Flight Environment
Builds on the basics of the aeromedical concerns to advance the understanding of the relevant aeromedical aspects related to the operational flight environment. Practical experiences in the hypobaric chamber, acceleration, and life support facilities supplement course work.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>731-3</td>
<td>Health Services Administration</td>
<td>(Also listed as 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. (Previously listed as CME 731.)</td>
</tr>
<tr>
<td>899-3</td>
<td>Aerospace Medical Research</td>
<td>Under supervision of an advisor, students choose research problems, prepare bibliographical searches, plan experimental protocol, and conduct experimentation. A full report, constituting a thesis, is written and defended before a graduate committee. (Previously listed as CME 899.)</td>
</tr>
<tr>
<td></td>
<td>Computer Engineering/CEG</td>
<td>Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information. CS/CEG 500-level courses, CS 600, and CEG 633 are considered background for entering students and are not counted in the 45 credit hours required for the degree.</td>
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<tr>
<td>505-4</td>
<td>Introduction to Expert Systems</td>
<td>Covers definitions of AI, discusses the different technologies that comprise the field, introduces the fundamental concepts and methodologies of expert systems, and provides hands-on experience developing small expert system applications. Prerequisite: CS 141 or 220 or 240 or EGR 153.</td>
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<tr>
<td>520-4</td>
<td>Computer Organization and Assembly Language Programming</td>
<td>Terminology and understanding of functional organizations and sequential operation of a digital computer. Program structure, and machine and assembly language topics including addressing, stacks, argument passing, arithmetic operations, traps, and input/output. Macros, modularization, linkers, and debuggers are used. 3 hours lecture, 2 hours lab. Prerequisite: CS 242, CEG 260.</td>
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<tr>
<td>560-4</td>
<td>Digital System Design</td>
<td>(Also listed as EE 651.) 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.</td>
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<tr>
<td></td>
<td>602-4 Introduction to Computer Communication Design</td>
<td>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 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.</td>
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<tr>
<td></td>
<td>611-4 Microprocessor-Based System Design</td>
<td>Introduces the design and development of software and computer interfacing hardware for effective use of microprocessors in process control, data collecting, and other special purpose computing systems. Software topics include assembly language programming, input/output, interrupts, direct memory access, and timing problems. 3 hours lecture, 2 hours lab. Prerequisite: CEG 260/EE 260, EE 501, 502.</td>
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<tr>
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<td>616-4 Matrix Computations</td>
<td>(Also listed as MTH 616.) Survey of numerical methods in linear algebra emphasizing practice with high-level computer tools. Topics include Gaussian elimination, LU decomposition, numerical eigenvalue problems, QR factorization, least squares, signal value decompositions, and iterative methods. Prerequisite: MTH 253 or 355; and CS 142 or 241.</td>
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<tr>
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<td>621-4 Microcomputer Design Projects</td>
<td>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 520, 560.</td>
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<tr>
<td></td>
<td>628-4 Linear Optical Systems for Computer Engineers</td>
<td>Introduction to linear optical systems, transformation properties of optical systems, correlation, convolution, diffraction, applications related to optical computers, such as beam steering for optical interconnection and parallel optical algorithm for pattern search, neural network. Prerequisite: EE 522.</td>
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</tbody>
</table>
633-4 Operating Systems
Management of resources in multi-user computer systems. Emphasis is on problems of file-system design, process scheduling, memory allocation, protection, and tools needed for solutions. Course projects use the C language and include the design of portions of an operating system. 3 hours lecture, 2 hours lab. Prerequisite: CEG 520, CS 600. Knowledge of C language useful.

634-4 Concurrent Software Design
Classical problems of synchronization and concurrency and their solutions are examined through course projects and through readings on operating system design. 3 hours lecture, 2 hours lab. Prerequisite: CEG 633.

652-4 Standard Cell VLSI Design Techniques
(Also listed as EE 652.) Standard cell VLSI design techniques. Topics include introduction to VLSI, MOS transistors, CMOS logic circuits, standard cell libraries, cell usage, schematic capture and simulation, circuit testing, and test program generation. Prerequisite: CEG 560/EE 651, EE 631, 634.

653-4 Design of Computing Systems
Projects in the laboratory that 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 520, 560.

654-4 VLSI Design
(Also listed as EE 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/EE 651, EE 631, 634.

660-4 Introduction to Software Engineering
Concepts of software engineering including analysis, design, and implementation of software engineering concepts that comprise structured programming and design. Case studies serve as examples illustrating the software life-cycle model. Prerequisite: CS 600 and (680 or 340).

676-4 Computer Graphics
Principles for the design, use, and understanding of computer graphics systems. Covers basic drawing techniques, line and polygon clipping, two- and three-dimensional transformations, segmentation, projections, and three-dimensional viewing. Graphics standards (GKS and PHIGS) and hardware are discussed. Students create a menu-driven, interactive graphics package capable of generalized three-dimensional viewing. 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. May be taken for letter grade or pass/unsatisfactory.

700-3 Principles of Instruction in Computer Engineering
Survey of available instructional materials and discussions of educational theory and techniques leading to more effective instruction. For graduate teaching assistants only.

720-4 Computer Architecture
Review of sequential computer architecture and study of parallel computers. Topics include memory hierarchy, reduced instruction set computer, pipeline processing, multiprocessors, various parallel computers, interconnection networks, and fault-tolerant computing. 3 hours lecture, 2 hours lab. Prerequisite: CEG 560, 634.

721-4 Computer Architecture II
Continuation of CEG 720 with a more detailed study of lecture and a research paper. 3 hours lecture, 2 hours lab. Prerequisite: CEG 720.
724-4 Computer Vision
Introduction to basic computer vision techniques including image formation, camera geometry, feature extraction, shape analysis, various shape from techniques, depth measurement, and motion analysis. Prerequisite: CS 600, MTH 230, 253.

728-4 Introduction to Optical Computing
Introduction to optical computing algorithms and architecture, optical logic, optical computing modules, optical CPU's, memory, interconnection, and optical devices. Prerequisite: CEG 628 or EE 522.

750-4 Microprocessors
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
(Also listed as EE 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 EE 710.

753-4 VLSI II
(Also listed as EE 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.

754-4 VLSI III
(Also listed as EE 754.) Design for testability of VLSI circuits. Topics include importance of testing, conventional test methods, built-in test, CAD tools for evaluation testability, test pattern generators, and compressors. Prerequisite: CEG/EE 753.

756-4 Robotics I
(Also listed as EE 756 and ME 756.) Detailed study of the dynamics and control of robotic systems and robot programming languages and systems. Material covered includes rigid-body dynamics, linear, nonlinear, adaptive, and force control of manipulators; and robot programming languages. Prerequisite: CEG 656.

758-4 CMOS Analog Integrated Circuit Design
(Also listed as EE 758.) Introduction to techniques, limitations, and problems in the design of CMOS analog integrated circuits. Topics include CMOS analog circuit modeling and device characterization, analog CMOS subcircuits, CMOS amplifiers, comparators, CMOS Op Amps. 3 hours lecture, 2 hours lab. Prerequisite: EE 631 and 634.

759-4 Artificial Intelligence in Robotics
Introduction to robot intelligence and task planning. Material includes obstacle avoidance, robot planning, robotics computations, neural network computing, robot learning, and expert systems. Prerequisite: CS 600.

760-4 Software Engineering I
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: CEG 660.

761-4 Software Engineering II
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.

763-4 Formal Methods in Software Engineering
Introduction to formal methods in the specification, design, construction, and verification of software systems. Discrete mathematics and logic for software engineering. Formal specification and design methods; design specification languages. Prerequisite: CEG 760.

765-4 Foundations of Neurocomputing
Information processing in neural networks as a mode of computation complementary to symbolic artificial intelligence, emphasizing common ideas across different network architectures. Current applications in machine learning and spatiotemporal pattern recognition will be evaluated. CS 710 recommended. Prerequisite: MTH 232, 253, CS 600.
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. Titles vary.

795-1 to 4 Independent Study
Special problems in advanced computer engineering topics. May be taken for letter grade or pass/unsatisfactory.

799-1 to 8 Thesis
May be taken for letter grade or pass/unsatisfactory.

890-1 to 4 Selected Topics
Selected topics in computer science and engineering.

891-1 Ph.D. Seminar
Registration in the Ph.D. seminar is required of all students seeking the Ph.D. in computer science and engineering. Graded pass/unsatisfactory.

892-12 General Exams
Examination that tests understanding of the fundamentals necessary to begin concentrated study in a chosen Ph.D. research area. Composed of written tests and an oral exam. Must be passed within two attempts. Graded pass/unsatisfactory.

894-1 Candidacy Exam
Examination that tests for depth and understanding in a chosen computer science and computer engineering research area. Includes a written proposal for a Ph.D. topic and an oral examination that is open to the public. Graded pass/unsatisfactory.

895-1 to 8 Independent Study
Independent study in a chosen area for Ph.D. research. May be taken for letter grade or pass/unsatisfactory.

896-1 Dissertation Defense
Examination on the Ph.D. dissertation. The written dissertation is submitted and must be successfully defended in the oral exam conducted by the dissertation committee. Graded pass/unsatisfactory.

897-12 Residency Research

898-1 to 12 Dissertation Research

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Computer Science/Courses

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

CS/CEG 500-level courses, CS 600, and CEG 633 are considered background for entering students and are not counted in the 48 credit hours required for the degree.

516-4, 517-4 Numerical Methods for Digital Computers
(Also listed as MTH 516, 517.) 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 EGR 153; MTH 231, 253 or 355; 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 242, MTH 253, 257.

605-4 Introduction of Database Management Systems
Survey of logical and physical aspects of database management systems. Hierarchical, network, and relational models of a database are presented. Physical implementation methods are discussed. Students are given experience creating and manipulating a database. Students must show ability to apply the concepts to the design of database systems. 3 hours lecture, 2 hours lab. Prerequisite: CS 242, MTH 253, 257.

607-3 Optimization Techniques
(Also listed as MTH 607.) Concepts of minima and maxima; linear programming; simplex method; duality; transportation and assignment problems, dynamic programming. Prerequisite: MTH 233, 253 or 355.

610-4 Theoretical Foundations of Computing
(Also listed as MTH 610.) Turing machines; μ-recursive functions; equivalence of computing paradigms; Church-Turing thesis; undecidability; intractability. 3 hours lecture, 2 hours lab. Prerequisite: CS 666.
619-3 Cryptography and Data Security
(Also listed as MTH 619.) Introduction to the mathematical principles of data security. Various developments in cryptography are discussed, including public-key encryption, digital signatures, the data encryption standard (DES), key safeguarding schemes. Prerequisite: MTH 253 or 355.

658-3 Applied Graph Theory
(Also listed as 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.

659-3 Combinatorial Tools for Computer Science
(Also listed as MTH 659.) Introduction to some of the mathematical tools needed for understanding computer programming. Topics include summations, elementary number theory, combinatorial identities, generating functions, and asymptotics. Prerequisite: MTH 280; MTH 457 recommended.

666-4 Introduction to Formal Language
Introduction to the theory of formal languages and automata. Emphasis is on those classes of languages commonly encountered by computer scientists, such as regular and context-free languages. 3 hours lecture, 2 hours lab. Prerequisite: CS 600, MTH 257; 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.

682-4 Scanning, Parsing, and Semantic Analysis
Study and use of tools for performing lexical, syntactic, and semantic analysis of computer-oriented languages. Prerequisite: CS 666, 680.

699-1 to 5 Selected Topics
Study of selected topics in computer science. Titles vary. May be taken for a letter grade or pass/unsatisfactory.

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. For graduate teaching assistants in the Department of Computer Science only.

701-4 Database Systems and 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 Database Systems and Design II
Continuation of CS 701, with emphasis on relational databases 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 (AI) 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, (CS 340—LISP or LISP programming experience).

711-4 Artificial Intelligence II
Follow-up course to CS 710 covering recent artificial intelligence projects in a variety of areas. Material is taken from reports and journal articles and is presented by students as well as by the instructor. 3 hours lecture, 2 hours lab. Prerequisite: CS 710, (CS 340—LISP or LISP programming experience).

712-4 Artificial Intelligence III
Artificial intelligence programming techniques including 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, (CS 340—LISP or LISP programming experience).

714-4 Machine Learning I
Reviews the development of machine learning paradigms. Introductory topics include parameter adjustment methods, signature tables, and the application of genetic algorithms to artificial intelligence problem domains. Prerequisite: CS 710.
716-4 Numerical Analysis I: Applied Linear Algebra
(Also listed as MTH 716.) Topics chosen with emphasis on computational linear algebra. Systems of linear equations and Gaussian elimination; computation of eigenvalues and eigenvectors; matrix exponential; norm and condition number; and iterative methods. Prerequisite: CS 142, MTH 355 (or knowledge of a higher-level language).

717-4 Numerical Analysis II: Finite Difference Methods for Partial Differential Equations
(Also listed as MTH 717.) Finite difference methods for partial differential equations; analysis of stability and convergence. Prerequisite: CS 716, MTH 333, 431.

718-4 Numerical Analysis III: Finite Element Methods for Partial Differential Equations
(Also listed as MTH 718.) Finite element methods for elliptic boundary value problems; analysis of errors: approximation by finite element spaces; effects of curved boundaries, numerical integration; finite element methods for parabolic problems. Prerequisite: CS 716, MTH 333, 431.

730-4 Systems Programming I
Study of multiprocess computer systems. Issues such as interprocess communication, synchronization, resource management, and reliability are studied. Emphasis on current literature on models of distributed computation. 3 hours lecture, 2 hours lab. Prerequisite: CEG 634.

731-4 Systems Programming II
Continuation of CS 730. Current research in distributed computing. Implementations of distributed operating systems are studied through readings and course projects. 3 hours lecture, 2 hours lab. Prerequisite: CS 730.

735-4 Evaluation and Prediction of System Performance
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. Completion of a statistics course required. Prerequisite: CS 670, CEG 633.

740-4 Algorithms, Complexity, and Theory of Computation I
Time complexity analysis of algorithms; computational complexity; NP completeness. 3 hours lecture, 2 hours lab. Prerequisite: CS 610, 666.

741-4 Algorithms, Complexity, and Theory of Computation II
Continuation of CS 610, 666, and 740. Covers advanced topics taken from formal language theory, predicate calculus, algorithm analysis, and complexity theory. 3 hours lecture, 2 hours lab. Prerequisite: CS 740.

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, 710.

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.

776-4 Functional Programming
In-depth look at functional programming techniques, and functional languages and their implementation. Prerequisite: CS 680.

780-4 Compiler Design and Construction
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
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: CS 680.
785-4 Programming Languages II
Continuation of CS 784. Emphasis on 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.

795-1 to 4 Independent Study
Special problems in advanced computer science topics. May be taken for letter grade or pass/unsatisfactory.

799-1 to 8 Thesis
May be taken for letter grade or pass/unsatisfactory.

890-1 to 4 Selected Topics
Selected topics in computer science and engineering.

891-1 Ph.D. Seminar
Registration in the Ph.D. seminar is required of all students seeking the Ph.D. in computer science and engineering. Graded pass/unsatisfactory.

892-12 General Exams
Examination that tests understanding of the fundamentals necessary to begin concentrated study in chosen Ph.D. research area. Composed of written tests and an oral exam. Must be passed within two attempts. Graded pass/unsatisfactory.

894-1 Candidacy Exam
Examination that tests for depth of understanding in a chosen computer science and computer engineering research area. Includes a written proposal for a Ph.D. topic and an oral examination, that is open to the public. Graded pass/unsatisfactory.

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Independent study in a chosen area for Ph.D. research. May be taken for letter grade or pass/unsatisfactory.

896-1 Dissertation Defense
Examination on the Ph.D. dissertation. The written dissertation is submitted and must be successfully defended in the oral exam conducted by the dissertation committee. Graded pass/unsatisfactory.

897-12 Residency Research

898-1 to 12 Dissertation Research

Counseling/CNL
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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 on student functioning. Family, school, and other social-psychological environments are studied in terms of their effect on 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 students 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. Pre- or corequisite: RHB 701.

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 and titles vary.

700-4 Introduction to Student Personnel Services in Higher Education
Overview of the history, philosophy, organization, and structure of student personnel services. Various student affairs functions, current and future trends, and issues in student affairs are considered.

751-3 Counseling Skills for Educators
Assists teachers in developing an understanding of the counseling needs of children. Teachers develop counseling skills needed to assist students in the classroom. Appropriate referrals to other school professionals are discussed.
755-4 Campus Ecology
Studies of campus ecology and the changing demography and developmental issues facing college students. Studies the impact of the college environment on student development and student interaction on the environment.

761-4 Psychometrics
Surveys psychological tests and measurements with emphasis on attitude, interest, and personality tests. Understanding of basic principles and their applications to counseling are stressed. Prerequisite: EDL 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 on this process. Prerequisite: RHB 701.

763-4 Theories of Counseling
Investigation of the theoretical models that are basic to counseling function and practice as applied to the therapeutic situation.

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, that counselors should be familiar with. An analysis of the referral process and the methods of interagency cooperation.

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.

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.

768-3 Community Resources in Counseling and Guidance
Surveys social agencies, both public and private, that counselors should be familiar with. 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.

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. Graded pass/unsatisfactory.

773-4 Mental Health II
Acquaints students with preventive mental health, advocacy roles, legal and ethical issues, and interdisciplinary approaches to community mental health.

778-4 Techniques of Play Therapy
Investigation of the techniques of play therapy for children ages 3 to 12. 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.

780-4 Systems Theory and Family Counseling
Introduces family systems counseling. Covers three interacting components: systems theory, Buckley's sociocultural analysis of systems theory, and the application of a systems analysis to the major views of family counseling. Prerequisite: RHB 701, CNL 779, 863 or permission of instructor.
781-4 Advanced Techniques of Family Counseling
Advanced technique and intervention course that focuses on family systems interventions. Emphasis on applications of family counseling, providing in-depth treatment of the major approaches to family counseling. Prerequisite: RHB 701, CNL 779, 780, 863 or permission of instructor.

782-4 Techniques of Marital Counseling
In-depth overview of marital counseling. Focuses on techniques and interventions that emphasize the application of the major schools of marital counseling. Course is experientially and performance focused; student participation is encouraged and expected in a variety of role-playing situations. Prerequisite: CNL 779, 780, RHB 701, CNL 863 or permission of instructor.

829-5 Internship in School Psychology
Supervised field practice in school psychology.

854-4 Intellectual Assessment for School Psychologists
Introduction to theoretical aspects of individual intelligence testing. Supervised clinical practice in the administration of the Stanford-Binet-R and the Wechsler intelligence scales. For school psychology majors only.

855-4 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 majors only. Prerequisite: CNL 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 majors only. Prerequisite: CNL 854.

857-4 Practicum in School Psychology
Application of assessment, consultation, and team planning skills in a school setting under the supervision of a certified school psychologist.

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. Graded pass/unsatisfactory. Prerequisite: permission of instructor.

863-4 Techniques of Counseling
Laboratory practice in individual counseling techniques; focuses on the development of basic skills and procedures. Prerequisite: RHB 701.

864-1 to 4 Practicum I: Individual
Provides an experience in counseling and guidance in which students, under supervision, actually counsel individuals in educational, vocational, and personal areas. Graded pass/unsatisfactory. Prerequisite: CNL 863.

865-4 Individual Practicum
Provides an experience in counseling and guidance in which students, under supervision, actually counsel individuals in educational, vocational, and personal areas. Graded pass/unsatisfactory. Prerequisite: CNL 863.

866-4 Advanced Individual and Group Practicum
Provides an experience in counseling and guidance in which students, under supervision, actually counsel individuals and groups in educational, vocational, and personal areas. Graded pass/unsatisfactory. Prerequisite: CNL 865, 866 or RHB 801, 802 or permission of instructor.

867-1 to 12 Internship
This field-based experience provides human services master's degree students with advanced clinical practice and supervision in their major specialty areas. Graded pass/unsatisfactory. Prerequisite: RHB 701; EDL 751, 869; CNL 700, 755, 667, 762.
880-4 Process Consultation in Student Personnel in Higher Education
Studies theories, models, and process techniques for collaborative consultation with other university personnel, student organizations, and community agencies. Focuses on a systems approach of consultative interaction and collaborative relationships that foster college students' development. Prerequisite: CNL 700, 863, 870; EDL 869.

950-4 Personality Theory and Psychopathology
Focuses on the development of personality throughout the lifespan and associated difficulties that can occur for individuals. Additional emphasis will be given to adaptation and the coping process. Prerequisite: Master's degree in counseling.

951-4 Clinical Assessment in Counseling Practice
Supervised clinical practice in the administration of mental health assessment instruments. Emphasizes advanced methods of administering and interpreting standardized tests. Includes use of assessment procedures in diagnosis and treatment planning. Prerequisite: Master's degree in counseling.

952-4 Diagnosis and Clinical Counseling Practice
Clinical course designed to introduce students to comprehensive diagnostic evaluation. Students gain familiarity with the Current Diagnostic and Statistical Manual and International Classification of Disease via lecture as well as case formulations. Prerequisite: Master's degree in counseling.

953-4 Case Formulation and Clinical Intervention
Focuses on treatment planning for clients. A variety of different treatment approaches will be discussed for DSM III-R disorders, syndromes, and other client problems. Prerequisite: Master's degree in counseling.

954-1 to 6 Internship: Advanced Clinical Counseling
This field-based experience provides practicing master's level counselors with the opportunity for supervised advanced clinical counseling practice. Prerequisite: Master's degree in counseling.

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. Topics might include professional ethics and responsibilities, crisis intervention and human sexuality. Topics vary.

961-3 Counseling the Gifted
Overviews the special social/emotional needs of gifted children and youth. Focuses 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 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, EDL 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 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 863; RHB 701.

Economic Education, Center for ECO
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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. Emphasis on those household roles (consumer/producer/citizen) that are teachable in the K-12 classroom. May be taken for letter grade or pass/unsatisfactory.

511-3 Principles of Economics for Teachers I
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.

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.
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
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
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
Financial planning and the family, with emphasis on aspects teachable in the K-12 classroom. May be taken for letter grade or pass/unsatisfactory.

Economics/EC
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

621-3, 622-3 Graduate Survey in Principles of Economics
Basic micro- and macroeconomics theory designed for persons having had no previous work in economics.

Economics 621 and 622 are prerequisites for the following courses. Additional requirements are indicated for each course.

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.

610-3 Introduction to Mathematical Economics
Application of mathematical tools in the formulation of economic theory. Methods used in model construction.

612-3 Forecasting Economic Activities
Techniques and theories used in forecasting. Practical methods and problems are stressed.

630-3 Economics of Health Care Services: A Survey
Explores problems with the current health care delivery system, and examines the political and economic factors responsible for the evolution of the health care system.

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.

635-3 Comparative Economic Systems
Comparison of the chief characteristics of capitalism, communism, socialism, and fascism to clarify the economic process in a free-enterprise society.

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
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.

709-3 Applied Econometrics
Application of economic theory, mathematical modeling, and statistics to the measurement and forecasting of economic relationships. Emphasis is on specification, estimation, and hypothesis testing. Prerequisite: MS 715. (Previously listed as EC 609.)

715-3 Applied Microeconomics
Emphasis on advanced microeconomics applications in consumption/work decisions of households. Production/pricing strategies of firms, and public policy toward businesses. Special attention paid to the roles of labor unions/not-for-profit firms.

717-3 Applied Macroeconomics
Emphasis is on modern views on fiscal and monetary policy in an open economy. Interrelationships between interest rates, unemployment, economic growth, inflation, and balance of payments are highlighted.
721-3 Contemporary Political Economy
Explores the influence of social and political factors on economic outcomes and contemporary economic policy.

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.

730-3 Regional and Urban Economics
Analysis of the basic forces that shape the economic, social, and physical environments of urban and nonurban regions. Emphasis on regional income determination and developmental models, location of economic activity, the structure of urban centers, intra-urban economic relationships, and economic policy.

740-3 Cost-Benefit Analysis and Social Project Evaluation
Measurement of benefits and costs of both public and private projects with significant public implications. Includes conceptual issues and focuses on practical application, including specific cost-benefit studies. Prerequisite: EC 715, MS 715, or permission of instructor.

755-3 The Economics of Health and Health Policy
Teaches students how alternative incentive systems and resource allocations affect the health services sector. Emphasis on current institutional arrangements, empirical studies, and policy alternatives. Prerequisite: EC 621 or permission of instructor.

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.

777-3 Economic Studies
An examination of special issues.

780-3 Economic Problems Seminars
Titles vary. Six hours of seminar must be selected from the following topics: economics of the workforce; regional and urban problems; environmental issues; technological change; economic development; economics of poverty; and income maintenance. Completion of introductory statistics course or equivalent 600-level survey course required. Prerequisite: EC 715, 717, or permission of instructor.

781-2 to 4, 782-2 to 4, 783-2 to 4 Research in Economics
Titles vary. Intensive reading or research in selected fields of advanced economics.

785-12 Internship
Titles vary. One-quarter internship working in a selected private, social, or governmental organization under the direction of a faculty advisor and work supervisor. Graded pass/unsatisfactory. (Previously listed as EC 760.)

Education/ED
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

603-3 to 4 Child Development
Factors that influence growth and development.

604-3 Adolescent Development
Examination of the period in the sequence of development known as adolescence, with emphasis on 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
Current trends and theories in education, and the development of criteria and procedures for their evaluation and implementation.

615-3 Improvement of Elementary Reading Instruction
Curriculum, methods, materials, and evaluation in reading designed to improve the teacher's instructional skills.

617-3 to 4 Elementary School Social Studies: Curriculum and Materials
Objectives, principles, and trends in elementary social studies education. Prerequisite: ED 704 or permission of instructor.

618-3 to 4 Problem Solving in School Mathematics
Prepares teachers of mathematics in grades K–8 to teach problem solving as a basic mathematical skill. Emphasis on the teaching/learning of a variety of problem solving heuristics, applying problem solving strategies, and the use of both routine and nonroutine in school mathematics.

620-2 to 4 Studies in English Education
(Also listed as ENG 685.) Focuses on theoretical issues and practical problems of teaching English at all levels, including the teaching of writing and the teaching of English to speakers of other languages (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. 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. Course covers teaching methods, class organization, production of plays, and co-curricular activities. Prerequisite: ED 663 or equivalent.

625-3 Modern Foreign Languages: Curriculum and Materials
The modern language curriculum in the public schools; purposes, methods, materials. Prerequisite: ED 663 or equivalent.

630-3 Teaching about Religion in the Public Schools
Introduction to the historical background and court decisions pertaining to teaching about religion in the public schools, current ways that religion is taught in the public schools, and new experimental approaches to teaching about religion.

632-3 Improving Reading in Secondary Schools
Surveys the teaching of reading in American secondary schools including the skills necessary to teach reading in the content subjects. Not open to reading majors.

635-3 Business Education Curriculum and Materials: Shorthand, Transcription, and Secretarial Procedures
Curriculum, methods, and materials in teaching shorthand, transcription, and secretarial procedures. Prerequisite: ED 312; OA 213. 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 on structural properties of number and numeration system studies at this level. Prerequisite: MTH 243 or equivalent.

638-3 Secondary School Mathematics: Curriculum and Materials
Curriculum, methods, and materials in mathematics for grades 7–12. Prerequisite: ED 701, 704, 710, or equivalent.

639-3 Secondary School Social Studies: Curriculum and Materials
Objectives, principles, and trends in secondary social studies education. Prerequisite: ED 704.

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
In-depth analysis of new social studies resource materials and curriculum modes with emphasis on improving instruction. Completion of a social studies methods course required.

650-3 Computer Science: Curriculum and Materials
Prepares teachers to teach computer science in a precollege setting. Curriculum, teaching methodology, and the computing teacher's role in computer science, grades K–12. Prerequisite: ED 214, 216, 218, 220 or equivalent; ED 302 and 327.

658-1 to 9 Practicum in Education
Supervised teaching experience for students who have completed student teaching or its equivalent and are seeking certification in another field. Titles vary.

660-1 to 4 Practicum in English Education
Students are assigned to an instructional class that focuses on the teaching of English to speakers of other languages (TESOL) for supervised practicum experience. Graded pass/unsatisfactory. Prerequisite: ED 620.

662-6 Studies in the Psychological Foundations of Education
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.

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.

664-3 to 4 Evaluation
Evaluation of learning, including selected forms of measurement and interpretation of data: sociometric techniques, anecdotal records, and testing.

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.
666-3 Introduction to Schooling
The organization and function of schools, legal and financial aspects of schooling, and the rights and responsibilities of those involved in the educational process.

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.

670-1 to 6 Curriculum and Instruction Workshop
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. Titles vary.

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. For first-year graduate assistants only.

701-3 Advanced Educational Psychology
Selected theories of learning and the relationship between the theories and instructional practice. Completion of graduate core courses required.

702-3 Social Foundations of Education
Relationship between public education in a democracy and the critical social issues and social forces.

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.

704-4 Introduction to Foundations of Education
The past and present social, philosophical, and psychological trends and issues in education in a democratic society.

708-3 Comparative Education
Analysis of educational systems as related to the values and cultures of selected countries.

710-4 Teaching Strategies in Cultural Diverse Settings
Focuses on curricula, materials, strategies, and techniques for instructing learners with cultural, social, economic, and intellectual differences.

711-3 Foundations of International Education
Factors influencing educational systems and practices throughout the world.

716-3 Foundations of Reading Instruction
Development of effective reading instruction based on children's language acquisition and development.

718-3 Curriculum and Instruction in Elementary School Mathematics
Analysis of the current curriculum, techniques of instructional improvement, and classroom management strategies. Prerequisite: ED 618 or equivalent.

719-3 Supervision of Student Teachers
Principles and methods of supervision, including observation, analysis, and guidance. For in-service elementary and secondary teachers who wish to prepare themselves for the responsibilities of cooperating teachers in the university student-teaching program.

721-3 Literature for Elementary Children
Extension and enrichment of knowledge of children's books. Introduction to research and scholarly and critical writing about children's literature in relation to classroom practices. Application of research and criticism ideas; exploration of internationalism in children's literature.

731-3 Secondary School Science: Curriculum and Materials
Curriculum and materials for teaching science. Emphasis on objectives, evaluation, planning, resources and facilities, and curricular trends in science education. Field/clinical experiences required. (Previously listed as ED 631.)

732-3 Principles and Practices of the Middle School
The historical and underlying philosophy of the middle school concept based on the nature of the students. Current and future instructional and curricular practices are viewed in relation to this philosophy.

736-3 History of Books for Children and Young People
International children's literature, primarily from the eighteenth century to the twentieth century.

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. Completion of education core courses required.

738-3 Supervision of Secondary School Mathematics
Analysis of curriculum, materials, techniques of instruction, and classroom management strategies to improve mathematics programs of secondary schools.
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. Titles vary.

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.

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.

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.

769-3 Content Reading Instruction Grades 4–12
Identifies differences between fiction and non-fiction reading. Provides a general model for content reading lessons and a wide range of activities for involving students in content learning. Includes attention to vocabulary/concept development and critical reading. Prerequisite: ED 716 or permission of instructor.

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.

810-3 Seminar in Elementary Education
Special areas or problems in elementary education. Topics vary.

815-3 Teaching Children to Write
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 Whole Language: Theory and Classroom Strategies
Focuses on theory and experiences of whole language and language in use in classrooms. Prerequisite: ED 716, 721, or EDT 763, or equivalent.

817-3 Organization and Supervision of the Reading Program
Principles, methods, and techniques of giving leadership in improving the reading program. Emphasis on problems involved in initiating and sustaining change. 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.

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.

899-1 to 9 Thesis
Research for thesis in education. Prerequisite: EDL 752 or permission of advisor.

Education—Early Childhood Education/EDE
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

613-3 Inductive Geometry in the Elementary School
Prepares elementary school teachers to teach geometrical concepts included in today's K–6 mathematics program. Emphasis on informal approach to teaching the use of experimentation, intuition, and guided discovery. Prerequisite: ED 704.

670-1 to 4 Workshop in Early Education
Intensive practical study in a selected area of early education. May be taken for letter grade or pass/unsatisfactory.

712-4 Advanced Study of Child Development
Focuses on childbirth to eight years with emphasis on genetic and environmental factors that underlie physical, cognitive, and social/emotional development. Observational studies required as part of field placement. Field placement required.
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**720-4 Advanced Curriculum Planning I: Integrating Literacy and the Expressive Arts**
Detailed definition of the concept of developmentally appropriate practice applied to educational settings for children ages three through eight. Focuses on applying the concept of planning for literacy using an integrated curriculum with expressive arts—visual art, poetry, music, and creative movement. Field experience required. Prerequisite: EDE 712.

**721-4 Advanced Program Planning II: Integrating Math and Science**
Continued examination of developmentally appropriate curriculum for children ages three through eight. Integrated planning for cognitive concepts including number, representation, visual/spatial skills, classification, logical thinking, and problem solving. Field experience required. Prerequisite: EDE 712, 730, or permission of instructor.

**730-4 Developmentally Appropriate Assessment in ECE**
Examination of the types and uses of assessment in early childhood. Experience in administering appropriate assessment in the field. Discusses current issues in testing relevant to early childhood. Field experience required.

**735-4 Individuality in ECE Classrooms**
Examination of the sources of individual differences within the early childhood classroom including culture/ethnicity, race, language, learning style, and brain dominance. Field experience required.

**744-4 Current Issues in ECE**
Examination of issues currently affecting the practice of early childhood education. Examines sociological and educational trends that have important implications for teachers and administrators of programs for children. Knowledge of opposing viewpoints and research that supports those views will be examined. Develops proficiency needed to support students' advocacy for programs that positively affect children. Prerequisite: EDE 712.

**745-3-6 Current Topics in Early Childhood Education**
Intensive study in current curricular, educational, and societal concerns. Suggested topics may include updates in ECE funding and legislation, comparative studies of ECE in United States and foreign countries, and maintaining classroom control with young children.

**750-2 Administering Early Childhood Programs**
Examines roles of the administrator, including hiring, staff training, staff evaluation, program evaluation, achieving program accreditation, program planning, marketing, budgeting. Meets weekly for the first half of the quarter. EDE 751 will meet weekly for the second half. Corequisite: EDE 751.

**751-2 Working with Parents of Young Children**
Attention given to the sociological factors that affect parent involvement with children and the potential role that preschools and public schools might have on that involvement. Examines strategies for increasing involvement. Students develop a plan for increasing parent involvement in a given setting. EDE 750 meets weekly for the first half of the quarter. EDE 751 meets weekly for the second half. Corequisite: EDE 750.

**760-1-6 Practicum in Pre-Kindergarten/Kindergarten**
Supervised teaching experience for students who have completed student teaching or its equivalent and are seeking certification in pre-kindergarten or kindergarten. Number of years experience with children ages 3-8 in educational settings determines credit hours required. Prerequisite: 12 hours of EDE courses and EDL 751.

**770-1-6 Independent Reading and Minor Problems**
Planned reading and/or project under guidance of an EDE faculty member. Titles vary.

**809-2 Seminar I**
Orients students to the use of various indices, resources, and the APA Style manual. Instructors mentor the selection of independent study projects required for master's degree comprehensive exams and the resource collection and initial planning for completing chosen projects. Master's candidates only. Graded pass/unsatisfactory. Prerequisite: 12 hours of EDE courses and EDL 751.

**810-2 Seminar II**
Completion, presentation, and group discussion of topics addressed by individual students' master's projects. Enrollment with advisor approval. Graded pass/unsatisfactory. Prerequisite: 12 hours of EDE courses and EDE 809; permission of advisor.
Education—Special Education/EDS

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

642-4 Curriculum, Methods, and Materials for the Mildly Handicapped
Practices and procedures used in developing elementary and secondary curricula for the mildly handicapped. Includes academic adaptations, social and motor skills development as applied to development, and implementation of the Individual Education Plan (IEP). Field/clinical experiences required. Prerequisite: ED 655. (Previously listed as ED 642.)

643-3 Introduction to Augmentative Communication
Introduces etiology, problems, and needs of nonspeaking individuals. Hands-on experiences are required using augmentative aids and devices with multiply handicapped individuals. Prerequisite: EDS 651 or experience with multiply handicapped individuals. (Previously listed as ED 643.)

644-3 Instructional and Behavioral Management of Exceptional Individuals
Prepares special educators to meet the instructional and behavioral management demands particular to working with exceptional individuals including those with severe behavior difficulties. Pre- or corequisite: EDS 651 or 655. (Previously listed as ED 644.)

645-3 Career Education and Occupational Training for Multiply Handicapped
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 with clients is required. Prerequisite: EDS 651, 652. (Previously listed as ED 655.)

651-3 Nature and Needs of the Multiply Handicapped
Review of etiological aspects; historical, educational, and training programs; and concerns and issues related to multiply handicapped individuals including mildly, moderately, severely, and profoundly retarded or physically handicapped. Prerequisite: teaching certificate or ED 603 or 604. (Previously listed as ED 651.)

652-3 Education of Individuals with Physical, Sensory, and Motor Disorders
Overview of the etiology and educational implications of physical disabilities, sensory deficits, and communication disorders. Emphasis on psycho-educational and physical needs of children and youth, including the adaptation of methods and materials. Prerequisite: teaching certificate or ED 603 or 604. (Previously listed as ED 652.)

653-3 Curriculum, Methods, Materials, and Adaptive Equipment for Multiply Handicapped
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 with clients is required. Prerequisite: EDS 651, 652. (Previously listed as ED 653.)

654-3 Administration and Interpretation of Educational Data
Administering and interpreting formal and informal educational assessment instruments and communicating assessment data to parents and colleagues. Pre- or corequisite: EDS 655. (Previously listed as ED 654.)

655-2 to 4 Nature and Needs of the Mildly Handicapped
Causes and effects of specific learning and language disabilities, severe behavior disorders, and mild developmental disabilities. Study of teaching strategies appropriate for these individuals. Pre- or corequisite: EDS 651, 655. (Previously listed as ED 655.)

656-4 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 637, 615 or 716 or 632, EDS 655, 642, 654. Nonspecial education majors do not need ED 642 and 655. (Previously listed as ED 656.)

659-3 Communication and Consultation Skills for Special Educators
Techniques of collaborative consultation needed to enhance communication with exceptional individuals, parents, and educational team members. Pre- or corequisite: EDS 651 or 655. (Previously listed as ED 659.)

670-1 to 4 Workshop in Special Education
Intensive practical study in a selected area of special education. May be taken for letter grade or pass/unsatisfactory.

700-1 to 2 Special Education Entrance Seminar
Required of beginning master's degree students to become familiar with research tools, resources, and writing styles and to design a plan for organizing and maintaining scholarly activities required for completing the comprehension examination. Graded pass/unsatisfactory.
720-3 Creative Problem Solving in Classrooms
Introduction to creative problem-solving models and approaches that can be used by classroom teachers to involve students in the solutions of problems. (Previously listed as ED 720.)

722-3 Gifted Children and Youth
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. (Previously listed as ED 722.)

723-1 to 3 Teaching the Gifted
(Also listed as AED 741.) Study of curriculum, materials, and methods appropriate for teaching gifted individuals. Local program models are presented and observed in class. Prerequisite: ED 722. (Previously listed as ED 723.)

740-3 Clinical Practice with Severe Behavior Handicapped Individuals
Furthers students' knowledge of the daily operations of various SBH programs. Provides students an opportunity to apply knowledge acquired in previous coursework and to assist students in the acquisition of skills needed to handle the physically aggressive client. Field/clinical work required. Prerequisite: EDS 644, 651, 656, 659. Pre- or corequisite: EDS 645 and CNL 751 or permission of department. (Previously listed as ED 740.)

800-1 to 2 Special Education Exit Seminar
Seminar for completing the comprehensive examination required for attaining a Master of Education in Special Education. Graded pass/unsatisfactory. Prerequisite: must be in final quarter of M.Ed. program.

850-3 Seminar in Special Education
Individual and group study of the problems of exceptional children. (Previously listed as ED 850.)

Educational Leadership/EDL
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

711-4 Leadership for School Improvement
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.

712-4 Philosophical and Curricular Foundations
Overview of past, present, and emerging curriculum trends. Examination of educational and curricular philosophy and how philosophy impacts school programs.

713-4 Applied Psychological Learning Theory
Selected theories of learning and their value to instructional practices. Emphasis on the relationships among learning theories, learner characteristics, motivational theories, and instructional practices.

714-3 Context of Education
Emphasizes the evolution of theories and the laws that underlie the free compulsory educational system as well as the organization, control, and support by the public of the educational system.

720-4 Analysis of Teaching
Focuses on teaching methods and skills, and on classroom climate, including microteaching, interaction analysis, and collection of feedback from students.

721-4 Curriculum Designing for the Teacher
Management and leadership skills as related to the development and organization of curriculum and materials; implementation of the learning program with students.

722-4 Instructional Management and Evaluation

730-3 Research on Teaching
Research on teaching effectiveness; culminates in the writing of a research proposal to be completed during the second year of the Teacher Leader Program.

731-4 Statistics and Appraisal in Education
Introduction to educational statistics and appraisal techniques. Emphasis on how to understand and use research data. Methods for appraising student development and progress. Enrollment limited to participants in the Teacher Leader Program.
732-1 to 3 Directed Inquiry on Teaching
Individual research to satisfy requirements of a research project for Teacher Leader majors. Group and/or individual conferences with a research advisor. Prerequisite: EDL 730.

733-3 Seminar: Teacher Leader
Issues in research related to classroom teachers. Critical and current issues relevant to the development of classroom teachers as leaders within the context of their roles. Prerequisite: EDL 730, 732.

740-4 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.

741-4 Instructional Design
Management and leadership skills as related to organizational patterns, staffing, utilization of space, time, and facilities at the building level.

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: EDL 751.

753-4 Advanced Educational Statistics
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: EDL 752.

755-1 to 5 Research Projects
Conference course; individual research to satisfy requirements of research study for the Master of Education degree. Prerequisite: EDL 752 or permission of instructor.

757-4 Student Appraisal Methods
Intensive study of methods constructed and/or used by teachers for appraisal of student progress and adjustment. Includes selection, use, and interpretation of standardized instruments. Prerequisite: EDL 751 or equivalent.

770-1–3 Independent Reading and Minor Problems
Planned reading and/or project under guidance of Department of Education Leadership faculty member. Prerequisite: 9 graduate credit hours in education and permission of department chair.

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.

772-3 Educational Administrative Behavior
Principles of educational administrative processes, formal school structures and organization, and an introduction to school administration task areas. Principles of democratic school administration are also studied. Prerequisite: EDL 771.

773-3 Curriculum Theory and Practice
Developing an understanding of the bases of curriculum, the purposes and organization of curriculum, and curriculum planning. Roles and responsibilities of curriculum planners/developers are covered.

774-3 Curriculum Organization
Developing an understanding of goals, pupil performance objectives, components of curriculum design, and organization. Emphasis on language arts, mathematics, science, and social studies curriculum structure and organization. Prerequisite: EDL 771.

775-3 Leadership for Instructional Improvement
Understanding teaching from research and methodological viewpoints. Emphasis on examining various bases of teaching and improving instruction techniques.

776-3 Supervision of Instruction and Personnel
Emphasis on general supervision practices, personnel management, and staff performance evaluation. Prerequisite: EDL 775.

777-1 to 3 Prepracticum: Role and Function of Educational Leaders
Focuses on the roles performed by practicing educational leaders. Students observe, interact, and draw conclusions from field experience. Class sessions integrate field experience with knowledge and skills studied in prerequisite courses. Prerequisite: EDL 771 through 776.

780-3 Public Relations and Politics in Education
Developing an understanding of potential structures and effective principles of schools/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: EDL 777.
781-3 School Finance and Economics
The financing of public education and the economics of education. Guiding principles for developing financial programs and management procedures are covered. Prerequisite: EDL 777.

782-3 School Law
Provides an examination of the legal framework that all school personnel must function in. Emphasis on both legal precedents and statutory provisions. Prerequisite: EDL 777.

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.

791-4 Curriculum Design and Evaluation
Provides curriculum and supervision students with knowledge and skills necessary to perform curriculum and instruction design and evaluation functions. Prerequisite: EDL 777.

792-4 Models of Supervision and Staff Development
Understanding self and others and understanding models of supervision and staff development. Emphasis on skill acquisition in the areas of personality data; consultation processes; and designing, implementing, and evaluating staff development programs. Prerequisite: EDL 777.

793-3 Computer Application for Educational Leaders
Introduction to computers and their applications for educational leaders. Investigation of potential uses of the computer for student learning and school management and administration. Review and evaluation of specific hardware.

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; and school/community relations.

851-3 Advanced Seminar in Educational Research Design and Analysis
Individual and group study of ongoing applied educational research. Prerequisite: EDL 752.

858-3 Advanced Educational Measurement: Theory and Practice
Covers text construction, evaluation, standardization, validation, item sampling, norm setting, criterion referencing, and accountability. Completion of one measurement course or permission of instructor required. Prerequisite: EDL 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.

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.

871-3 Management of the School
Focuses 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.

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.

873-3 Pupil Personnel Administration
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/co-curricular activities are covered.

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.

890-1 to 3 Practicum in School Administration
Provides an experience in school administration in which students perform administrative tasks under supervision. Field experience is planned jointly by students and practicum supervisors, and includes activities in all administrative task areas.
920-4 History and Philosophy of Higher Education in the United States
Reviews history and development of higher and continuing education in the United States with special attention to forces that have shaped its development. Examines history of critical philosophical debates, and issues about the nature and role of higher education.

921-4 Curriculum in Higher Education
Introduction to patterns of curricular organization in the four-year college and university with attention to historical development and current models. Study of the issues governing curriculum planning, including the social, economic, political, historical, and philosophical contexts of which curriculum is formed and developed. Prerequisite: EDL 920. May be taken for letter grade or pass/unsatisfactory.

922-4 Law of Higher Education
Examination of statute and case law that governs the operation of institutions of higher education. Issues of employment, evaluation, contracts, copyright, and student and faculty rights will form the basis of the course. Can be taken for a letter grade or pass/unsatisfactory. Prerequisite: EDL 920.

923-4 Instruction in Higher Education
Designed to facilitate the application of theory to practice in teaching in colleges and universities. Students will explore diverse pedagogical approaches and develop an understanding of the professional role of the faculty member. May be taken for letter grade or pass/unsatisfactory. Prerequisite: EDL 920.

924-4 Administration in Higher Education
Introduction to administrative, organizational, and leadership theory and practice in the two-year and four-year college and university. Participants explore historical, current, and future plans for administration in higher education. May be taken for letter grade or pass/unsatisfactory. Prerequisite: EDL 920.

928-4 Internship in Higher Education
Provides opportunity for an in-depth field experience in higher education with administrative professionals. Designed to provide breadth to the students' prior experiences and be consistent with individual career goals. Prerequisite: EDL 920.

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.

941-3 Planning Educational Futures
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.

971-3 Superintendent/Staff/Board Relationships
Emphasis 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.

972-3 Ideas in Education
Draws on original sources and examines the impact of professional and nonprofessional educational thinkers on American education. The impact of social trends on education is also examined.

973-3 Research in Educational Leadership
Focuses on research on schools as organizations, research on educational leadership, and research related to educational content and practice.

974-3 Seminar in Educational Leadership
Issues in educational leadership and curriculum leadership. Program development and administrative practice serve as bases for emerging study issues.

975-1 to 3 Directed Study
Designed for students enrolled in the Educational Specialist degree program and/or those students admitted to a cooperative doctoral program. Course requirements are determined by students and their assigned program advisors. Minimum requirements involve an individualized set of objectives, learning strategies, and evaluation design. Titles vary.

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 are used to help participants conceptualize the interpersonal nature of organizations. Participants acquire the skills necessary to function effectively in interpersonal dimensions within educational settings.

986-4 Organizational Behavior in Education and Human Services
Focuses on role theory, leadership theory and style, and decision-making theory and practice relative to the institution of education. Emphasis 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.
987-3 Administrative Leadership Skills
Focuses on the development of leadership skills in relationship to individual and organizational communications, group processes, conflict management, decision making, and problem solving. Participants study and practice the principles of change.

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.

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. Topics include concepts of power, politics, decision making, institutional racism and sexism, and change.

991-1 to 4 Advanced Seminar in Educational Leadership
Three basic topics are addressed: (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.

992-3 School/Community Relations
Designed to assist superintendents and principals in their relations with the public.

993-3 School Business Management
Guiding principles for developing adequate financial programs and detailed study of sources of revenue—local, state, and federal; procedures in management of school funds with reference to budgeting, accounting, and auditing. Prerequisite: EDL 793 or equivalent.

994-4 Advanced Seminar for Educational Leaders
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.

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. Topics might include personnel management related to negotiations, human rights, or decision making. Topics vary.

999-1-9 Thesis
Research for thesis in Educational Specialist Program. Prerequisite: EDL 752 or permission of advisor.

Educational Technology/EDT
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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. Prerequisite: ED 633 or equivalent. (Previously listed as ED 607.)

608-3 Intensive Office Education
Qualifying course for intensive office education programs. Comprehensive study in developing procedures and principles in program construction, selection, improvement, implementation, and development of program guidelines. Prerequisite: ED 633 or equivalent. (Previously listed as ED 608.)

633-4 Business Education Curriculum and Materials: Basic Business Subjects
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. Prerequisite: ED 214, 216, 218, 220 or equivalent. Corequisite: ED 327. (Previously listed as ED 633.)

634-4 Business Education Curriculum and Materials: Typewriting, Keyboarding, Word Processing, and Office Procedures
Curriculum, methods, and materials in typewriting, keyboarding, word processing, and office procedures in the secondary school; current trends in teaching typewriting, keyboarding, word processing, and office procedures. Prerequisite: EDT 433, OA 213. (Previously listed as ED 634.)

670-1 to 6 Workshop in Educational Technology and Vocational Education (Titles vary)
Intensive, practical study in a selected area of educational or applied technology.
700-2 Principles and Applications of Educational Technology
Examines theory relevant to the role of educational technology specialists. Special consideration is given to changing roles and the application of theory to the problems of the specialist. Also focuses on possible consequences of the diffusion of educational technology innovations within the business, educational, service, and governmental institutions of American society. Graded pass/unsatisfactory.

717-2 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.

718-2 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.

719-2 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.

721-4 Cataloging and Classification
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. (Previously listed as EDT 621.)

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. (Previously listed as EDT 724.)

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. (Previously listed as EDT 727.)

728-3 Curriculum and Materials in Economic Education
Analysis of materials available, the development of appropriate teaching units, and the application of special methods for teaching economics on the elementary, secondary, and postsecondary levels. (Previously listed as EDT 728.)

729-3 Teaching Strategies and Curriculum Trends in Accounting and Data Processing
Analysis of the curriculum of business education and vocational business and office education in accounting and data processing, and the development of teaching strategies. (Previously listed as EDT 729.)

730-3 Teaching Strategies and Curriculum Trends in the Skilled Business Education Subjects
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. (Previously listed as EDT 730.)

735-4 Advanced Production of Instructional Materials
Examines philosophy and methodology of producing Instructional materials. Includes basic and advanced techniques, tools, materials, and mechanics. Prerequisite: EDT 435 or permission of instructor.

739-4 Developing Materials for Instruction
Advanced course in the development of a wide range of techniques and materials to improve instruction. Includes factors that facilitate learning, patterns for teaching and learning, the contributions of audiovisual material to improve learning, procedures for designing instruction, and the instructional design plan. (Previously listed as EDT 749.)

745-4 The Art and Technique of Storytelling
Students learn principles of the art of storytelling, as this reflects a listening/language experience. Includes a broad foundation in literature, story cycles, storytelling techniques, and program planning. (Previously listed as EDT 645.)

746-4 Teaching Information and Research Skills
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. (Previously listed as EDT 646.)
749-4 Introduction to Instructional Media
Survey course in instructional media including the interpretation of visuals (projected and nonprojected), film, instructional television, gaming, audio technology, multimedia systems, computers, operation of audiovisual equipment, and media facilities. Focuses on the appropriate use of media for specific instructional outcomes. (Previously listed as EDT 649.)

751-4 Educational Utilization of Video-Based Technology
Studies the potential, limitations, and techniques for effectively using ITV, radio, distance learning, telecommunications, and interactive video. (Previously listed as EDT 651.)

756-4 Advanced Television Production
Designed to improve the skills, knowledge, and creativity used in television production. Planning, writing, producing, and editing for educational and informational productions are emphasized. Prerequisite: EDT 455 or permission of instructor. (Previously listed as EDT 656.)

763-4 Young Adult Literature
Study of books appropriate for students age 12-18. Selection, evaluation, and survey of books; techniques for reading guidance and promotion of books; studies of history, literary criticism, current research, and issues related to this field of literature. (Previously listed as EDT 663.)

770-1 to 9 Independent Study
An individualized course of study under the close supervision of a faculty member. May include extensive readings, the performance of a research project, a paper, or a production. May be taken for letter grade or pass/unsatisfactory.

781-4 LOGO and Problem Solving
Provides introduction to LOGO with emphasis on the problem-solving processes of the language. Completion of a geometry course recommended.

782-4 Educational Computer Courseware Design
Students use elements of instructional design and storyboarding techniques to translate instruction into computer software.

786-4 Applications of Computers in Education
Types of educational software and applications, software evaluation, curriculum development, and lesson planning integrating computer courseware. (Previously listed as EDT 686.)

787-4 Advanced Programming for Educators
Introduces PASCAL programming language using the Apple computer. Programs useful to educators are developed using proper techniques for algorithms, coding, testing, and documentation.

788-4 The Writing Process and the Use of Computers
Provides knowledge of the writing process in drafting, revision, and manuscript preparation through word processing. Related software examined. Keyboard skills required. (Previously listed as EDT 688.)

791-4 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. (Previously listed as EDT 691.)

792-4 Tech for Small Libraries
Students become acquainted with a broad range of computer technology appropriate for small libraries and media centers. Tools and criteria for selection and use of such hardware/software will also be discussed. (Previously listed as EDT 721.)

795-4 Administration and Supervision of Educational Technology
Covers leadership theory and networking; qualifications and duties of the director; planning and administering the program; preparing the budget; buying equipment and handling materials; in-service training and evaluation of the program.

799-2 Seminar in Educational Technology
Individual and group study of problems related to educational technology. Enrollment is limited to department majors. Should be taken as the last class in a student's program of study. Graded pass/unsatisfactory. (Previously listed as EDT 779.)

890-3 to 12 Internship
Students are assigned for a maximum of 100 hours to a library, learning center, computer facility, or video operation to gain practical experience under supervised conditions. Graded pass/unsatisfactory. (Previously listed as EDT 780.)

899-1 to 9 Master's Thesis
The project may be a thesis or creative production and is prepared under the guidance of the student's advisory committee. (Previously listed as EDT 799.)
Electrical Engineering/EE

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

501-4 Circuit Analysis I
Basic elements and laws, circuit analysis techniques and concepts, energy storage elements, first and second order circuits, sinusoidal steady state analysis. Prerequisite: MTH 233; PHY 252 or 251. Co- or postrequisite: EE 302.

502-1 Circuit Analysis I Laboratory
Computer-assisted analysis, RLC circuits, operational amplifiers and circuits, Thévenin and Norton equivalents, maximum power transfer, AC networks. Pre- or corequisite: EE 301.

503-3 Circuit Analysis II
Circuit review, alternating current concepts, computer-aided circuit analysis, two-port networks, power. Prerequisite: EE 301 and 302. Pre- or corequisite: EE 303.

521-4 Linear Systems I
Considers systems in a broad context including linear, nonlinear; variant, invariant; and analog and discrete. Approaches to system and signal modeling are discussed with emphasis on the Fourier transform technique. Prerequisite: EE 301, 302.

522-4 Linear Systems II
Extends techniques of EE 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: EE 321.

525-4 Numerical Methods for Electrical Engineers
Root location, polynomial interpolation, numerical methods for linear-systems analysis, matrix methods in circuit analysis, frequency domain circuit-analysis techniques. Prerequisite: EE 322, MTH 253, CS 220 (or proficiency in Pascal or FORTRAN).

531-3 Electronic Devices
Introduction to basic solid-state electron devices. Fundamentals necessary for comprehension and further study of modern engineering electronics. Major topics include carrier flow in semiconductors, p-n junction theory, semiconductor diodes, bipolar junction transistors, field-effect transistors, biasing, and introduction to amplifiers. Prerequisite: EE 301, 302, 303, 304.

545-4 Electromagnetics
Developments in the basic concepts of vector calculus and their application to electromagnetics, electrostatics, and magnetics; induced electromotive force; and Maxwell's equations and their physical interpretation and application. Prerequisite: EE 301, 302, MTH 232.

546-4 Transmission Lines, Waveguides, and Radiating Systems
Plane waves in free space and matter, development of the transmission line equations, and application of Smith charts. Application of Maxwell's equations to the rectangular and circular waveguides. Introduction to radiating systems including the dipole and loop antennas; actual design of typical systems containing transmission lines, waveguides, and antennas. Prerequisite: EE 345.

601-3 Electronic Circuits and Devices
Application of modern electronics to instrumentation and data collection. Topics include semiconductor devices, small signal and power amplifiers, operational amplifiers, power supplies, digital fundamentals, and microprocessors. For nonelectrical engineering majors. Prerequisite: EE 501 and 502. Co- or postrequisite: EE 602.

602-2 Electronic Circuits and Devices Laboratory
Experiments in simple circuits, diode and transistor circuits, operational amplifiers, and simple microprocessors. Prerequisite: EE 501 and 502; Pre- or corequisite: EE 601.

613-3 Control Systems I
(Also listed as BMS 710.) Introductory course providing students with a general control background. Major topics include block diagrams and signal-flow graphs, electromechanical modeling including state variable representation, time response, root locus, and introduction to design. Prerequisite: ME 213 and EE 521. Co- or postrequisite: EE 614.

614-1 Control Systems I Laboratory
(Also listed as BMS 711.) Application and testing of control systems theory with electromechanical systems. Pre- or corequisite: EE 613.
Control Systems II
(Also listed as BMS 712.) Using Control Systems I background, this course concentrates on controller design in both the time and frequency domains, using Nyquist, Bode, root locus, and state variable techniques. Digital control concepts are introduced. Prerequisite: EE 522, 613, and 614. Co- or postrequisite: EE 616.

Control Systems II Laboratory
Application and testing of control systems theory with electromechanical systems. Prerequisite: EE 613 and 614. Pre- or corequisite: EE 615.

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: EE 522.

Digital Control Systems
Sampled spectra and aliasing, analysis and design of digital control systems using root locus and transform techniques, and discrete equivalents of continuous controller and quantization effects. 3 hours lecture, 2 hours lab. Prerequisite: EE 615, 616.

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: EE 322, MTH 232.

Electronic Circuits
Theory and application of basic engineering electronics developed for discrete and integrated circuits. Topics include bipolar and field effect transistor amplifier analysis and design, frequency response, multistage and feedback amplifiers. Prerequisite: EE 521 and 531. Co- or postrequisite: EE 634.

Electronic Circuits Laboratory
Applications of diodes and operational amplifiers in analog circuits, design of bias circuits; single and multiple stage amplifier circuits; feedback amplifiers; circuits to meet frequency response specifications; output stages. Prerequisite: EE 531. Pre- or corequisite: EE 631.

Network Synthesis and Design

Linear Integrated Circuits
Theory and applications of linear integrated circuits. Topics include ideal and real operational amplifiers, frequency response and compensation, active filters, comparators, and waveform generators. 3 hours lecture, 2 hours lab. Prerequisite: EE 631, 634.

Microwave Circuit Design
Review of Smith chart, introduction to microstrip lines, impedance matching, power-gain equations, stability considerations, and design methods for amplifiers and oscillators. CAD (Touchstone software by EESOF) is used. Prerequisite: EE 546.

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: EE 631, 634.

Digital Systems Design
(Also listed as CEG 560.) Design of digital systems. Topics include digital arithmetic, register-level design, memory devices and their logic, and controller and processor design. 3 hours lecture, 2 hours lab. Prerequisite: EE 260 or 351.

Standard Cell VLSI Design Techniques
(Also listed as CEG 652.) Standard cell VLSI design techniques. Topics include introduction to VLSI, MOS transistors, CMOS logic circuits, standard cell libraries, cell usage, schematic capture and simulation, circuit testing, and test program generation. Prerequisite: EE 631, 634.

VLSI Design
(Also listed as 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: EE 631, 634.

Introduction to Robotics
(Also listed as CEG 656 and ME 656.) Introduction to the mathematics, programming, and control of robots. Topics covered include coordinate systems and transformations, manipulator kinematics and inverse kinematics, trajectory planning, Jacobians, and control. Prerequisite: MTH 253; proficiency in Pascal, C, or FORTRAN programming.
673-4 Communication Systems Design I
Concepts of probability and random processes are introduced and used to specify and analyze communication systems. A complete noise study of the AM and FM analog modems is made. The matched filter is introduced and the following binary modems are considered: PSK, ASK, and FSK. 3 hours lecture, 2 hours lab. Prerequisite: STT 363 and EE 621.

674-4 Communication Systems Design II
Noise figure analysis and communication link design are introduced. Nyquist signaling and equalization are discussed. Information theory and error correcting coding are considered. The course also provides support for the communication design project. 3 hours lecture, 2 hours lab. Prerequisite: EE 673.

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: EE 522.

700-3 Principles of Instruction in Engineering
Survey of available instructional materials and discussion of educational theories and techniques leading to more effective instruction. For first-year graduate teaching assistants only.

701-4 Linear Systems I
(Also listed as BMS 705.) Signal representation, orthonormal bases, and generalized Fourier series. Description of linear, discrete, and continuous systems. Systems analysis via classical equations, convolution, and transform methods. Prerequisite: EE 521, 522.

702-3 Linear Systems II
(Also listed as BMS 706.) State variable representations of continuous and discrete systems. Linear vector spaces and similarity transformations; eigen-analysis, time and transform domain solutions of linear state equations; controllability, observability, and stability of linear systems. Prerequisite: EE 701.

710-4 Digital Signal Processing
Data acquisition and quantization, unitary transforms, circular convolution, Hilbert transform, FIR/IIR filter design and realization, analysis of finite-precision numerical effects, spectral estimation, and Cepstrum analysis. Prerequisite: EE 701.

711-3 Multidimensional Digital Signal Processing
Topics of EE 710 extended to multidimensional systems and signals. Provides the theoretical and applied basis for analysis and synthesis of discrete systems and operations used in digital images, transducer arrays, and other multidimensional signals. Prerequisite: EE 710.

715-4 Digital Image Processing
Image representation, sampling/quantization, spatial/frequency concepts, image enhancement, color image theory, unitary image transforms, image data compression, image models, image coding, image restoration, feature extraction and description, and computer implementation of concepts and algorithms introduced. Prerequisite: EE 710.

717-4 Multisensor/Data Integration

718-4 Multitarget Tracking and Data Association

720-4 Advanced Digital Control
Analysis and design of digital control systems using the state approach, Multirate digital control systems, and digital state observer and microprocessor control. Prerequisite: EE 627, 702.

724-3 Foundations of Optimization Theory
Theory of minima and maxima, calculus of variations, optimum-seeking search techniques, dynamic programming, and maximum principle. Prerequisite: EE 702.
725-3 Principles of Modern Control Theory
Calculus of variations for continuous processes. Euler-Lagrange equations and the use of Lagrangian multipliers; Pontryagin's maximum principle, Hamilton-Jacobi theory; and application to control examples. Prerequisite: EE 615, 616. Corequisite: EE 702.

726-3 Computational Techniques of Modern Control Theory
Continuation of EE 725 emphasizing search techniques, state estimation, and the Linear-Quadratic-Gaussian problem. Prerequisite: EE 725.

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 applications to radar systems design. Consideration is also given to coherent imaging radar. Prerequisite: EE 621, 675, STT 363 or equivalent.

740-4 Information and Coding Theory
Development of communication channel model and use of information theory as means of quantifying that model. Investigation of various error correcting and detecting codes. The popular Viterbi coding algorithm is also considered. Prerequisite: Completion of courses in probability theory, linear systems.

741-3 Power Semiconductor Devices
General-purpose, fast-recovery, and Schottky diodes; performance parameters: power BJTs, MOSFETs, and MOSIFTs; static and dynamic characteristics, drivers, pulse transformers, and optocouples; thyristor characteristics, SGR, and GTO parameters; cooling, snubbers, voltage and current protection, and varistors. Prerequisite: EE 631 and 634.

742-3 Power Electronics
AC-to-DC converters, natural and forced thyristor commutations, controlled rectifiers, power factor improvements, static AC and DC switches, AC voltage controllers, output harmonic reduction, DC choppers, characteristics of DC-to-AC inverters, PWM and FM control. Prerequisite: EE 741.

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; and baseband encoding techniques. Introduction to spread spectrum. Prerequisite: Completion of courses in probability theory, linear systems.

752-4 VLSI
(Also listed as 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: EE 451; EE 710 or CEG 720.

753-4 VLSI II
(Also listed as CEG 753.) Design of digital integrated circuits using gallium arsenide (GaAs) fabrication technology. Topics include introduction to GaAs devices and models, logic design principles and examples, layout and simulation tools, and test procedures for GaAs digital integrated circuits. 3 hours lecture, 2 hours lab. Prerequisite: EE 752.

754-4 VLSI III
(Also listed as CEG 754.) Design for testability of VLSI circuits. Topics include importance of testing, conventional test methods, built-in test, CAD tools for evaluating testability, test pattern generators and compressors. Prerequisite: EE/CEG 753.

756-4 Robotics I
(Also listed as CEG 756 and ME 756.) Detailed study of the dynamics and control of robotic systems and robot programming languages and systems. Material covered includes rigid-body dynamics; linear, nonlinear, adaptive, and force control of manipulators; and robot programming languages. Prerequisite: EE 656.

758-4 CMOS Analog Integrated Circuit Design
(Also listed as CEG 758.) Introduction to the techniques, limitations, and problems in the design of CMOS analog integrated circuits. Topics include CMOS analog circuit modeling and device characterization, analog CMOS subcircuits, CMOS amplifiers, comparators, and CMOS Op Amps. 3 hours lecture, 2 hours lab. Prerequisite: EE 631 and 634.
Courses/Electrical Engineering

761-3 Analytical Techniques of Stochastic Analysis
Probability and random variable, distributions and density functions, random processes, strict-sense and wide-sense stationarity, autocorrelation and power spectral density, ergodicity, response of linear systems with stochastic inputs, discrete linear models, and Gaussian processes. Prerequisite: EE 701.

762-3 Detection, Estimation, and Optimal Filter Theory
Binary detection with single/multiple observations, linear minimum mean-square error filtering: Wiener and Kalman filters, MLE and MAP estimators, histogram, tests of hypotheses, regression analysis, model-free and model-based parameter estimation of random processes. Prerequisite: EE 761.

763-3 Classical and Modern Spectral Analysis
Linear and matrix algebra, periodogram and Blackman-Tukey estimators, moving average, auto-regressive and auto-regressive moving-average methods, fast techniques, statistics of estimators, model order selection, and minimum variance and high-resolution techniques. Prerequisite: EE 761.

831-3 Robust Controls
Study of several important topics from recent research in robust-control design. Topics include review of LQR and state feedback designs; Kharitonov's theorem; Barmish's theorem; Wei-Yedavalli's theorem; edge theorem; and elements of H∞ control. Prerequisite: EE 615, 616, and 702.

861-4 Adaptive Filters
Introduction to adaptive systems, adaptation with stationary signals, and to adaptive algorithms and structures. Applications to systems identification, deconvolution, equalization, control systems, interference canceling, adaptive arrays, and beam forming are considered. Prerequisite: EE 701.

880-3 Selected Topics in Systems Engineering
Selected topics in current research and recent developments in systems theory and engineering.

890-1 to 5 Special Problems
Special problems in advanced engineering topics. Titles vary.

899-1 to 5 Thesis

Engineering/EGR
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

535-3 Technical Communication for Engineers and Computer Scientists
A modular approach to oral and written communication of complex technical information to an expert audience. Course includes describing technical mechanisms, processes designing, and using tables, graphs, charts, and figures; producing technical proposals, progress reports, feasibility reports, and formal reports; and doing technical briefings. Prerequisite: graduate standing in the College of Engineering and Computer Science.

633-4 Reliability Analysis
Reliability measures: probability distribution models, hazard functions, failure rates, and model estimation. Static reliability models: series, parallel, and combination systems; redundancy techniques. Probabilistic engineering design and its relation to other aspects of design. Reliability computations for several probabilistic models used in mechanical and electrical engineering design. Other topics include reliability estimation and allocation, sequential life testing, and failure modes and effects analysis. Prerequisite: STT 363 or equivalent.

English/ENG
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

530-4 Business Writing
Written business and organizational communication; attention to various forms including short reports and informal oral presentations.

533-3 Fundamentals of Technical Writing
Survey of the fundamental principles and skills used in scientific and technical writing.

543-4 Advanced Composition
Emphasis on sophisticated techniques of expository writing and the refinement of style.

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.
547-3 Desktop Publishing and Technical Graphics
Introduction to the design and illustration of technical documents through labs requiring use of word processing and desktop publishing systems.

600-3 Advanced Technical Writing
Reviews the fundamentals of technical writing with attention to reports, proposals, manuals, technical articles, and style manuals. Emphasis on writing for specific fields with opportunity for independent writing projects in the student’s major field. Prerequisite: ENG 333 or 533 and 347 or 547.

602-3 Technical Editing
Experience in various elements of technical editing—grammar, style, and content; editing for consistency of format and adherence to standards; and preparing a document for printing. Prerequisite: ENG 400 or 600.

605-1 to 6 Topics in Technical Writing
Courses, seminars, or workshops in specialized topics relating to technical writing. Prerequisite: ENG 400 or 600 or permission of the instructor.

610-4 Studies in English Literary History
Provides intensive study of English literature from the point of view of literary history. Develops an understanding of the historical approach to literature and an ability to deal critically with historical generalizations about literary periods and movements. Titles vary.

620-4 Studies in American Literary History
Provides intensive study of American literature from the point of view of literary history. Develops an understanding of the historical approach to literature and an ability to deal critically with historical generalizations about literary periods and movements. Titles vary.

630-4 Studies in Major English Writers
Provides intensive study of major English authors such as Shakespeare, Chaucer, Milton, and others. Develops an understanding of individual works of literature in the context of an author’s life and total literary production. Titles vary.

640-4 Studies in Major American Writers
Provides intensive study of major American authors such as Melville, Whitman, James, and others. Develops an understanding of individual works of literature in the context of an author’s life and total literary production. Titles vary.

650-4 Studies in Literary Types and Modes
Provides intensive study of important literary forms such as poetry, the novel, comedy, tragedy, satire, and the epic. Develops an understanding of the formal aspects of literature as approached theoretically, analytically, or historically. Titles vary.

654-4 Feature Story Writing
(Also listed as COM 654.) Includes finding, writing, polishing, and marketing feature material. Prerequisite: permission of instructor.

658-4 Editing for the Media
(Also listed as COM 658.) Editing copy for mass media with emphasis on newspaper format, headline writing, rewriting, and general copy desk. Prerequisite: permission of instructor.

660-4 Studies in Literary Themes
Provides 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. Titles vary.

670-4 Studies in Literary Criticism
Provides intensive study of the theoretical, practical, and historical aspects of literary criticism in order to develop an understanding of important critical questions and approaches. Titles vary.

677-1 to 6 Workshop
Intensive study of selected special topics or problems designed to meet the needs of participating students. Titles vary.

678-4 Introduction to Linguistics
Survey of major branches of English linguistics; present-day phonology, morphology, and syntax and their historical development; and social and psychological approaches to language.

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.

680-4 Studies in Linguistics
Provides intensive study of the English language and linguistics, and develops an understanding of the historical, comparative, and descriptive approaches to the study of language and of the nature and value of their findings. Titles vary. Prerequisite: ENG 478 or 678.

681-4 Theory of ESL
Presents a theoretical foundation for the study of second language acquisition, including first language acquisition, interlanguage, contrastive analysis, error analysis, language universals, communicative competence, and learning theory. Prerequisite: ENG 478 or 678.
682-4 Grammatical Structures of English
Provides basic understanding of English morphology and syntax, including the terminology and methodology of contemporary grammar as applied to teaching. Relates grammatical issues to the teaching of English to nonnative speakers. Prerequisite: ENG 478 or 678.

683-4 Sociolinguistics
Investigates the different subcategories of sociolinguistics, including the sociology of language, the ethnography of speaking, and variation in language structures. Prerequisite: ENG 340 or 478 or 678.

685-2 to 4 Studies in English Education
(Also listed as ED 620.) Focuses on theoretical issues and practical problems of teaching English at all levels, including the teaching of writing and teaching of English to speakers of other languages (TESOL). Titles vary. Prerequisite: ENG 340 or 478 or 678.

690-4 Studies in World Literature
Provides study in English of non-European literature, focused nationally, regionally, cross-culturally, thematically, or generically (e.g., Caribbean Fiction, Modern Japanese Literature, and Commonwealth Literature). Titles vary.

692-4 Poetry Writing Seminar
Advanced students work closely with instructor on writing and revising, leading to the creation of professional and publishable poetry. Reading and discussion of contemporary poetry and poetics. May be repeated twice for credit. Prerequisite: permission of instructor.

693-4 Fiction Writing Seminar
Advanced study and practice of the techniques and forms of fiction of any length, with emphasis on producing fiction of professional and publishable quality. May be repeated twice for credit. Prerequisite: permission of instructor.

700-4 Methods and Materials of Research in Language and Writing
Introduction to research in language and writing. Emphasis on finding and using library resources, surveying research designs, and understanding and reporting research in the human sciences.

701-4 Methods and Materials of Research in Literary Studies
Examination of the aims and approaches of scholarly study of literature and the tools and methods of literary research. Emphasis on the problems of collecting, evaluating, and reporting the findings of scholarly study.

702-4 History of Literary Criticism
Survey of major critical documents from ancient times to the present.

703-2, 704-2 Teaching College Composition I, II
Introduction to the theory and pedagogy of college-level writing courses. Requires concurrent teaching or tutorial experience. Required of all first-year English teaching assistants. Prerequisite: for 704, ENG 703.

707-4 The Nature of Language
Consideration of the sources and processes of language and its relationship to thought, imagination, and symbolic form. Emphasis on the contributions of anthropology, linguistics, philosophy, psychology, and sociology to our understanding of language.

710-4 The Creative Process
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
Introduction to rhetoric as related to the written word. Covers the history of rhetoric, current rhetorical theory, and the application of rhetorical theory to the study of literature and composition.

712-4 Style in Writing
Introduction to the theoretical and practical study of style in writing, with emphasis on 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. Topics include literary types, analysis, evaluation, and the relationship of literature to other disciplines.

717-4 The Study of Writing
Current approaches to writing and the study of composition in the classroom. Topics include whole language, invention, revision, stylistics, editing, the analysis of student writing, and effective pedagogical practice. Titles vary.

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. Prerequisite: Any two of the following three courses: ENG 330/530, 333/533, 347/547 or permission of instructor.
720-4 Seminar in Literature and Gender
Reading, research, reports, and discussion of topics dealing with gender and literature (e.g., literature by and about women, feminist critical theory and practice, and gender roles in literature). Titles vary. Prerequisite: ENG 700 or 701 or HUM 707.

721-4 Teaching Literature and Gender
Study of materials, topics, texts, and methodology appropriate to teaching gender studies in literature. Includes an assigned lesson and a research project. Prerequisite: ENG 700 or 701 or HUM 707 and ENG 716.

730-4 Seminar in Major Writers
Reading, research, reports, and discussion on topics dealing with a single writer or two closely related ones (e.g., Chaucer, Melville, Joyce, or Wordsworth and Coleridge). Prerequisite: ENG 700 or 701 or HUM 707.

731-4 Teaching Major Writers
Study of materials, topics, texts, and methodology appropriate to teaching a single writer or two closely related ones. Includes an assigned lesson and a research project. Prerequisite: ENG 700 or 701 or HUM 707 and ENG 716.

740-4 Seminar in Literary Genres
Reading, research, reports, and discussion on topics dealing with a single literary genre (e.g., epic, novel, tragedy, lyric poetry, or historical drama). Prerequisite: ENG 700 or 701 or HUM 707.

741-4 Teaching Literary Genres
Study of materials, topics, texts, and methodology appropriate to teaching a single literary genre. Includes an assigned lesson and a research project. Prerequisite: ENG 700 or 701 or HUM 707 and ENG 716.

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 (e.g., the Middle Ages, the age of Johnson, romanticism, or the twenties). Prerequisite: ENG 700 or 701 or HUM 707.

751-4 Teaching Cultural Periods
Study of materials, topics, texts, and methodology appropriate to teaching the literature and culture of particular historical periods or teaching literary movements. Includes an assigned lesson and a research project. Prerequisite: ENG 700 or 701 or HUM 707 and ENG 716.

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 700 or 701 or HUM 707.

761-4 Teaching Special Literary Problems
Study of materials, topics, texts, and methodology appropriate to teaching special problems such as literary themes, literary conventions, literature in relation to other disciplines. Includes an assigned lesson and a research project. Prerequisite: ENG 700 or 701 or HUM 707 and ENG 716.

770-4 Seminar in the English Language
Reading, research, reports, projects, and discussion on English linguistic topics, including phonetics, phonology, morphology, syntax, semantics, pragmatics, discourse analysis, text linguistics, sociolinguistics, psycholinguistics, language acquisition, and historical linguistics. Prerequisite: ENG 478 or 678 and 700 or 701 or HUM 707.

780-4 Seminar in Writing
Reading, research, reports, and discussion on topics dealing with the theory and pedagogy of writing (e.g., response to writing, writing across the curriculum, computers and composition). Prerequisite: ENG 700 or 701 or HUM 707.

791-1 to 4 Independent Study
Faculty-directed independent study in literature or language usually requiring reports and conferences with the instructor. A maximum of four credits may be applied to the M.A. degree.

793-1 to 4 Classroom Research in English
Study, discussion, and application of techniques of observational research in the English/language arts classroom. Students will design, carry out, and write a research project. May be taken for letter grade or pass/unsatisfactory.

795-4 to 8 Internship and Apprenticeship
Supervised college-level teaching, archival work, or professional writing. Graded pass/unsatisfactory.

799-4 to 8 Thesis
Finance/FIN

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

621-3 Graduate Survey in Financial Management
Theories, concepts, and techniques of financial management. Designed for students with no previous coursework in financial management and for those with a need to review basic concepts prior to taking an advanced finance course. Prerequisite: ACC 622.

702-3 Management of Financial Institutions
Analysis of issues relating to the financial management of financial institutions. Prerequisite: FIN 621, EC 717.

710-3 Investment Management
Concepts, theories, and techniques underlying the development of investment policies and strategies. Prerequisite: FIN 621.

711-3 Seminar in Investments
Advanced treatment of selected topics in investments including options, futures, and portfolio theory. Prerequisite: FIN 710.

741-3 Financial Management
Application of financial management principles, concepts, theories, and techniques. Emphasis on case problems and decision making. Prerequisite: FIN 621.

742-3 Seminar in Financial Theory
Advanced treatment of theoretical issues in finance. Topics include capital structure, options, agency theory, capital budgeting, and other long-term finance issues. Extensive use of outside readings. Prerequisite: FIN 741.

743-3 Seminar in Working Capital Management
Advanced treatment of the theory and practice of working capital management, including cash management, credit policy, inventory policy, and short-term financing strategies. Extensive use of outside readings. Prerequisite: FIN 741.

750-3 Financial Management of Health Service Organizations
Overview of the financial management function in health care organizations. Topics include budgeting, control, capital expenditure analysis, and rate settings. Prerequisite: FIN 621.

760-3 Special Topics in Finance
In-depth analysis of a current trend in finance. Prerequisite: FIN 741 and permission of instructor.

780-6 Finance Internship
One-quarter internship in a selected private or governmental organization under the direction of a faculty advisor and employment supervisor.

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

790-3 Seminar in International Financial Management
Advanced treatment of the concepts and techniques of international financial management. Prerequisite: FIN 741.

799-1 to 9 Thesis

French/FR

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

652-4 The Nineteenth-Century Novel
Chateaubriand, Constant, Stendhal, Balzac, Flaubert, Zola, and France.

653-4 Poetry from Baudelaire to Breton
Symbolists, Decadents, and Surrealists.

662-4 Twentieth-Century Literature
The novel.

665-4 Problems in French Literature
Examination of selected topics in French literature to investigate various themes, myths, genres, literary movements, or characters. Titles vary.

Geography/GEO

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

531-4 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.

570-3 Regional Geography
Physical and cultural analysis of major and minor world regions. Topics vary.
613-4 Urban Planning III: The Land Use Plan
Process of preparing comprehensive urban plans. Methods for assessing land-use conditions, housing patterns, and urban deterioration. Students participate in the development of a land-use plan for a selected area.

645-5 Intermediate Cartography and Map Interpretation
Study and practice of compilation processes for the development of maps and models using 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 on the full spectrum of photo interpretation as applied to the controlled mapping of terrestrial and marine surfaces. Prerequisite: GEO 645 or permission of instructor.

647-5 Geographic Information Systems
Principles, structures, and applications of geographic information systems and use of data from topographic, remotely sensed, and photogrammetric sources. Prerequisite: GEO 365 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.

662-4 Remote Sensing of the Environment
Application of remote sensing techniques to environmental and resource problems. Emphasis on optimizing sensor selection to enhance image information content.

663-4 Geographic Applications of Remotely Sensed Data
Application of geographic methodology to problems employing photographic and machine-processed multispectral scanner data that are used in academic research, environmental analysis, and planning. Prerequisite: GEO 662 or permission of instructor.

665-5 Cartography
Principles of map projections and their construction and use in illustrating geographic relationships. Includes methods of design, compilation, and graphic representation of data. 4 hours lecture, 1 hour lab.

681-1 to 4 Special Problems in Geography
Research and problems designed for specific needs and talents of the students. Titles vary.
614-3 Volcanology
Study of volcanic processes and 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; and solid solutions. 3 hours lecture, 3 hours lab.

617-3 Theoretical Hydrology
Introduction to mathematical and physical concepts in hydrology; equations of flow of ground water; mathematical modeling of boundary value problems in hydrology; and steady state and unsteady state behavior.

620-3 Regional Tectonics
Variations in regional tectonics style as determined by stratigraphy, structure, and geophysical measurements. Prerequisite: GL 311.

621-3 Ground Water Law and Regulatory Principles
A case study approach to understanding current federal, state, and local ground water laws and regulations.

622-5 Introduction to Geophysical Prospecting
Introduction to principles of gravity, magnetic, seismic, electrical, and radioactive prospecting. 3 hours lecture, 4 hours lab.

623-4 Seismic Exploration
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 and Magnetic Exploration
Study of the theory of the earth's gravitational and magnetic fields and the application of these principles to resource 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: GL 400 (600), 422 (622), or permission of instructor.

626-1 Geophysics Seminar
Literature survey and student presentations on selected topics in geophysics. Graded pass/unsatisfactory. Prerequisite: GL 600 or 422 (622).

627-4 Regional Structural Synthesis
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 (611), 312 (643).

628-0.5 to 2 Geology Colloquium
Selected geological topics discussed by students, guest speakers, and faculty. May be taken for letter grade or pass/unsatisfactory.

629-4 Sedimentology
Clastic rocks, their mineralogy, texture, provenance, and classification; nonclastic carbonates and other nonclastic rocks; and depositional environments and sedimentary structures. 3 hours lecture, 2 hours lab. Completion of an undergraduate course in stratigraphy is required.

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
Character, composition, origin, and diagenesis of carbonate rocks are examined using ancient and modern examples. 3 hours lecture, 3 hours lab.

633-4.5 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.

634-9 Field Geology
Geologic phenomena illustrated in the field. Introduction of mapping techniques and the application of many geologic disciplines to geologic analysis.

636-3 Advanced Sedimentary Petrology
Theory and application of petrographic techniques to studies of carbonate and classic rocks, with emphasis on diagenesis and porosity development. 2 hours lecture, 2 hours lab. Prerequisite: GL 412 or equivalent.

637-4 Seismic Data Processing
Digital filtering, deconvolution, and migration of seismic data. 3 hours lecture, 2 hours lab. Prerequisite: GL 623.

638-2 Seismic Interpretation
Interpretation methods for seismic reflection data are studied with emphasis on structural and stratigraphic interpretation for petroleum traps. Prerequisite: GL 623 or permission of instructor.

639-1 to 6 Applied Geophysics for Hydrology and Engineering
Geophysical principles, field techniques, and interpretation methods are applied to geological problems in hydrology and engineering. Emphasis is on electrical resistivity and seismic refraction methods.
641-4.5 Paleontology I
Morphology, geologic record, and geographic distribution of major invertebrate groups characterized by significant fossil representation. 3 hours lecture, 3 hours lab.

642-4.5 Paleontology II
Morphology, geologic record, and geographic distribution of major vertebrate and plant groups characterized by significant fossil representation. 3 hours lecture, 3 hours lab.

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
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.

645-4 Petroleum Geology
Hydrocarbon source rocks, maturation and migration, and reservoir rocks and traps. Fluids in the reservoir: gas, oil, water, and their relationships. Exploration for and production of hydrocarbons. Review of major petroleum basins and deposits.

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.

650-4 Hydrogeology
Provides a fundamental understanding of basic hydrological principles including ground water flow and chemistry, surface water hydrology, unsaturated flow, and meteorology.

651-3 Regional Hydrogeology
Study of the hydrogeology of the United States including water balance, budget, and yield.

652-3 Advanced Hydrogeology
Second-level course in hydrogeology providing the theoretical background necessary to solve real-life problems involving ground water flow, well hydraulics, aquifer characterization, and contaminant transport. Prerequisite: GL 450 (650) and completion of a calculus course.

653-3 Hydrogeochemistry
Lectures focus on the types of chemical reactions that control the composition of ground water. Included are solubility, adsorption and ion exchange, redox reactions, and complexing. Computer programs for geochemical modeling are introduced. Prerequisite: GL 410, CHM 121, 122, 123.

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 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 chosen from both published and unpublished sources especially to illustrate principles, problems, and solutions. 3 hours lecture, 3 hours lab. Prerequisite: GL 656.

658-3 Ground Water Management
Introduces the basic principles of ground water management, including case studies.

660-1 Seminar in Hydrogeology
Explores current topics and contemporary research programs and ideas. Graded pass/unsatisfactory.

663-4 Geologic Applications of Remote Sensing
Familiarizes 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.

665-3 Regional Geomorphology
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.

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.
699-1 to 6 Special Problems
Research and problems designed for specific needs and talents of the students.

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. For graduate teaching assistants only.

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. Concurrent registration in physical chemistry required.

740-4.5 Numerical Analysis in Geology
Use of numerical modeling methods, including finite differences and finite elements in solving problems related to ground water flow and mass transport. Emphasis is on the theory including development of well-posed boundary-value problems, development of the numerical scheme, and choice of solution algorithms. Students write explicit and implicit finite difference codes, as well as a finite element code to solve two-dimensional flow problems.

750-3 Sedimentary Basin Analysis

754-3 Hydrogeochemical Modeling
Introduces students to several computer programs that have been developed to aid in the understanding of ground water geochemistry. Includes programs for mass balancing, speciation, and ground water simulation. Prerequisite: GL 453 (653).

759-2 Advanced Ground Water Management
Study of ground water management case histories and special topics. Prerequisite: GL 650.

762-4 Ground Water Exploration and Evaluation
Exploration and delineation of aquifers; interpretation of hydrologic tests; and case studies. 3 hours lecture, 2 hours lab.

799-1 to 6 Special Problems
Titles vary. May be taken for 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 experience included.

899-1 to 5 Thesis

German/GER
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

625-4 German Literature of the Nineteenth Century: Prose
Representative works of Eichendorff, Hoffmann, Keller, Meyer, Storm, Fontane, and others.

631-4 German Literature of the Twentieth Century: Prose
Readings and reports in twentieth-century literature. Representative works of Hesse, Mann, Kafka, and others.

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.

650-1 to 4 Independent Graduate Research
Titles vary.

Health, Physical Education, and Recreation/HPR
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.
630-1 to 3 Coaching Theory
Theory, skills, strategies, and organization principles of coaching a particular sport. Sports include baseball, basketball, football, soccer, swimming, track and field, tennis, and volleyball. Prerequisite: HPR 101 in same sport.

635-1 to 3 Officiating
Rules and techniques of officiating a particular sport, including baseball, basketball, football, soccer, and volleyball. Prerequisite: HPR 101 in same sport.

668-1 to 6 Independent Study
Independent reading, writing, and/or reporting in an area related to health, physical education, or recreation.

689-1 to 6 Workshop in Health, Physical Education, and Recreation
Intensive study of content, curriculum, method, or materials designed to meet the needs of pre-service and in-service professionals in health, physical education, and recreation. Titles vary.

710-4 Physical Education for Children with Special Needs
Assessing students with handicapping conditions, planning appropriate physical activities based on this assessment, and providing the activities described in the plan. Prerequisite: HPR 212 or equivalent.

720-4 Motor Development and Acquisition of Motor Skills
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
Ways of directing interscholastic athletic programs. Emphasis 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
Topics include exercise training techniques, heart rate, blood pressure, ventilation, strength, flexibility, and body composition. Includes laboratory methods. Prerequisite: HPR 351 or equivalent.

753-4 Assessment of Physical Activity
Focuses on 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
Examination of trauma, contusions, hematoma, strains, sprains, fractures, open wounds, and dislocations. Prerequisite: HPR 460 or equivalent.

780-5 Research in Physical Education
Study of the research processes in physical education and the development of research projects in students' areas of interest. Prerequisite: HPR 455 or equivalent.

History/HST
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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.

590-4, 591-4, 592-4 Medieval Western Europe

605-4 Ancient History
Selected problems in Roman history to the death of Constantine in A.D. 337.

615-4 Early Modern European History
Selected problems in European history from the decline of the Roman Empire through the Renaissance and Reformation. Titles vary.

625-4 Modern European History
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. Titles vary.

635-4 British History
Examines particular periods of British history (e.g., modern Britain) or topics (e.g., British constitutional history). Titles vary.

655-4 Latin American History
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). Titles vary.

665-4 Far Eastern History
Examines 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
The colonial, Revolutionary, and early national periods of American history, and topics such as Puritanism or the origins of early American political thought.

675-4 Nineteenth-Century United States History
Examines distinct periods in the nineteenth century (e.g., Civil War and Reconstruction) and major topics such as slavery. Titles vary.

680-4 Twentieth-Century United States History
Particular stages of the twentieth-century American experience (e.g., the Progressive era) or selected topics (e.g., the civil rights movement).

685-4 Special Topics in United States History
Intensive analysis of topics drawn from the entire range of the American experience, such as religion, diplomacy, women, immigration, and urbanization. Titles vary.

690-4 Topics in African-American History
Examines topics drawn from the African-American experience. Topics covered may include black ideology and leadership, racial tension in urban society, and the civil rights movement. Topics vary. Prerequisite: HST 211, 212 or 214, 215.

691-1 to 4 Independent Readings
Faculty-directed readings in a field of student's choice.

695-4 Comparative History
Compares developments or movements in different parts of the world and/or different times in history. May compare revolutions, slave systems, religious movements, or other human experiences that transcend a particular time or place. Titles vary.

698-4 Historiography
Introduction to the work of representative historians and important theories of historical interpretation.

700-4 Historical Methods
Intensive training in the research methods and materials of history.

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
708-4 Seminar in History
Topics vary.

709-4 Topics in African-American History
Conducted as a reading seminar. Focuses on African diaspora in the Americas. Topics include the black experience in the United States and Latin America from the colonial period to the present. Topics vary. Prerequisite: HST 211, 212 or 214, 215.

710-4 Introduction to Archives and Manuscripts
Fundamental problems and techniques of managing a historical archive or manuscript collection.

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.

713-4 Advanced Problems in Historical Administration
Prepares students for positions in historical societies and similar organizations that preserve, maintain, or interpret historical properties.

714-2 Advanced Problems in Archival Work
Major problems in archival work and manuscript curatorship. Prepares students for careers as manuscript librarians, archivists, oral historians, and records management specialists. Prerequisite: HST 710.

715-5 Historical Management Internship
Gives plan C students a 300-clock-hour internship in cooperating historical agencies. Practical training in various aspects of historical administration. Reports to be written by students on the internship experience. Graded pass/unsatisfactory. Prerequisite: HST 710, 711, 712, 713, 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

727-4 Introduction to Public/Applied History
Introduces students to the origins, nature, and varieties of public history and to careers in the field. Explores questions of ethics and politics in public history.
730-1 Archival Automation
Examines the physical nature of books and paper materials, the causes of their deterioration, and the means to care for and preserve historical materials. Graded pass/unsatisfactory.

740-1 Archival Preservation
Introduces the uses of electronic automation in an archival setting with special emphasis on microcomputer software and archival applications. Graded pass/unsatisfactory.

799-4 to 8 Thesis

Human Factors Engineering/HFE
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions or special course information.

506-4 Engineering Psychology
(Also listed as PSY 506.) Introduction to the study of human factors in the design and operation of machine systems. Prerequisite: PSY 111, 112.

507-4 Industrial Ergonomics
Introduces students to the application of ergonomic principles to the industrial environment. Includes subject matter on ergonomic planning and implementation, the work environment, NIOSHA work factors, and workstation and equipment design. Prerequisite: HFE 506.

631-3 Human Factors Engineering of Visual Displays
Introduction to the design of visual display systems. Topics include display technologies, human visual capacities, design of display parameters, and image quality metrics. Prerequisite: HFE 506.

650-4 Human Factors Engineering Analysis Methods
Covers a variety of engineering and behavioral analytic techniques critical to the study of work performance. Prerequisite: HFE 306 (506).

651-4 Human Factors Engineering in Computer Systems Design
Theoretical paradigms in human-computer interaction and their application to interface design are examined. Emphasis is placed on advanced interface technologies such as multimodel input/output, hypertext, and knowledge-based systems. Prerequisite: CS 142 or equivalent.

671-4 Systems Models in Human Factors Engineering
Studies quantitative means of analyzing and predicting human performance, particularly for human-machine interactions. Topics include estimation theory, control theory, queueing theory, and fuzzy set theory. Prerequisite: PSY 400 or STT 363.

676-4 Human Factors Engineering in Aerospace System Design
Application of human factors engineering concepts to aerospace systems design. Develops human factors engineering influence on aerospace system dynamics, structure, and control as well as impact on reliability and maintainability. Prerequisite: HFE 471.

699-1 to 5 Special Problems in Human Factors Engineering
Topics vary.

723-2 Human Factors Engineering in Aerospace Medicine
Focuses on recent developments in human factors engineering. Design principles, crew compartment technology and resource management, crew member performance, and reliability are discussed. Open to residents of the Aerospace Medicine Program only.

724-3 Human Factors Engineering Advanced Aerospace Systems Design
(Also listed as BMS 953.) Qualifies students to make significant human factors contributions to the design of state-of-the-art aerodynamic and space systems. Emphasizes the design of control-display integration, cockpit configuration, maintainability, and reliability. Prerequisite: HFE 676.

725-3 Human Factors Engineering Workload Analysis
(Also listed as BMS 954.) Provides required tools needed to accomplish a workload analysis as a requisite to a systems design or a redesign of an existing system. Prerequisite: HFE 650.

726-3 Human Factors Engineering: Crew Station Design
(Also listed as BMS 955.) In-depth treatment of human factors engineering principles applicable to design of crew command centers for aerodynamic, space, and maritime systems. Prerequisite: HFE 676.
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731-3 Human Factors Engineering Advances in Visual Display Design
Application of human factors engineering principles to the design of visual display systems. Discusses current display technologies, human vision, design of display parameters, and image quality metrics.

733-3 Advanced Topics in Human-Computer Interaction
Seminar exposing students to theoretical and research issues associated with human-computer interaction (HCI) and cognitive-oriented work from a human factors engineering standpoint. May be taken for letter grade or pass/unsatisfactory.

733-3 Application of Human Factors Engineering to Rehabilitation
(Also listed as BMS 963.) Teaches the application of human factors design concepts for designing aids for the physically handicapped. In addition to manipulation and locomotion aids, barrier-free designs are emphasized.

789-1 Continuing Registration
May be taken for letter grade or pass/unsatisfactory.

790-1 to 5 Seminar in Human Factors Engineering
Topics vary. Graded pass/unsatisfactory.

790-1 to 5 Special Problems in Human Factors Engineering
Graded pass/unsatisfactory. Topics vary.

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. Titles vary.

Latin/LAT
Note: See quarterly class schedule or departmental advisor for further enrollment restriction, requirements, or special course information.

600-1 to 5 Special Project Workshop
Intensive study of Latin, including Latin pedagogy, designed for teachers and others who desire to improve or enhance existing ability. Topics vary.

681-4 Independent Reading in Latin
Reading and discussion of selected works of Latin literature with emphasis on grammatical, rhetorical, literary, and cultural analysis and criticism. May be repeated for credit by number, but not by content. Prerequisite: three years college Latin or departmental permission. Topics vary.

Law/LAW
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

611-3 Graduate Survey of Law and the Legal Environment
Survey course in law and legal systems for students having had no previous course work in law and legal systems.

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.

695-3 Ethics of an Industrial Society
(Also listed as REL 679 and MGT 695.) Investigates the ethical responsibilities of business in light of political, moral, and religious considerations. Emphasizes the analysis and evaluation of the changing framework of responsibilities facing both business organizations and their leaders.
781-3 Special Studies in Business
Topics vary.

**Management/MGT**

**Note:** See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

**621-3 Graduate Survey in Management**
Survey course of basic management designed for students who have had no previous course work in management.

**695-3 Ethics of an Industrial Society**
(Also listed as LAW 695 and REL 679.) Investigates the ethical responsibilities of business in light of political, moral, and religious considerations. Emphasizes the analysis and evaluation of the changing framework of responsibilities facing both business organizations and their leaders.

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

**703-3 Seminar in Personnel Administration**
Analysis of the principal functions, processes, and problems involved in the management of human resources. Evaluation of personnel systems, with emphasis on implications of personnel policy and practice. Prerequisite: MGT 621 or equivalent.

**705-3 Seminar in Industrial Relations**
Presents organization development as an ongoing change process that must be planned and managed. A variety of interventions are explained and situations are analyzed to determine effectiveness. Prerequisite: MGT 700.

**706-3 Organizational Development and Change**
Organization development is presented as an ongoing change process that 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 Research and Development Management**
Seminar of research and development management problems and discussion of possible solutions to provide students with a framework for understanding technological change as an essential element of management. Considers possible future innovations (technological forecasting), defining the steps required to achieve that future, the planning of those steps, and the human-relations aspects of managing the scientific community. Readings and case studies provide source materials. Prerequisite: MGT 621 or equivalent.

**721-3 International Management**
Description and analysis of comparative and dominant international management trends with focus on the following topics: sensitivity to the need for a global managerial perspective; consideration of international and multinational strategic environmental factors; differences in human resource attitudes, behaviors, and management practices; and current issues international managers face in entering and remaining competitive in world markets.

**731-3 Strategic Management and Organizational Policy**
Strategic management process is presented as practiced in business and other types of organizations. Main emphasis is on the organization's interaction with environmental forces that influence its planning for long-term survival and prosperity. Methods include lectures, case studies, and simulation gaming. Students are required to work in teams on some assignments. Prerequisite: All Stage II required courses.

**753-3 Selected Topics in Management**
Topics in international management.

**755-3 Health Care Management**
(Also listed as CMH 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. Prerequisite: MGT 621.

**763-3 Systems Management**
Focuses on the systems approach to the design, management, and operation of organizations. The systems approach is presented as a contemporary organizational philosophy and managerial style as well as an aid in the design and redesign of organizations. A research project is required. Prerequisite: MGT 621 or equivalent.
770-3 Fundamentals of Project Management
Concepts and philosophies are developed by which modern management deals with one-time projects/tasks that have a set of specified time, cost, and performance objectives. Prerequisite: MGT 621, 700, MS 741.

771-3 Human Resources in Project Management
Presents and analyzes the unique inter- and intra-organizational issues vital to the management of human resources and projects. Techniques for enhancing project-oriented resource management are developed. Prerequisite: MGT 770.

772-3 Project Contract Management
Overview of the role of contracting and contract administration in contemporary society. Analysis and synthesis of the relationship of contracting to the project management system. Prerequisite: MGT 621, 770.

773-3 Project Management and Control Techniques
Examines project management techniques that are currently available to aid in planning, estimating, scheduling, and controlling a project from inception to completion. Current project management software is used and/or demonstrated. (Previously listed as MS 791.)

780-6 Management Internship
One-quarter internship in a selected private or governmental organization under the direction of a faculty advisor 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 management. Topics vary. Prerequisite: permission of instructor.

Management Information Systems/MIS
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

621-3 Introduction to Management Information Systems
Overview of the role of information systems in the functional areas of business and in decision support for the organization. Discusses being a user/manager in the systems development life cycle. Assumes personal computer literacy. Prerequisite: CS 205 or equivalent.

622-3 Graduate Survey in Statistics
Basic statistical analysis covering descriptive statistics relating to central location, spread and shape, probability distributions, sampling statistics, and point and interval estimation. Computer software packages are used. Prerequisite: MS 621 or equivalent.

650-3 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, MS 621, 622 or permission of instructor.

Management Science/MS
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

621-3 Survey of Mathematics for Business, Economic, and Logistic Research
Develops competence in quantitative methods for the analysis of business problems by providing students with a background in matrix algebra, and differential and integral calculus.

622-3 Graduate Survey in Statistics
Basic statistical analysis covering descriptive statistics relating to central location, spread and shape, probability distributions, sampling statistics, and point and interval estimation. Computer software packages are used. Prerequisite: MS 621 or equivalent.

650-3 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, MS 621, 622 or permission of instructor.

715-3 Statistical Methods for Business Decisions
Statistical techniques including regression, correlation, hypothesis testing, and analysis of variance. Prerequisite: MS 621, 622.

717-3 Quantitative Methods for Decision-Making
Deals with building quantitative models for public and private sector decision problems, and the analysis and solutions of these problems. Tools emphasized are implemented on computers. Prerequisite: MS 621, 622.
725-3 Business and Social Science Research Methods
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. This course is application oriented and includes the use of computer packages. Prerequisite: MS 715.

730-3 Operations Research Techniques for Business Decisions
Survey of operation research techniques for modeling nonlinear and probabilistic business decisions. Topics include nonlinear optimization, simulation, waiting line analysis, and Markov processes. Computer software packages are used. Prerequisite: MS 715, 717.

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; MS 621, 622; or equivalent. (Previously listed as MGT 741.)

753-3 Inventory Management
Extension of techniques surveyed in MS 741 for forecasting and control of inventory systems. Topics include exponential smoothing, trend and seasonal forecasting techniques, safety stock and order quantity models, and aggregate inventory management methods. Prerequisite: MS 741. (Previously listed as MGT 765.)

755-3 Quality Management
Introduction to the philosophy of quality management (Deming, Juran, etc.), including the practices and techniques used in statistical process control. Prerequisite: MS 741, 715.

757-3 Production Planning and Control
Study of policies and techniques for the planning and control of inventories and production levels. Major topics include production planning, material requirements planning, capacity planning, and just-in-time production systems. Prerequisite: MS 741. (Previously listed as MGT 751.)

759-3 Purchasing and 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: MS 741. (Previously listed as MGT 750.)

760-3 Logistics Systems Design
Examination of the major engineering and management techniques involved in the design, fielding, operation, and phase-out of equipment systems. The impact of maintainability, availability, and reliability on system costs is also covered. Prerequisite: MS 717 or permission of instructor.

770-3 Selected Topics in the Management Sciences
Seminar on one of the areas of management science (i.e., operations research, statistical analysis, and logistics). Topics vary.

771-3 Strategic Logistics Planning
Examines the role of logistics in corporate strategy and to provide a framework within which logistical strategies of firms can be examined and formulated. Prerequisite: MKT 713.

781-1 to 3 Special Studies in Management Science
Intensive reading or research in a selected field of management science. Individualized instruction with varying topics.

Marketing/MKT
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

621-3 Graduate Survey in Marketing
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, and legal, insurance, and marketing aspects.

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
Quantitative techniques of market segmentation, marketing policy in an age of discontinuity, product planning and development, and price management. Topics vary. Prerequisite: MKT 621.

675-3 Entrepreneurship
Problems and perspectives in starting new ventures. Concepts and techniques of searching for market opportunities, screening and evaluating potentials, negotiating, and financing to initiate or purchase a company. Includes development of an individual comprehensive written business plan. Prerequisite: MKT 621, FIN 621.

704-3 Personal Selling and Sales Management
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.

707-3 Marketing Research and Analysis
Understanding the marketing research function in both a basic and an applied sense with emphasis on the concepts, methods, and techniques currently employed in its use as a tool of management. Prerequisite: MKT 741, MS 715.

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, and environment. Prerequisite: MKT 621.

713-3 Logistics Systems
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. 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
Critical study of marketing concepts and practices as related to consumerism, ecology, product safety, truth in advertising, poverty, national interest, social responsibility, and government's role in consumer protection. Emphasis 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. A qualifying examination to test entry-level knowledge of basic marketing is given to all students the first week of class. Prerequisite: MKT 621 or equivalent.

780-6 Marketing Internship
One-quarter internship in a selected private or governmental organization under the direction of a faculty advisor and employment supervisor. Completion of at least seven out of ten core courses and departmental approval required.

781-1 to 6 Independent Studies in Marketing
Readings or research in a selected field of marketing.

799-1 to 9 Thesis

Mathematics/MTH
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

503-3 Differential Equations II
Examples of systems of differential equations, complex and repeated eigenvalues, solutions of systems, matrix exponential, qualitative behavior of first-order equations, planar systems and stability, almost linear systems, and energy methods. Prerequisite: MTH 233, 253.
516-4, 517-4 Numerical Methods for Digital Computers
(Also listed as CS 516, 517.) 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 EGR 153; or permission of instructor; 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. Prerequisite: MTH 232.

533-3 Partial Differential Equations and Boundary Value Problems
Partial differential equations, boundary value problems, eigenfunctions, Fourier series, and applications. Prerequisite: MTH 232.

540-3 History of Mathematics

545-4 Geometry for Elementary School Teachers
Axioms, finite geometries, nonmetric and metric lengths, angles, area, volume, polygonal figures, and elementary curves. Prerequisite: MTH 244.

599-1 to 5 Selected Topics
Selected topics in mathematics. May be taken for letter grade or pass/unsatisfactory.

606-3 Mathematical Modeling
Structure and properties of mathematical models. Size effects; dimensional analysis, graphical methods, comparative statics, stability, optimization techniques, probabilistic models, and Monte Carlo simulation. Prerequisite: MTH 233, 253 or 355, or permission of instructor.

616-4 Matrix Computations
(Also listed as CEG 416/616.) Survey of numerical methods in linear algebra emphasizing practice with high-level computer tools. Topics include Gaussian elimination, LU decomposition, numerical eigenvalue problems, QR factorization, least squares, singular value decompositions, and iterative methods. Prerequisite: MTH 253 or 355; CS 142 or 241.

619-3 Cryptography and Data Security
(Also listed as CS 619.) Introduces the mathematical principles of data security. Various developments in cryptography discussed, including public-key encryption, digital signatures, data encryption standard (DES), and key safeguarding schemes. Prerequisite: MTH 253 or 355.

631-3 Real Variables I
Functions, sequences, limits, continuity, differentiability, integration, and mean-value theorems.

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 and vector-valued functions. Prerequisite: MTH 632.

650-3 Discrete Algebraic Structures
Introduces several abstract algebraic structures and their models that are used in computer science. Examples include semigroups, finite-state machines, and groups and codes. Prerequisite: MTH 253 or 355 or equivalent.

651-3, 652-3 Introduction to Modern Algebra I, II
Introduction to abstract algebraic structures including groups, rings, integral domains, and fields. Prerequisite: for 651, MTH 231; for 652, MTH 651.

655-3 Advanced Linear Algebra
(Also listed as BMS 655.) Vector spaces and subspaces, basis and dimension, linear transformations and matrices, eigenvalues and eigenvectors, inner product spaces. Prerequisite: MTH 255 or permission of instructor.

657-3 Combinatorics
Topics from permutations, combinatorics, generating functions, recurrence relations, and Polya's theory of counting. Prerequisite: MTH 231.

610-4 Theoretical Foundations of Computing
(Also listed as CS 610.) Turing machines; μ-recursive functions; equivalence of computing paradigms; Church-Turing thesis; undecidability; intractability. 3 hours lecture, 2 hours lab. Prerequisite: CS 666.
658-3 Applied Graph Theory
(Also listed as 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.

659-3 Combinatorial Tools for Computer Science
(Also listed as CS 659.) Introduction to some of the mathematical tools needed for an understanding of computer programming. Topics covered are summations, elementary number theory, combinatorial identities, generating functions, and asymptotics.

671-3 Geometry
Topics in the foundation of Euclidean geometry, introduction to non-Euclidean and other geometries. Prerequisite: MTH 231.

672-3 Projective Geometry

675-4 Differential Geometry
Calculus on Euclidean space, Frame fields, calculus on a surface, shape operators, and geometry of surfaces in Euclidean 3 space. Prerequisite: MTH 232.

680-3 Methods of Applied Mathematics: Geometric Methods
Basic mathematical tools for the description of physical systems in three-dimensional space: vector and tensor analysis, matrices, and curvilinear coordinate systems. 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, and orthogonal functions. Additional topics may include Bessel and Legendre functions, stability theory, Liapunov's methods, autonomous systems and the Poincare, phase plane, and existence and uniqueness theorems. Prerequisite: MTH 233, 355 or 480.

682-3 Methods of Applied Mathematics: Integral Methods
Use of integral transforms in the solution of differential and integral equations. Fourier series, Fourier and Laplace transforms and inverses, integral equations, and Green's functions. Prerequisite: MTH 332, 355 or 480.

688-1 to 5 Independent Reading
Titles vary.

692-1 to 5 Seminar
699-1 to 5 Selected Topics
Selected topics in mathematics.

700-3 Principles of Instruction in Mathematics
Survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction.

716-4 Numerical Analysis I: Applied Linear Algebra
(Also listed as CS 716.) Topics chosen with emphasis on computational linear algebra. Systems of linear equations and Gaussian elimination; computation of eigenvalues and eigenvectors; matrix exponential; norm and condition number; and iterative methods. Prerequisite: MTH 355 and CS 142, or knowledge of a high-level language, or permission of instructor.

717-4 Numerical Analysis II: Finite Difference Methods for Partial Differential Equations
(Also listed as CS 717.) Finite difference methods for partial differential equations; analysis of stability and convergence. Prerequisite: MTH 333, 431, 716 or permission of instructor.

718-4 Numerical Analysis III: Finite Element Methods for Partial Differential Equations
(Also listed as CS 718.) Finite element methods for elliptic boundary value problems; analysis of errors, approximation by finite element spaces, effects of curved boundaries, numerical integration, and finite element methods for parabolic problems. Prerequisite: MTH 333, 431, 716 or permission of instructor.

725-4 Computational Logic
Introduces predicate logic as an inference system, emphasizing refutation procedures, problem reduction, and resolution. A basis for studying logic programming and artificial intelligence. Prerequisite: CS 400, or equivalent and departmental approval.

730-4 Principles of Analysis

731-4 Real Analysis I
Lebesgue measure and integration on the real line. Convergence theorems, differentiation of integrals, functions of bounded variation, and absolute continuity. Prerequisite: MTH 730.
732-4 Real Analysis II

733-4 Real Analysis III
Outer measure, measure, integration, general convergence theorems, Radon-Nikodým theorem, product measure, and Fubini's theorem. Prerequisite: MTH 732 or equivalent.

751-4 Algebra I
Group theory-isomorphism theorems, Jordan-Hölder theorem, permutation groups, Sylow theorems, finitely generated Abelian groups, and free groups. Prerequisite: MTH 355, 452; or equivalent.

752-4 Algebra II
Ring theory-polynomial rings, unique factorization, radicals, and 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.

777-4 Applied Analysis I
Function spaces, differential and integral equations, fixed point theorems, Hilbert spaces, compact operators, eigenvalues, eigenfunction expansions, and Sturm-Liouville problems. Prerequisite: MTH 730.

778-4 Applied Analysis II
Inverse operators, fixed-point theorems, compactness, variational methods, and functional analysis of numerical methods. Prerequisite: MTH 777.

792-1 to 5 Special Problems
Titles vary.

799-1 to 5 Selected Topics
Selected topics in mathematics.

899-1 to 18 Graduate Research
Titles vary.

Mechanical Engineering/ME
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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, and column theory. 3 hours lecture, 2 hours lab. Prerequisite: ME 212.

515-4 Thermodynamics I
Classical thermodynamics with applications of the first and second laws to engineering systems.

516-4 Thermodynamics II
Concepts of availability and irreversibility, power and refrigeration cycles, thermodynamic relations, compressible flow, and mixtures and combustion. 3 hours lecture, 2 hours lab. Prerequisite: ME 515.

517-4 Fluid Dynamics
Fluid properties, fluid statics, one-dimensional compressible and incompressible flow, flow of real fluids, and flow measurements. 3 hours lecture, 2 hours lab. Prerequisite: ME 213, 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: ME 517.

570-4 Materials Engineering Science
Effect of atomic, molecular, and crystalline structures on the properties of materials with emphasis on electronic materials and ceramics, characterization of materials, and device fabrication.

571-3 Structure and Properties of Engineering Materials
Effect of microstructure, phase equilibrium, and processing on properties of structural materials including metallic alloys, polymers, and composites. Prerequisite: ME 513, 570.

575-4 Thermodynamics of Materials
Application of classical thermodynamics to engineering materials. Heats of formation and reaction; behavior of solutions; free energy concepts; thermodynamic fundamentals of phase equilibria. Prerequisite: ME 515, 571.

576-3 Physical Metallurgy
Fundamentals of structure property relations in metals and alloys related to transformations and kinetics. Application to recovery and recrystallization, solidification, precipitation strengthening, and displacive transformations. Prerequisite: ME 575.

585-2 Metallography Laboratory
Preparation of metallographic specimens; use of the metallurgical microscope including the preparation of photomicrographs. Corequisite: ME 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: ME 585. Corequisite: ME 571.

605-4 Kinematics and Design of Mechanisms
Graphic, analytical, numerical, and symbolic techniques are used in the kinematic and dynamic analysis of machines. Computer-aided design of mechanisms is introduced. Emphasis on the application of these techniques to planar mechanisms. Prerequisite: ME 213.

608-3 Design Optimization
Concepts of minima and maxima; linear, dynamic, integer, and nonlinear programming. Variational methods. Engineering applications are emphasized. Prerequisite: ME 213, MTH 233.

609-4 Aerospace Structures
Analysis and design of flight structures. Stress, deformation, and stability analysis of aerospace structures. Thin-walled members bending, torsion, and shear stresses calculation in multi-cell structures. Buckling of thin plates. Prerequisite: ME 513.

612-4 Finite Element Analysis
Finite element formulations for line, surface, bending, torsion, and three-dimensional elements. Numerical methods and applications of FEM programs in structural design and solid mechanics. Prerequisite: ME 513, MTH 233.

614-4 Mechanical Design I
Fundamental concepts in design for static strength, fatigue, and impact loading; application to selected mechanical components and systems. Prerequisite: ME 513.

615-4 Mechanical Design II
Design of mechanical elements such as springs, bearings, shafts, gears, clutches, brakes, and flywheels; students conduct an individual design project. Prerequisite: ME 614.

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: ME 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: ME 518.

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: ME 515.

630-4 Aeronautics
Aviation history. Standard atmosphere, basic aerodynamics, theory of lift, airplane performance, principles of stability and control, aeronautics, and propulsion concepts. Prerequisite: ME 213, 515.

631-4 Aerospace Propulsion
Engine cycle analysis; combustion fundamentals; reciprocating engines and propellers; applications to turbojet, turbofan, turboprop, ramjet, SCRAM jet, and rocket engines. Prerequisite: ME 517.

632-4 Flight Control Systems

656-4 Introduction to Robotics
(Also listed as CEG 656 and EE 656.) Introduction to the mathematics, programming, and control of robots. Topics covered include coordinate systems and transformations, manipulator kinematics and inverse kinematics, trajectory planning, Jacobians, and control. Prerequisite: MTH 253; proficiency in Pascal, C, or FORTRAN programming.

660-4 Mechanical Vibrations
Modeling and analysis of single and multi-degree freedom systems under free and forced vibration and impact. Lagrangian and matrix formulations, energy methods, and introduction to random vibrations. Prerequisite: ME 213, EE 521. (Previously listed as ME 560.)

670-3 Failure Analysis
Engineering aspects of failure analysis, failure mechanisms, and related environmental factors. Analysis of actual service failure. Prerequisite: ME 513, 571.

675-3 High Temperature Materials
Design and use of high-temperature superalloys, strengthening mechanisms, creep and fatigue, corrosion and oxidation, protective coatings, and alternative materials. Prerequisite: ME 576. Corequisite: ME 677 or permission of instructor.
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: ME 513, 571.

678-3 X-Ray Spectral Analysis
Electron microprobe and X-ray fluorescence for analysis of alloys and other materials are explained and demonstrated with examples. 2 hours lecture, 1 hour lab. Prerequisite: ME 682.

679-4 Materials Corrosion
Survey of the principles of corrosion processes with application to metallic and nonmetallic materials. Principles of electrochemistry are included. Prerequisite: ME 515, 571 or corequisite: CHM 553.

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: ME 571.

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: ME 576.

683-3 Introduction to Ceramics
Ceramic and refractory raw materials and products; atomic structure and bonding; structure of crystalline phases and glasses; structural imperfections; diffusion in oxides; phase equilibria; processing of ceramics. Prerequisite: ME 575.

684-4 Physical Ceramics
Processing, microstructure, and properties of ceramics; defect equilibria in oxides; thermal, optical, electrical, and mechanical properties of ceramic materials. Ceramics for special applications. 3 hours lecture, 2 hours lab. Prerequisite: ME 683.

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: ME 575.

686-4 Deformation Processing
Fundamentals of principal deformation processing systems including forging, extrusion, rolling, and sheet forming; material response and formability; and mechanics and analysis of selected processes. 3 hours lecture, 2 hours lab. Prerequisite: ME 513, 571.

687-5 Machining
Fundamentals of machining with emphasis on engineering models of machinability, chip formation, cutting forces and power, and lubrication. Introduction to numerical control machining. 3 hours lecture, 2 hours lab. Prerequisite: ME 571.

688-4 Powder Processing

689-4 Engineering Plastics: Materials, Processes, and Design
(Also listed as 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. Titles vary.

700-3 Principles of Instruction in Engineering
Survey of available instructional materials and discussion of educational theories and techniques leading to more effective instruction. For first-year graduate teaching assistants only.

708-3 Multidisciplinary Structural Optimization
Structural optimization of large scale systems with constraint approximations, sensitivity analysis, and design variable linking methods. Primal, dual, and optimality criteria methods for shape and size optimization. 3 hour lecture. Prerequisite: ME 608 or equivalent.

710-4 Computational Methods in Structural Dynamics
Vibration of discrete and continuous systems. Computational methods for the eigenvalue problem. Large-dimensional systems. Approximate methods for continuous systems. Substructure synthesis. Response of vibrating systems. 3 hours lecture, 2 hours lab. Prerequisite: ME 660, FORTRAN programming.

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: ME 612.
714-4 Nonlinear Finite Element Analysis

720-4 Advanced Mechanics of Solids

724-3 Continuum Mechanics
Applying the physical laws of conservation of mass, energy, momentum, and thermodynamics to a continuum to formulate the mathematical equations governing the macroscopic behavior of matter. Understanding the physical meaning of the laws and individual terms in the equations, analysis of stress and deformation at a point, and the development of constitutive equations will be emphasized.

730-3 Advanced Fluid Dynamics
Theory and application of conservation equations for fluid mechanics. Develops boundary layer equations for laminar and turbulent flows. Topics include incompressible, viscous, supersonic, and hypersonic flows. Prerequisite: ME 517.

734-3 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. Prerequisite: ME 730, FORTRAN programming.

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: ME 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, and radiation between gases and surrounding surfaces. Finite difference solution for radiation problem. Prerequisite: ME 518.

742-3 Numerical Simulation of Heat and Mass Transfer
Computational techniques for the solution of engineering problems in multidimensional fluid flow, and heat and mass transfer including two-phase flows and chemical reactions. Prerequisite: ME 730.

756-4 Robotics I
(Also listed as CEG 756 and EE 756.) Detailed study of the dynamics and control of robotic systems and robot programming languages and systems. Material covered includes rigid-body dynamics; linear, nonlinear, adaptive, and force control of manipulators; and robot programming languages. Prerequisite: ME 656.

760-4 Thermodynamics of Solids
Thermodynamics of solutions, reactions, phase transformations, surfaces and interfaces, and point defects. Quasi-chemical model for solutions. Heterogeneous phase equilibria. Phase diagrams and thermodynamic quantities. 3 hours lecture, 1 hour seminar. Prerequisite: ME 575.

761-4 Advanced Topics in Materials Science
Study of equilibrium diagrams through ternary diagrams with an introduction to quaternaries. Advanced topics in diffusion in binary and ternary alloys, ceramics, and intermetallics, defect structures. Fourth-hour discussion of current topics in materials.

762-4 Phase Transformations in Solids
Theory of homogeneous and heterogeneous nucleation, diffusion- and interface-controlled growth, recrystallization, precipitation, and eutectoid decomposition. 3 hours lecture, 1 hour seminar. Prerequisite: ME 576.

780-3 Applied Plasticity

782-3 Processing of Engineering Materials
In-depth study of processing-microstructure-property relationships for selected engineering materials.

880-3 Selected Topics in Systems Engineering
Selected topics in current research and recent developments in systems theory and engineering.

890-1 to 5 Special Problems
Special problems in advanced engineering topics. Titles vary.

899-1 to 5 Thesis
Microbiology and Immunology/M&I

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

699-1 to 4 Special Problems in Microbiology
Study of the physiological and biochemical processes unique to microorganisms.

726-5 Immunology and Basic Virology
(Also listed as BMS 802.) 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
(Also listed as BMS 803.) Microorganisms pathogenic for humans 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 with emphasis on identification of bacteria, fungi, and viruses using culture and immunological methods. Prerequisite: BIO 202, 402; CHM 216 or equivalent.

731-3 Basic Virology
(Also listed as BMS 807.) Introduction to the field of virology with emphasis on animal viruses. 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
(Also listed as BMS 812.) 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; or BIO 402.

800-1 Microbiology Seminar
Graded pass/unsatisfactory.

801-1 to 5 Microbiology and Immunology Seminar/Journal Club
Selected topics in microbiology.

831-3 Seminar Topics in Molecular Virology
(Also listed as BMS 808.) Structure, infectious process, replication, maturation, release, and genetics at the molecular level of the major groups of animal viruses. Prerequisite: M&I 431 (731).

833-3 Seminar Topics in Viral Oncology
(Also listed as BMS 809.) Understanding the processes involved in cell transformation by oncogenic viruses. Prerequisite: M&I 431 (731).

840-2 to 5 Special Topics in Immunology
(Also listed as BMS 813.) Students select, present, and analyze information from current literature in immunobiology. Seminar/discussion format. 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 with emphasis on the contributions of lymphocyte subpopulations. Sequelae of immune imbalance are studied. Prerequisite: M&I 745 or departmental approval.

846-3 Seminar Topics in Infection and Immunity
(Also listed as BMS 818.) 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.
204 Courses/Microbiology and Immunology

851-3 Seminar Topics in Reproductive Immunology
Immunology as it relates to maternal/fetal interactions. Faculty lectures and student presentations on the fetus as a graft, the passive transfer of immunity to the fetus, pregnancy loss, and infertility. May be taken for letter grade or pass/unsatisfactory. Prerequisite: M&l 726/BMS 802.

852-3 Seminar Topics in Clinical Immunology
Immunology as it relates to disease processes. Faculty lectures and student presentations on hypersensitivity diseases, immune deficiency diseases, immunologic diagnosis of disease, tumor immunology, and immunotherapy. May be taken for letter grade or pass/unsatisfactory. Prerequisite: M&l 726/BMS 802.

899-2 to 18 Graduate Research
Supervised thesis research.

Music/MUS

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

Music Education
Registration requires graduate standing in music, or permission of the director of graduate studies in music, and permission of the instructor.

680-1 to 4 Workshops in Music
Selected topics or problems in music, or special areas of music teaching. Titles vary.

681-1 to 6 Independent Study

701-4 Introduction to Graduate Study in Music Education
Methods of investigation in music; use of music bibliography; problems of collecting and evaluating information; and reporting of findings.

702-4 Introduction to Research in Music Education
Class studies and individual projects. Reading, research, discussion, and reports; interpretation of contemporary research. Prerequisite: MUS 701.

704-4 Foundations and Principles of Music Education
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 the public school. Curricula, testing programs, inservice training, teaching aids, school-community relationships, and budget.

707-3 Contemporary Trends in Music Education

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

712-3 Advanced Conducting—Instrumental
Technique and practice of instrumental conducting and 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 and performance practices. Selection of literature and programming.

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

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

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. Titles vary.

799-1 to 6 Thesis

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.

735-3 Contrapuntal Techniques
Study of contrapuntal techniques with practical application in writing and analysis.

741-3 Band and Orchestral Arranging
Band and orchestral instrumentation; scoring of transcriptions and original compositions.

742-3 Choral Arranging
Arranging for choral ensembles common to schools, grades 6–12. Prerequisite: MUS 735 or the equivalent and permission of instructor.

Music History and Literature
651-3, 652-3 Piano Literature I, II
Historical survey of music for piano from origins in clavichord and harpsichord in the Renaissance through the twentieth century.

653-3 Piano Literature III
A study of selected intermediate-level piano music written by major composers and chosen to illustrate chronological sequence and characteristics of important nationalities.

The following courses, MUS 746–749, provide advanced studies in music history and literature of the eras named. Course work includes critical analysis of representative works from major composers, with emphasis on 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
Includes critical analysis of representative works from major composers.

747-3 Baroque Music
Includes critical analysis of representative works from major composers.

748-3 Classic and Romantic Music
Includes critical analysis of representative works from major composers.

749-3 Twentieth-Century Music
Includes critical analysis of representative works from major composers.

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

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 and 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
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

The graduate curriculum is under revision. Specialty area courses in clinical practice, nursing administration, and nursing education will not remain the same as those listed in this catalog. Please call the School of Nursing for current course descriptions and requirements.

614-3 Selected Topics
Special topics. For nursing majors only.

617-2 to 4 Selected Topics
Special topics.

707-3 Research Design and Methodology
Critical analysis of components and methodology of nursing research. Application of the research process in developing a research proposal. Pre- or corequisite: Completion of a statistics course.
708-3 Theoretical Basis of Nursing Practice
Analysis of nursing and other selected concepts, models, and theories as related to nursing practice, administration, and education in development and application of nursing science.

710-3 Advanced Health Assessment
Use of assessment skills with clients for maximum and altered health states using both theoretical and experiential knowledge as appropriate in the role of the advanced clinical practitioner.

713-4 Community Nursing Practice: Altered Health States
Application of community health concepts to designated populations in altered health states with emphasis on health promotion, rehabilitation, and maintenance. Comprehensive multidisciplinary approaches to client care are explored. Clinical practicum required. Prerequisite: NUR 708 and completion of a physical assessment course.

714-3 Selected Topics
Advanced study of various topics. Titles vary.

715-1 to 3 Independent Study
Faculty-directed, individualized study in topics selected by the students.

720-3 Foundations of Advanced Clinical Practice
Analysis of theories and concepts related to advanced nursing practice and alternative models of care. Students concentrate on chosen client population for development of advanced nursing practice role. Prerequisite: Completion of six hours clinical support courses.

723-7 Advanced Clinical Practicum
Application of nursing process in an advanced clinical practitioner role using theoretical and experiential knowledge. Seminar synthesizes previous learning with application to the role of practitioner. Prerequisite: NUR 707, 708, 713, 720, and completion of six hours clinical support courses.

732-3 Health Care Resource Management
Analysis of human and financial resources management in health care organizations. Specific application is made to nurses who are in administrative roles.

733-7 Practicum in Nursing Administration
Observation, participation, and practice in the administration of nursing services in health care settings. Seminars synthesize previous learning and application to nursing administration. Clinical practicum required. Prerequisite: NUR 707, 708, 713, EC 630, LAW 680.

740-4 Curriculum Process in Nursing Education
Analysis of learning theories and models of curriculum design. Development and evaluation of curricula for nursing programs. Prerequisite: NUR 708.

741-3 Teaching Strategies in Nursing
Examination and application of the art, principles, and strategies of teaching in nursing programs. Role of teacher in classroom is explored.

743-7 Practicum in Teaching Nursing
Observation, participation, and practice in teaching nursing concepts. Seminars synthesize previous learning with application to the role of the nurse educator. Clinical practicum required. Prerequisite: NUR 707, 708, 713, 740, 741, and educational support course.

750-3 Health Policy, Politics, and Issues
Critical analysis of public policies and issues affecting nursing and health care delivery. Encompasses economic, political, social, technological, ethical, and legal influences on consumers and health care providers from a global perspective.

751-4 Health and Well-being
Theoretical foundation with emphasis on health promotion, disease prevention, and well-being for individuals and aggregates. Includes application of epidemiological concepts; appreciation of cultural diversity; and investigation of national trends.

752-2 Concepts of Education in Nursing
Analysis of conceptual models of education and instructional technologies for advanced practice.

753-2 Concepts of Advanced Practice
Analysis of concepts and models for advanced practice.

754-2 Concepts of Nursing Leadership and Management
Analysis of models and concepts of leadership, management, and information services for advanced practice.

755-1 Informatics in Health Care
Introduction to trends and issues of informatics in health care with an emphasis on effective use of hardware and software in information technology.

781-3 Thesis/Scholarly Project Seminar
Development of a proposal for a thesis or scholarly project. Seminar focuses on peer review of proposal. Prerequisite: NUR 707.

799-1 to 6 Thesis/Scholarly Project Advisement
Thesis or scholarly project.
Office Administration/OA
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

601-1 to 4 Office Practicum
Selected and supervised work experience in an office. Prerequisite: Bachelor's degree in business education or completion of 9 credit hours of graduate business education required. Graded pass/unsatisfactory.

Pharmacology/PHA
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

610-2 to 3 Introduction to Pharmacology
Covers basic principles of pharmacology, including dose-response relationships, mechanisms of drug action and resistance, the concept drug receptors, and specific binding, and biological transport and distribution of drugs. Prerequisite: BIO 112; CHM 211.

750-3 Biotransformation and Kinetics
(Also listed as BMS 890.) The general bases of toxicology and therapeutics: pharmacokinetics, xenobiotic metabolism, and their effects on determination of the dose-response-time relationship. Completion of courses in physiology, biochemistry, or calculus, or permission of instructor required.

751-4 General Toxicology I
(Also listed as BMS 887.) 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.

752-4 General Toxicology II
(Also listed as BMS 888.) Continuation of PHA 751. 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: PHA 751.

876-2 to 3 Introduction to Pharmacology
(Also listed as BMS 876.) Abbreviated course describing passage of drugs across membranes and their mechanisms of action, distribution, biotransformation, and elimination. Discusses dose-response relationships, receptor-binding kinetics, and topics of interest and importance to enrolled students. May be taken for letter grade or pass/unsatisfactory.

879-5 General Pharmacology I
(Also listed as BMS 879.) Introduces drug-receptor interactions, dose-response relationships, physico-chemical principles of drug action and distribution, pharmacokinetics, and mechanisms of action plus uses of drugs affecting both autonomic and central nervous system functions. Completion of courses in physiology, biochemistry, and anatomy required.

880-4 General Pharmacology II
(Also listed as BMS 880.) 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. Emphasis on antibiotics, antineoplasia, immuno-suppressants, and toxicology. Prerequisite: PHA 879.

990-1 Toxicology Journal Club
Guest speakers, students, and WSU faculty present results of their research. Graded pass/unsatisfactory.

Philosophy/PHL
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

541-4 Aesthetics
Study of theories concerning the nature of the work of art, aesthetic experience, the arts, and beauty.

578-4 Ethics and Medicine
(Also listed as REL 578.) 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.
599-1 to 4 Studies in Selected Subjects
Problems, approaches, and topics in the field of philosophy.

601-4 Major Philosophers
Introduction to the major writings of the outstanding philosophers. Involves presentation and critical examination of the philosophers' views.

632-4 Modern Political Philosophy
(Also listed as PLS 503.) Critical examination of political ideas from 1600 to 1900 with emphasis on Hobbes, Locke, Rousseau, Montesquieu, Hume, Burke, Hegel, Bentham, Marx, and Mill.

681-3 to 4, 683-3 to 4 Independent Reading
Faculty-directed readings in philosophical literature.

694-4 Existentialism
(Also listed as 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 212 or 213 or permission of instructor.

696-4 Epistemology
Origin, certainty, and extent of human knowledge. Prerequisite: PHL 212 or 213 or permission of instructor.

751-1 to 5 Research in Philosophy
Research designed for specific needs of qualified students.

Physics/PHY
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

500-3 Semiconductor Materials
Crystal structure. Selected topics in quantum theory. Electron band structure. Charge carriers in semiconductors. Generation recombination and motion of charge carriers. Electrical and optical properties. Structure and characteristics of p-n junctions. Prerequisite: PHY 250, 244 or 251, 252 and CHM 121.

501-3 Semiconductor Device Physics
Structure and characteristics of bipolar transistors, of field effect transistors, and of other selected devices. Design and computer modeling of devices. Prerequisite: PHY 500 or EP 500. (Environmental Physics [EP] course descriptions not available by press time.)

502-3 Semiconductor Device Processing
Survey of the individual processes used in fabricating semiconductor devices. Integration of these processes to produce MOS and bipolar structures. Computer design aids. Prerequisite: PHY 301, or EP 301 or ME 370 or permission of instructor. (Environmental Physics [EP] course descriptions not available by press time.)

602-3 Thermodynamics I*
First and second laws of thermodynamics: general thermodynamic formulas with applications to matter. Prerequisite: PHY 210 and 211 or 252.

621-3 Statistical Thermodynamics II*

622-4 Applied Optics*
Study of optical instruments by means of both geometric and physical optics. Theory and applications of interferometry and light detection devices. Brief introduction to lasers and holography. 4 hours lab for five weeks, 3 hours lecture. Prerequisite: PHY 252.

632-3 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 252 and 260 or CHM 121; or permission of instructor.

642-4 Physical Optics
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*
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, and electromagnetic radiation. Prerequisite: PHY 252; 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 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.

671-3, 672-3 Analytical Mechanics I, II*
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 210, 211, or 252; MTH 232. Corequisite: MTH 233.

680-4, 681-3, 682-3 Introduction to Theoretical Physics
Classical theoretical physics with emphasis on mechanics, electromagnetic field theory, and mathematical techniques. Prerequisite: PHY 372, 452; MTH 333.

694-3 Advanced Physics Laboratory
Selected laboratory problems and experiences in experimental physics at the advanced level. Students maintain a high level of independence in the investigations.

699-1 to 4 Topical Problems in Physics
Special topics, problems, or research designed for specific need and proficiency of the student.

700-3 Principles of Instruction in Physics*
Survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. For physics majors only or departmental approval required.

710-3, 711-3, 712-3 Quantum Mechanics
Introduction to nonrelativistic quantum mechanics. Schroedinger's equation. Matrix mechanics. Applications to simple atomic and nuclear systems.

720-4 Statistical Physics

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 481 (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 482 (682).

730-3, 731-3, 732-3 Solid State Physics
Introduction to the physics of solids. Lattice dynamics; thermal, electrical, and mechanical properties. Free electron and band theories of solids.

770-3 Selected Topics
Topics vary.

780-3, 781-3, 782-3 Plasma Physics
Introduction to plasma physics. Motion of charged particles in electric and magnetic fields. Magneto-ionic theory, continuum equations, the Vlasov equation, the Boltzmann equation, and the BBGKY equations.

799-1 to 5 Minor Problems
Students pursue topics on a tutorial basis. Cannot be used for thesis credit.

800-0.5 Seminar
Scheduled discussions of current problems in physics. Centered around student presentations.

899-1 to 15 Research
Gives students opportunities for study or laboratory work in a specialized field of interest. For thesis preparation. May be repeated.

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

Physiology and Biophysics/P&B
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

501-4 Physiology of Health and Disease I
Subject areas include membrane transport, nervous and skeletal function, central and autonomic nervous systems, gastrointestinal function, and metabolism. Topics include normal and abnormal responses of the body.
502-4 Physiology of Health and Disease II
Subject areas include cardiac function and circulation, pulmonary and renal function, and acid-base regulation. Topics include normal and abnormal responses of the body.

503-4 Physiology of Health and Disease III
Subject areas include fluids, electrolytes, osmolarity, blood, endocrinology, and reproduction. Topics include normal and abnormal responses of the body.
Prerequisite: P&B 501, 502 or equivalent.

601-4 Cell Physiology and Biophysics
(Also listed as BMS 852.) Fundamentals of cellular homeostasis and the role of specialized cells in organismal homeostasis.
Prerequisite: PHY 111, 112, 113, 210, 211 or 240, 241, 242 or CHM 456.

602-4 Physiology and Biophysics of Cells and Systems II
Epithelial solute and water transport; the control of intracellular pH and role in cellular growth; gastrointestinal mucosal transport; hormonal adaptation; and muscle energetics and exercise.
Prerequisite: P&B 601.

642-3 Introductory Neurophysiology
(Also listed as BMS 865.) Physiological mechanisms that subserve the functions of the nervous system. Topics include the biophysics of neuronal information, intercellular communications, motor control, sensory systems, and developmental neurobiology.
Prerequisite: BMS 750, 752.

669-3 Quantitative Aspects of Membrane Transport
(Also listed as BMS 869.) Employs a quantitative approach to the properties of solutes, water, bio-electrical phenomena, the properties of transport systems that move solutes across biological membranes, and the interactions of these solutes with membranes. Completion of calculus, cell biology, and cellular physiology and biophysics required. May be taken for letter grade or pass/unsatisfactory.

699-1 to 4 Special Problems in Physiology
Enables students to explore potential careers in physiology. Varies from working on an ongoing physiological research project to a historical survey related to a completed research project.

701-1 to 5 Selected Topics in Physiology
A selected area is discussed in greater detail than in the basic courses (P&B 702, 703). Some topics may include laboratory.
Prerequisite: P&B 702, 703, or permission of instructor.

702-6 Basic Human Physiology I
Homeostasis, cell function, muscle action, nervous system integration, and circulation. 4 hours lecture, 2 hours lab, conference. Completion of one year each of biology, chemistry, and physics required.

703-4 Basic Human Physiology II
Negative feedback regulation; metabolism; gastrointestinal, pulmonary, renal, and endocrine functions; and integrative functions. 4 hours lecture, 2 hours lab, conference. Prerequisite: P&B 702.

704-1 Fluorescence: Theory and Practice
(Also listed as BMS 867.) Covers the theoretical basis for fluorescence and instrument design in this methods-oriented course. Applications of interest to the physiological and biochemical sciences will be discussed. Graded pass/unsatisfactory. Prerequisite: BMS 750, 752.

720-3 Neurophysiology
(Also listed as BMS 902.) Topics address the representation, processing, and transmission of neural information, and the role of neuronal circuits in motor control and sensory systems.
Prerequisite: P&B 642 or permission of instructor.

722-3 Ion Channels
(Also listed as BMS 853.) This course explores the role of ion channels in a variety of cell types with an emphasis on both electrophysiological and biochemical methods for evaluation of channel function.
Prerequisite: P&B 601 or permission of instructor.

733-3 Cardiovascular Physiology
(Also listed as BMS 866.) Survey of the physiology of the human cardiovascular system: components and control, cell, organ, and system level. Both newborn and adult are included, as well as adjustments to exercise and non-exercise stress. Completion of one year each of biology, chemistry, and physics required.

751-3 Molecular Basis of Secretion
(Also listed as BMS 868.) Explores current hypothesis for the formation, sorting, and release of secretory vesicles at a molecular level integrating ideas from cell biology, neuroscience, and membrane biophysics. Methodology is emphasized. Prerequisite: P&B 601 or BMS 852.

761-3 Gastrointestinal Physiology and Biophysics
(Also listed as BMS 859.) Principles of gastrointestinal physiology and biophysics emphasizing cellular mechanisms of secretion, absorption, and motility.
Prerequisite: P&B 601 or permission of instructor.
771-3 General Endocrinology
(Also listed as BMS 860.) Survey of endocrinological mechanisms and their role in integration of body function. Prerequisite: P&B 703 or permission of instructor.

777-7 Medical Neuroscience
(Also listed as ANT 777 and BMS 854.) Interdisciplinary/interdepartmental course for graduate and medical students that integrates basic and clinical neurosciences. Structural and functional topics are combined with clinical information to address major neurological and psychiatric disorders.

783-5 Physiological Aspects of Exercise
(Also listed as BMS 864.) 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: P&B 702, 703 or equivalent, or permission of instructor.

800-2 Seminar
Students organize and present material to colleagues and faculty.

808-1 Neuroscience Seminar
(Also listed as BMS 990.) Students present a current scientific article to colleagues and faculty. Graded pass/unsatisfactory.

899-2 to 18 Graduate Research
Supervised thesis research.

Political Science/PLS
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

502-4 Classical and Medieval Political Thought
Critical examination of political ideas from 500 B.C. to A.D. 1500 with emphasis on Plato, Aristotle, Cicero, St. Augustine, St. Thomas Aquinas, Luther, Calvin, and Machiavelli. (Previously listed as PLS 601.)

504-4 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. (Previously listed as PLS 603.)

540-4 Law and Society
Theories of law and the nature and functions of the judicial process.

541-4 Civil Liberties
Cases and related materials on the Bill of Rights and the 14th Amendment with emphasis on the First Amendment freedoms.

542-4 Civil Liberties I: The First Amendment
Cases and related materials on the Bill of Rights and the 14th Amendment with emphasis on the First Amendment freedoms, concentrating on Supreme Court behavior and First Amendment procedures.

543-4 Civil Liberties II: Due Process and Equal Protection
Covers cases and related materials on the Bill of Rights and the Fourteenth Amendment. Emphasis on the First Amendment freedoms concentrating on enforcement of civil rights and liberties under the Bill of Rights and the Fourteenth Amendment.

547-4 American Public Policy Analysis

566-4 Politics of the Middle East
Introduction to governments and politics of the Middle East with emphasis on cultural and historical background and the Arab-Israeli conflict.

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
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.

581-4 National Security Politics
Study of U.S. national defense and security policy process and the major strategic issues facing the U.S. government. Prerequisite: PLS 200.

583-4 Soviet Foreign Policy
Study of the historical and ideological origins of Soviet foreign policy, with particular emphasis on U.S./Soviet relations, and Soviet involvement in the Third World. Prerequisite: Completion of political science major core courses or permission of instructor.

599-1 to 4 Studies in Selected Subjects
Problems, approaches, and topics in the field of political science. Topics vary.

627-4 Urban Policy Analysis
Selected urban problems and their relationship to the political environment; explores program design and evaluation, and the use of social indicators.
630-4 Seminar in American Politics and Government
Selected topics related to American political institutions and processes. Emphasis on readings, discussion, and research.

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; and development of political attitudes and values.

635-4 Political Corruption in America
Analysis of political corruption in America, including campaigns and elections, graft, the executive branch, congressional ethics, corruption in law enforcement, organized crime, and abuse of authority. Prerequisite: PLS core or permission of instructor.

638-4 Environmental Law and Policy
Examines environmental law and policy and reviews the statutory framework pertaining to environmental impact statements, the regulation of air and water pollution, the disposal and cleanup of toxic wastes, and workplace safety.

639-4 Bioethics and Law
New biological technologies are emerging that increase our control over human behavior and functions. Course examines the legal implications of these new biological technologies, particularly mind and behavior control, genetic engineering, birth and death control, and organ transplantation.

640-4 Constitutional Law
Cases in which provisions of the Constitution have been judicially interpreted; federal systems; separation of powers; and limits on government. (Previously listed as PHL 540.)

642-4 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. (Previously listed as PHL 542.)

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.

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; and legislative-executive relations in budget formation and implementation.

650-4 Political Institutions in Primitive Societies
(Also listed as ATH 650.) Study of that part of the culture of primitive societies that is recognized as political organization. An attempt is made to show how in less complex (primitive) societies, new local communities come into being through fission.

670-4 Seminar in International Relations
Readings, research, reports, and discussion on selected topics and problems.

671-4 International Law
Study of rules governing the conduct of international politics with emphasis on their relevance to current world problems.

672-4 International Terrorism Seminar
Surveys the phenomenon of terrorism: who employs it, how and why it occurs in international politics, and how targets respond to terrorism. Prerequisite: PLS 222.

690-1 to 4 Independent Reading
Supervised individual readings on selected topics.

691-1 to 4 Independent Research
Supervised individual research on selected topics.

692-1 to 4 Independent Field Experience
Supervised individual projects. May involve intern programs in local government or other special programs.

694-1 to 4 Special Topics
Study of particular political problems of contemporary significance.

Professional Psychology/PSI
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

All PSI courses may be taken for a letter grade or pass/unsatisfactory.

811-3 History and Systems of Psychology
Historical and philosophical precursors of psychology's knowledge base. Early philosophers' and recent thinkers' views of epistemology, existentialism, consciousness, and behavior.
**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, and cognitive structure and processing. Applications to clinical and training problems.

**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.

**814-3 Advanced Statistics and Experimental Design**
Strengths, limitations, and applications 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.

**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.

**816-3 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.

**830-3 Physiological Psychology I**
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.

**831-1 to 6 Physiological Psychology II**
Continuation of PSI 830. May be taken for letter grade or pass/unsatisfactory.

**832-3 to 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.

**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; and genetic counseling.

**834-3 Psychopharmacology and Nutrition**
Chemical structure of primary CNS neurotransmitters. Classification, chemical structure, effects, and side effects of psychoactive drugs. Basic principles of nutrition and behavior correlates of imbalance in nutritional status.

**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.

**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.

**852-3 Human Development I**
Conceptualizations of infancy, early childhood, and adolescence including physical, cognitive, intellectual, social, and interpersonal development. Lecture, lab, field work.

**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, including biological, sociological, and interpersonal factors. Lecture, lab, field experience.

**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.

**871-3 to 5 Social Deviancy**
Study of juvenile justice system, delinquency, criminal behavior, and antisocial behavior. Discussion of familial social factors that contribute to deviant behavior, with emphasis on children and adolescents.
872-3 Social Systems
Family as an institution: socioeconomic status, rural-urban, ethnic, cultural, and religious. Sex and age roles. Socialization practices and patterns of parenting. Lecture, lab, field work.

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.

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.

875-3 Conflict Resolution
The effective, 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.

876-3 to 5 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.

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 (human/machine interface) are considered. Lecture, lab, field work.

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.

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.

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.

882-3 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.

910-1 to 6 Introduction to Assessment
Overview and review of assessment theory, techniques, and strategies to prepare students for further practical work in the assessment of cognitive functioning. Topics include history of assessment, theoretical and statistical principles, reliability and validity, behavioral assessment, writing assessment reports, and ethical and legal aspects of assessment. May be taken for letter grade or pass/unsatisfactory.

911-3 Cognitive 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. Titles vary. Lab may be taken for letter grade or pass/unsatisfactory and variable credit hours.

912-3 to 5 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.

913-3 Personality Assessment II
Objective and projective techniques; how and when to administer, score, interpret, and convey results meaningfully. Emphasis on integrating these results into the clinical situation. Lecture, lab, field work.

914-3 Basic Psychotherapeutic Methods I
915-3 Basic Psychotherapeutic Methods II

916-3 Advanced Personality Assessment
Advanced understanding of the use of projective techniques in the assessment of personality functioning and psychopathology, with particular reference to the Exner system of Rorschach assessment. Use of case studies, test protocols, and interpretive approaches to formulation of personality dynamics. May be taken for letter grade or pass/unsatisfactory.

917-3 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.

930-3 Basic Psychotherapeutic Research
Strategies and problems unique to psychotherapeutic research. Outcome research in psychotherapy. Relation of outcomes to diagnosis and survey of predictors of success in psychotherapy.

931-3 Psychodynamic Psychotherapy
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.

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.

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.

934-1 to 6 Behavioral Intervention II
Continuation of PSI 933. May be taken for letter grade or pass/unsatisfactory.

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.

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.

937-3 Psychophysiological Interventions

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.

939-3 to 5 Child Psychopathology

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.

942-1 to 5, 943-1 to 5, 944-1 to 5, 945-1 to 5 Selectives
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Topics vary.

946-1 to 5, 947-1 to 5, 948-1 to 5, 949-1 to 5 Selectives
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Topics vary.

954-3 Psychology of Disability: Mental Retardation
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. (Previously listed as PSI 892.)
216 Courses/Professional Psychology

955-3 Geriatric Clinical 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.

956-1 to 5 Group Interventions
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches.

957-3 to 5 Brief Psychotherapy
Study and discussion of problem-focused, time-limited interventions. Study of concepts and techniques; use of programmatic and group methods.

968-3 to 5 Special Interventions
Study and discussion of unique programs for focalized psychological problems (e.g., phobias, treatment of psychopaths, and multiple personalities) and other specialized intervention techniques not covered in previous intervention courses. Titles vary.

970-3 Eclectic Psychotherapy
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.

971-3 to 5 Community Psychology
Study of influence of community on 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.

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.

973-1 to 5 Professional Practice Seminar
Study of the establishment and maintenance of independent or small group practice. Discussion of issues related to practice management. Titles vary.

974-1 to 6 Supervision and Case Management Techniques
Focuses on issues related to personal and professional practice management; i.e., time and resource management, quality assurance, fundamentals of service delivery systems, and case management activities. Development of general knowledge and skill acquisition in practice management. May be taken for letter grade or pass/unsatisfactory.

980-1 to 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.

981-1 to 6 Practice Tutorial
Provides for an in-depth exposure of students to a variety of clinical case materials under the direct supervision of experienced clinical faculty, using a vertical team format comprised of students at various levels of training and experience. May be taken for letter grade or pass/unsatisfactory.

982-1 to 5 Selective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Topics vary.

995-1 to 5 Directed Readings: Research
Individualized course of readings completed under faculty supervision.

996-1 to 5 Directed Research
Research or evaluation performed under faculty supervision.

997-1 to 6 Supervised Experience
Faculty supervised clerkship, field placement, or other isolated circumscribed professional experience.

998-1 to 5 Directed Projects
Project of excellence or other professional project carried out with faculty approval and supervision.

999-6 to 12 Internship

Psychology/PSY
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

503-4 Psychology of Health Behavior
The contributions of psychology of health care. Focus is 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. Prerequisite: PSY 111, 112.

506-4 Engineering Psychology
(Also listed as HFE 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
Introduction to the construction and use of attitude scales, aptitude and ability tests in organizational settings with emphasis on the use 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
Principles of conditioning as related to problems in human adjustment. General principles of the psychology of learning 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 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. For nonmajors only. Prerequisite: PSY 111, 112.

521-4 Cognition and Learning
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. 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; emphasis on motivational systems and learning.

592-4 Advanced Physiological Psychology
Physiological mechanisms of behavior with emphasis on motor and sensory systems. Prerequisite: PSY 591.

600-4 Advanced Research Design and Quantitative Analysis
Use of factorial designs and multivariate tests in psychological research. Prerequisite: PSY 300.

601-4 Advanced Experimental Design: Packaged Computer Programs
The use of canned computer programs such as SPSS, SAS, and BIOMED in the design, analysis, and interpretation of behaviorally oriented research. Prerequisite: PSY 300, 400.

611-4 Advanced Topics in Abnormal Psychology
Theories and research relating to causes, symptoms, and influence of abnormal behavior. Prerequisite: PSY 311 or permission of instructor.

619-4 Advanced Topics in Physiological Psychology
(Also listed as BMS 910.) Detailed examination of selected areas in cognition and learning. Prerequisite: PSY 391.

621-4 Advanced Topics in Cognition and Learning
Detailed examination of selected areas in cognition and learning. Prerequisite: PSY 321.

625-4 Human-Computer Interface
Relationship of human cognitive, perceptual, and language processes to the effective operation of computer systems. Review of research and theory. Prerequisite: PSY 321, CS 142.
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.

631-4 **Advanced Theory and Research in Personality**
Review of selected topics in personality. Focuses on selected personality constructs and their measurement (i.e., need for achievement and self-concept) as well as situational determinants of behavior. Prerequisite: PSY 331.

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.).

633-4 **Developmental Psychopathology**
Survey of theoretical approaches to the description and explanation of childhood psychopathology, overview of current research in childhood psychopathology, and description of methodological problems involved in clinical research with children.

636-4 **Behavior Modification Method and Theory**
The principles of conditioning as they relate to problems in human adjustment. The general principles of the psychology of learning 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 411 or permission of instructor.

637-4 **Behavior Modification**
Applications of psychological principles to a wide variety of behaviors. Prerequisite: PSY 331 or 411 (611) 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 permission of instructor.

641-4 **Advanced Developmental Psychology**
Development of learning and cognition in children is covered in depth. Prerequisite: PSY 300, 341.

643-4 **Psychometrics**
The basic principles, problems, and techniques of psychological testing with emphasis on test construction, interpretation, and usage.

644-4 **Advanced Industrial Psychology**
Theories and research findings in selected topics in industrial psychology.

647-4 **Psychology of Aging**
Overview of the theoretical, methodological, and conceptual issues in the study of human aging. Focus is on current research and applied relevance. Prerequisite: PSY 111, 112, 341.

650-4 **Biofeedback: Research and Application**
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. Prerequisite: PSY 361.

651-4 **Advanced Topics in Experimental Social Psychology**
Detailed examination of selected areas of current research in social psychology. Prerequisite: PSY 300, 351.

655-4 **Psycholinguistics**
Experimental findings in the areas of animal communication and human language with emphasis on their implications for current theories of language. Includes production and reception of speech, acoustic signal, speech mechanism, personality and speech behavior, development and deficiencies, and communication.

657-4 **Psychology of Administrative Principles for Social Agencies**
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.

661-4 **Advanced Topics in Learning and Motivation**
Continued study of conditioning, learning, and motivation. Prerequisite: PSY 300, 361.

665-4 **Information Processing**
(Also listed as BMS 905.) Experimental findings in animal and human memory with emphasis on their implications for current theories of memory.

671-4 **Advanced Topics in Perception**
Emphasis on modern controversial issues and theories. Prerequisite: PSY 300, 371.

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.
678-4 Animal Behavior
(Also listed as BIO 678.) Physiology, phylogeny, and ontogeny of behavior.
Prerequisite: PSY 111, 112 or 300; or BIO 105, 106, 107; or BIO 115, 112, 114.

681-4 History of Psychology
Major trends in the development of psychology from its beginning to the present.

682-4 Theories and Systems in Psychology
Comprehensive treatment of the historical antecedents for selected theories and systems in psychology.

688-1 to 4 Seminar in Special Topics
Topics vary.

690-1 to 4 Independent Readings—Selected Topics in Psychology
Topics vary. Graded pass/unsatisfactory.

698-1 to 4 Independent Research
Original problems for investigation.

700-3 Principles of Instruction in Psychology
Survey of available instructional material and discussion of educational theory and techniques leading to more effective instruction. For psychology majors only. Department permission required. Graded pass/unsatisfactory.

701-4 Research Design and Quantitative Methods: I
The foundation of experimental design and quantitative techniques will be developed. Students are expected to understand assumptions underlying each technique or procedure. They must also understand their applications to experimental and field research and to experimental and quasi-experimental designs. Both complex analyses of variance, multiple regression and non-parametric techniques will be covered. Computation and computer skills must be mastered. First year research projects and their design and analysis will be reviewed.

702-4 Research Design and Quantitative Methods: II
Continuation of PSY 701. Prerequisite: PSY 701

703-4 Research Design and Quantitative Methods: III
Continuation of PSY 702. Prerequisite: PSY 702.

707-4 Multivariate Methods in Psychology
The techniques of multivariate analysis will be reviewed and developed. Techniques will include MANOVA, discriminate analysis, canonical correlation, factor analysis, and path analyses. Application to problems in psychology will be required. Use of statistical packages for analysis. Prerequisite: PSY 703.

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.

721-4 Engineering Psychology
Application of psychology to equipment design and human-machine relationships.

724-4 Human Factors in System Development
The process of system design and development will be described and human factors activities at each phase will be elucidated. Macroergonomic as well as microergonomic considerations will be reviewed. Analytic techniques such as job and task analysis, link analysis and timeline analysis will be utilized. Each student will participate in a design project individually or as a team member.

725-4 Workspace Design and Anthropometry
Design parameters for the effective use of a workspace will be reviewed, including seated and standing environments. Data sources will be reviewed and students will practice using them for workspace design. Anthropometric measurement techniques will be described.

726-4 Attitude Structure and Change
Attitude as a social psychological concept, including problems of measurement, empirical findings, and theoretical models. Prerequisite: PSY 351 or permission of instructor.

727-4 Small Groups
Current theory and research in selected areas of small groups, including communications, group norms and conformity, group structure, and leadership. Prerequisite: PSY 351 or permission of instructor.

729-4 Interpersonal Relations
A laboratory group for the study of interpersonal relations, in which the group determines the goals and the means of goal achievement and then proceeds toward the goal.

731-4 Theories of Personality
Contemporary theories of the development, organization, and dynamics of personality. Prerequisite: PSY 331.
732-4 Personality Structure and Assessment
The major approaches for describing personality structure will be discussed and the results of factor analytic studies will be summarized. Implications of personality structure for behavior will be explored and the interactionist model will be described and evaluated. Relevant data on individual differences and tests will be summarized and evaluated. Consistency of differences across situations as well as application of results will be discussed.

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 problems versus illness models of psychopathology and treatment, and preventive interventions.

735-4 Systems Analysis and Organizational Change
Overview of the systems approach to organizational diagnosis, planning, and intervention in human service organizations. Behavioral interventions are emphasized. Prerequisite: ABS 721, 722, or permission of instructor.

740-4 Seminar in Industrial/Organizational Psychology
(Also listed as ABS 770.) Designed to provide an overview of the major topics in industrial/organizational psychology. Traditional as well as developing topics are surveyed.

741-4 Personnel Selection
In-depth review of the psychological basis of personnel selection including recruitment techniques, criterion development, performance evaluation, validity generalization, and instruments. Theoretical, practical, and legal issues are covered. Prerequisite: PSY 740/ABS 770.

742-4 Behavior in Organizations
Review of behavior in organizations within a framework of psychological theory and research. Topics include socialization, careers, organizational design, and leadership. Prerequisite: PSY 740/ABS 770.

743-4 Psychology of Leadership
Designed to explore the theories, research, and practice of leadership in work organizations from a psychological perspective. Prerequisite: PSY 740/ABS 770.

745-4 Research Methods in Industrial/Organizational Psychology
The course focuses on the unique methodological challenges faced by I/O researchers. The empirical problems that the complex nature of organizations and their uncontrollable environments pose for researchers are discussed. Theory, causation, and experimental validity are reviewed. Various research designs (e.g., true experiments, quasi-experiments, correlation and regression analysis, ethnographic study) are presented and scrutinized. Methods of data collection (e.g., unobtrusive measurement, survey, qualitative) are reviewed. Meta-analysis as a research method is discussed.

751-4 Proseminar in Human Factors Psychology I
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
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.

753-4 Group Processes and Social Behavior
Theories and data on social behavior will be reviewed. Topics will include attitude and attitude change, social perception, prejudice, and group decision-making. Possible applications will be discussed.

759-0 to 1 Seminar in Human Factors
Discussions of topics in human factors.

761-4 Human Learning Psychology
Phenomena, principles, and problems of learning and retention.

762-4 Advanced Learning
Experimental findings in animal and human learning with emphasis on their implications for current theories in learning. Prerequisite: PSY 361 or permission of instructor.

763-4 Advanced Motivation
Experimental findings in animal and human motivation with emphasis on their implications for current theories of motivation. Prerequisite: PSY 361 or permission of instructor.

765-3 Human Information Processing
An exploration of the basic phenomena of attention and pattern recognition. Both top-down and bottom-up approaches to word recognition, reading and speech recognition will be discussed. Components of pattern recognition and the relevant data will be analyzed. Models of choice, identification and search will be evaluated. Theories of attention and relevant data from dichotic listening and dual task experiments will also be discussed.

766-1 Human Information Processing Laboratory
Corequisite has changed to PSY 765.
766-1 Human Information Processing Laboratory
Laboratory experiments in human information processing illustrating basic cognitive phenomena. Practical experience in measurement techniques and experimental design. Corequisite: PSY 665.

771-4 Perception
Selected problems in perception with emphasis on theoretical interpretations.

773-4 Sensory Processes
The basic physiology of the senses and the peripheral nervous system. Emphasis on receptor mechanisms and neural coding processes. Prerequisite: PSY 371 or 391 or permission of instructor.

775-4 Neuropsychology
Intensive laboratory involvement with the instrumentation and surgical techniques used in physiological psychology including: GSR, EMG, EKG, and EEG recordings; animal behavioral changes produced by electrical stimulation of the brain and/or lesions of brain structures. Prerequisite: PSY 391, 392 or permission of instructor.

776-3 to 4 Visual Science
Study of visual systems including psychophysical measurement, temporal and spatial properties, display criteria, colorimetry, and visual system modeling.

777-1 Visual Science Laboratory
Laboratory experiments in visual psychophysics and perception illustrating phenomena studied in PSY 776. Practical experience in measurement techniques. Corequisite: PSY 776.

782-4 Instrumentation in Psychology
Review of instrumentation used in psychological research and applications—relevant microprocessors and analog devices will be described. Topics will include displays, timing, transducers, A/D/A, amplifiers, and logical control. Students will construct and modify devices.

784-1 Professional Issues
Seminar in which professional issues and ethics are discussed.

785-4 Intermediate Statistics
Statistical methods and interpretations encountered in experimental studies and presentations of behavioral data.

790 1-6 Independent Research
Research conducted under faculty supervision. Permission of Instructor.

799 1-5 Thesis Research
Research conducted for the M.S. thesis. Research must be approved by supervisory committee, submitted in writing and defended by public oral examination.

823-4 Display Design
Principles and data underlying the design of visual displays will be reviewed. Topics will include legibility and physical display characteristics, organization of display screen information, and stimulus-response compatibility and coding systems. Students will explore methods for evaluating displays.

825-4 Aviation Psychology
Review of human factors applications in aviation. Cockpit displays and controls and the principles of their design will be summarized. Causes of human error and accidents will be examined. Use of flight training and simulation methods. Students will write a critical review paper on relevant topics and present a seminar on it. Prerequisite: PSY 721 or Permission of Instructor.

842-4 Work Motivation
Work Motivation theories are examined in terms of their empirical support and practical usefulness. The relationship between intrinsic and extrinsic motivation is examined and the effectiveness of reinforcers and pay in motivating employees is investigated. Goals and the setting of objectives by employees are discussed in terms of their impact on performance. The design of work is discussed in terms of motivating and demotivating job characteristics and work factors. Expectancy-Valence theory is presented and critiqued. The impact employees' perceptions of fairness have on performance and satisfaction is considered.

845-4 Organizational Theory
The structuring of organizations is discussed in terms of centralization, formalization, and complexity. Issues of division of labor, span of control and departmentalization and delegation are examined. Mechanistic versus organic models of organizational design are compared and contrasted. The role technology plays in design is addressed. The environment's impact on organizational design is examined including uncertainty, information processing and adaptation. Matrix designs are evaluated in terms of their efficiency and flexibility.

862-4 Training, Simulation and Instructional Systems
Advances in computer science and artificial intelligence have provided us with the potential to develop instructional systems that are capable of improving the effectiveness of training. The modules that comprise an instructional system (expert diagnosis, instructional, and environmental modules) are discussed. Theories of information processing, learning, and memory that can be used to guide the development of these systems are also discussed. Evaluation of training programs are analyzed in depth.
864-4 Cognitive Modeling
Review of computer models for cognitive processing, including propositional and connectionist approaches. Development and evaluation of mathematical models.

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.

875-4 Psychoacoustics
Advanced examination of auditory psychophysics and perceptual processes involving consideration of peripheral and central auditory physiology whenever possible.

881-4 History and Systems in Psychology
A review of the history of psychology that explores the major trends in the development of the field. The relation of modern psychology to its antecedents will be explored.

886 1-4 Topics in Human Factors
Seminars with in-depth coverage of special topics in human factors. Topics vary. Permission of Instructor.

888 1-4 Topics in Industrial/Organizational
Seminars with in-depth coverage of special topics in industrial or organizational psychology. Topics vary. Permission of Instructor.

891-4 Behavioral Neuroscience
(Also listed as BMS 914.) Coverage of the neurobiological basis of behavior. Focuses on motor function, ingestion, mating, learning, memory, rhythmical influences, and emotion.

894-4 Engineering Psychophysiology
The application of psychophysiological measures to problems in engineering psychology will be addressed. Electroencephalographic, oculomotor, cardiovascular and respiratory measures will be reviewed. Relationship to workload, attention, circadian rhythms, stress, and display design will be explored.

968-4 Manual Control and Psychomotor Skills
Description of human control processes and their models. Analyses of human skills and skill typology. 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.

999 1-12 Dissertation Research
Original research of a quality that is publishable in refereed journals. Research must be acceptable to the supervisory committee, submitted in writing and defended by public oral examination.

Rehabilitation/RHB
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

670-1 to 4 Workshop in Rehabilitation
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.

700-4 Counseling: Severe Disability Foundations of Vocational Rehabilitation
Introduces rehabilitation. Topics include history, philosophy, legislative bases, organizational structures, rehabilitation process and procedures, public and private sectors of rehabilitation, rehabilitation agencies, and professional issues and ethics.

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
Necessary terminology and knowledge of disabilities and disorders for understanding and interpreting medical reports. Symptomology, treatment, functional limitations, and other management aspects of specific disabilities encountered in the course of employment are covered. Titles vary.

703-1 to 5 Applied Research in Rehabilitation
Introduction to current rehabilitation research and rehabilitation program evaluation models.

705-1 to 5 Behavioral Assessment
Surveys psychological tests and measurements with emphasis on attitude, interest, vocational, and personality tests. Understanding of basic principles and their application to counseling in various settings are stressed. 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 Vocational Evaluation and Job Placement Techniques
The history, philosophy, theoretical basis, goals, function, and scope of vocational evaluation. Theories and principles concerning work and career development are also explored. Prerequisite: RHB 701, 705.

720-3 Counseling: Severe Disability Case Management in Vocational Rehabilitation
Develops specific case management skills in diagnosis, information processing planning, service arrangement, program monitoring, and job placement. Emphasis on case management techniques, ethics, consultation strategies, and specialized counseling skills development. Prerequisite: RHB 700, 702, 711 or permission of instructor.

721-5 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. 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. Prerequisite: RHB 730 or permission of instructor.

775-1 to 4 Graduate Seminar
Includes the study of community-related rehabilitation program efforts in terms of individualized systems analysis. Graded pass/unsatisfactory. Prerequisite: RHB 700, 701, 702, 705, EDL 751.

801-2 to 10 Internship: Severe Disability
Students spend 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. Titles vary. Graded pass/unsatisfactory. Prerequisite: RHB 700, 701, 702, 711, 720, CNL 863.

802-1 to 10 Internship II
Culminating integrative experience for graduate rehabilitation counseling students. Students spend from twenty to thirty hours per week in a rehabilitation setting providing professional-level rehabilitation counseling and services to severely disabled clients. Titles vary. Graded pass/unsatisfactory. Prerequisite: RHB 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, 711, 721.

Rehabilitation Medicine and Restorative Care/RM
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

699-1 to 4 Special Problems in Rehabilitative Sciences
Course enables students to explore selected research topics related to the rehabilitation of various patient populations. Students and faculty advisors will interact to establish specific course requirements. May be taken for letter grade of pass/unsatisfactory.

800-1 to 2 Seminar in Rehabilitative Sciences
Various topics related to research in rehabilitative sciences are presented. Students hear faculty and guest speakers, as well as participate in seminar presentations. Graded pass/unsatisfactory.
Religion/REL

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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.

521-4 Religions in the Biblical Period
Examination of selected religious movements and/or problems in the Biblical period and their interconnectedness and mutual influences. (Previously listed as REL 504.)

522-4 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. (Previously listed as REL 505.)

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.

540-4 Topics in Asian Religion
Studies in the religious dimension of Asian cultures, with emphasis on historical, social, and aesthetic perspectives.

544-3 Religion in Japanese Life
Examination of the role of religion in Japanese culture and society with attention to both historical development and current issues.

557-4 Understanding Death
Basic issues in death and dying using resources from human sciences and humanities in a religious perspective. (Previously listed as REL 525.)

561-4 Religion and Society
(Also listed as SOC 561.) Treatment of religion as a social institution. Examines the influence of religious ideas and organizations on other social institutions, and the influence of society on religion.

562-4 Anthropology of Religion
(Also listed as 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. (Previously listed as REL 546.)

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.

578-4 Ethics and Medicine
(Also listed as 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.

582-4 Philosophy of Religion: Process
Realism and the revolt against idealism. Cross-disciplinary analysis of major contemporary process philosophers and the implications of their thoughts for religion. Focus on Alfred North Whitehead.

583-4 Philosophy of Religion: Secular
Cross-disciplinary analysis of modes of human awareness through which religious meaning is expressed (sensation, morality, beauty, reason, and human relations). Examination of presuppositions of contemporary secular religion in existentialism.

635-3 Black American Religious Thought
Analysis of black American religious thought through critical study of the writings of selected figures who have helped shape black religion from 1780 to the present. (Previously listed as REL 620.)

641-4 Islam
Study of the origin and development of Islam, including contemporary issues and problems.

643-4 Asian Religious Philosophy
(Also listed as PHL 643.) Perennial themes in Asian cultures, such as individual, society, and cosmos; appearance and reality; time and history; and karma, freedom, and responsibility. Treatment of these themes in the philosophical traditions of Asian cultures. (Previously listed as REL 549.)

670-1 to 6 Workshop
Intensive study of selected problems (e.g., the teaching of religion in secondary school, medical ethics) to meet particular needs of participating students. Titles vary.
679-3 Ethics in an Industrial Society: the Responsibility of Business in Society
(Also listed as LAW 695 and MGT 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. (Previously listed as REL 619.)

687-4 Evolution, Religion, and Ethics
(Also listed as BIO 617.) Introduction to the biological, philosophical, theological, and ethical aspects of evolution. (Previously listed as REL 617.)

693-4 Seminar in Religion
Topics vary. (Previously listed as REL 600.)

694-3 to 4 Existentialism
(Also listed as PHL 694.) Representative writers of the existentialist movement.

697-4 Foundations for Religion Studies
Introduction to various methods used in religion studies and an application of these methods to concrete data. (Previously listed as REL 629.)

701-2 to 4, 702-2 to 4, 703-2 to 4 Reading and Research in Religion
Intensive research in specialized areas. Students must submit written proposals, with faculty approval, for acceptance into course.

Social Work/SW
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

580-4 Basic Practice Theory
Generalist social work practice theory. Problem assessment, data collection, data analysis, interventive methods, and evaluation procedures are studied and simulated.

662-4 Social Gerontology
(Also listed as SOC 662.) Social aspects of aging. The needs of the population and society’s response to those needs.

663-4 Social Gerontology II
(Also listed as SOC 663.) Explores in-depth concepts and issues related to aging. Prerequisite: SW 662 or equivalent experience.

677-1 to 4 Seminar on Special Problems in Social Welfare Policy and Services
The operation of the social welfare system in America; issues, trends, and problems. Topics vary.

680-3 to 4 Gerontology Practicum
Supervised learning under direction of faculty and agency staff. Ten weeks/twenty hours per week, or twenty weeks/ten hours per week. Prerequisite: SW/SOC 462.

681-4 Generalist Practice with Individuals
In-depth study of generalist social work practice theory for the enhancement of social functioning of individuals.

682-4 Generalist Practice with Groups
In-depth study of generalist social work practice theory for the enhancement of social functioning as small groups. 3 hours lecture, 1 hour field experience.

683-4 Generalist Practice with Families
In-depth study of generalist social work practice theory for the enhancement of family social functioning.

684-4 Generalist Practice with Organizations and Communities
In-depth study of generalist social work practice theory for the enhancement of social welfare organizations and communities. Prerequisite: permission of instructor.

Sociology/SOC
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

510-4 Sex and Gender Roles
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, and health; and other topics such as socialization and media.

512-1 to 6 Workshop in Current Problems
Intensive study of a particular problem area using professionally qualified personnel from the academic and community environments. May be taken for letter grade or pass/unsatisfactory. Titles vary.

520-4 Sociology of Deviant Behavior
Extensive exploration of the various sociological approaches to the study of deviance and social disorganization with emphasis on contemporary sociological theory and research.

532-4 Juvenile Delinquency
Problems of definition and treatment of delinquency; preparation for further study and work with delinquents.
540-4 Social Organization
Theories and analysis of social organization in its historical and present context. Emphasis on the interrelationship between individuals, the family, and other institutions.

541-4 Social Inequality
Structures, theories, and consequences of social inequality with emphasis on the United States.

550-4 Sociology of Occupations and Professions
Investigation, analysis, and discussion of contemporary theories focusing on the relationship of the individual to work.

560-4 Sociology of the Family
Sociological analysis of family development over its life cycle, and the relationship of the family to society and the individual. Topics include courtship, marriage, parenthood, adulthood, and aging.

561-4 Religion and Society
(Also listed as REL 561.) Treatment of religion as a social institution, examining the influence of religious ideas and organizations on other social institutions, and the influence of society on religion.

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.

599-1 to 4 Studies in Selected Subjects
Problems, approaches, and topics in the field of sociology. Topics vary.

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 (e.g., probation, parole, and jail). Course requires readings, a log, progress reports, and a paper synthesizing readings and field experience. Completion of 8 credit hours from SOC 330, 332, or 432, and permission of instructor required.

639-4 Selected Topics in Problems/Deviance
Topics vary.

641-4 Industrial Sociology
Cross-cultural analysis of industrialization; organization of relationships within industrial social groups.

642-4 Race and Minority Relationships
Intergroup, racial, and ethnic group relations, including the processes and consequences of conflict, prejudice, and discrimination.

644-4 Urban Sociology
Role of cities in past and present societies, the social and cultural implications of urban living, and problems associated with city life.

646-4 Neighborhoods and Communities
Examines the part the community and the neighborhood play in the social life of modern societies. What makes a "good" neighborhood? What makes a "good" community? These and other questions are addressed.

650-4 Stress Management
Investigation and analysis of contemporary theories that suggest an interrelationship between personal stress, distress, varying lifestyles, and a rapidly changing society with transitional values and norms.

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.

662-4 Social Gerontology
(Also listed as SW 662.) Study of social aspects of aging, the needs of the aging population, and society's response to those needs.

663-4 Social Gerontology II
(Also listed as SW 663.) Continuation 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.

689-4 Selected Topics in Social Interaction
Topics vary.

690-2 to 4 Directed Studies in Sociology
May be taken for letter grade or pass/unsatisfactory.

720-4 Seminar in Social Deviance
(Also listed as ABS 761.) 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.

760-4 Seminar on Family Problems
(Also listed as ABS 781.) Builds on the foundations of society and its institutions to examine contemporary problems facing American families.
770-4 Seminar on Criminal Justice
(Also listed as ABS 771.) Investigation of the criminal justice system in the United States and its relation to deviant adult and juvenile behavior.

Spanish/SPN
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

603-4 Advanced Studies: Language/Civilization
Topics vary. Conducted in Spanish.

612-4 Modern Drama
Intensive readings of dramas by playwrights of the nineteenth and twentieth centuries.

631-4 Seminar in Spanish Literature
Intensive study of selected topics in peninsular literature. Background lectures, oral reports, and discussions. Titles vary.

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.

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.

Statistics/STT
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

560-4, 561-4 Applied Statistics I, II

567-2 Introduction to Statistical Analysis System
Introduces the use of Statistical Analysis System (SAS), a statistical computing package widely used in industry, government, and academia. Prerequisite: STT 265 or equivalent.

586-1 to 5 Independent Reading in Statistics and Probability
May be taken for letter grade or pass/unsatisfactory. Titles vary.

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.

611-4 Applied Time Series
Stochastic models for discrete time series in the time-domain, moving average processes, autoregressive processes, model identification, parameter estimation, and forecasting. Statistical computing software packages are used. Prerequisite: STT 361 (561) or permission of instructor.

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
(Also listed as 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.

666-4 Statistical Methods I
Classical statistical techniques for analysis and interpretation of research data, with emphasis on the use of packaged computer routines. Includes descriptive statistics, normal distributions, one- and two-sample t-tests, sample contingency table analysis, simple linear regression, and correlation. Introduction to analysis of variance. Prerequisite: MTH 253 or 355, and STT 265 or 361 or equivalent.
667-4 Statistical Methods II
Continuation of STT 666. Includes further topics in analysis of variance, multiple and curvilinear regression, multiple and partial correlation, analysis of covariance, and some exploratory data analysis. Prerequisite: STT 666.

669-4 Introduction to Experimental Designs
Use of techniques of experimental designs, blocking, Latin squares, and regression design. One or more statistical computing packages are used to analyze resulting data. Emphasis on applications to various areas of scientific research. Prerequisite: STT 265 or 361 or 363 or equivalent.

686-1 to 5 Independent Reading in Statistics and Probability
696-1 to 5 Topics in Statistics and Probability
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 662 and 666, or 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, and structure of multivariate observations. Completion of 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 completion of 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. Prerequisite: STT 761.

764-4 Design of Experiments
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. 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. Completion of a mathematical statistics course 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. Prerequisite: STT 662, 667.

Theatre/TH
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

531-3 Studies in Film History
Intensive study of a selected area of film history. Titles vary. Prerequisite: TH 131 or permission of instructor.

533-3 Studies in Film Genre
Intensive study of a film genre (e.g., the western, the musical, and the gangster film). Titles vary. Prerequisite: TH 131 or permission of instructor.

635-3 Studies in Film Criticism
Intensive examination of a selected area of film criticism. Titles vary.

Urban Studies/URS
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

599-1 to 6 Studies in Selected Subjects
Deals with problems, approaches, and topics in the field of urban studies. Topics vary.
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.

710-4 Urban Legal and Political Environment
Examines the legal and political variables that affect the management and operation of local governments with special emphasis on Ohio.

711-4 Urban Organization Theory and Management Behavior
Analysis of the fundamental behavior concepts and processes involved in public sector organizations. Evaluation of approaches to major behavioral issues such as motivation, leadership, and management development. Prerequisite: URS 710 or permission of instructor.

712-4 Methods of Analysis for Urban Administrators
Emphasis on techniques for collecting data such as questionnaire formation, sampling, surveys, scaling, interviewing, and analysis of documents and records. Analysis and interpretation of data collected with an emphasis on the appropriate statistical techniques.

713-4 Urban Planning
Reviews concepts, theories, and practices of community development and planning. Evaluation of current developments in the field with special emphasis on implementation strategies.

714-4 Urban Fiscal Management
Examines local fiscal institutions and introduces analytical tools for designing and evaluating fiscal policies. Reviews financial reporting and accounting, the municipal bond market, pension systems, state and local taxes, user charges, and intergovernmental relations. Prerequisite: URS 710 or equivalent.

715-4 Urban Budgeting
Focuses on the budget process at the city level. Structural influences on the budget process are discussed. Different budget techniques are analyzed and critiqued. Prerequisite: URS 710, 714 or permission of instructor.

716-4 Urban Personnel Administration
Examines personnel functions such as job evaluation, recruitment and selection, performance appraisal, compensation, training, labor relations, and affirmative action. Prerequisite: URS 710 or permission of instructor.

717-4 Urban Labor Relations
Examines collective bargaining, the negotiation process, impasse resolution, and contract and grievance administration in local government. Prerequisite: URS 710, 716 or permission of instructor.

718-4 Urban Public Works Administration
Examines the community’s infrastructure with an emphasis on capital improvements programming. Reviews the community’s development of the street system, water and sewer systems, solid waste management, and code enforcement. Prerequisite: URS 710, 714 or permission of instructor.

721-4 Urban Leadership
Study of urban government leadership and community decision making. Major theories and concepts of leadership behavior within organizations and macro studies of urban community power systems.

722-4 Directed Study in Urban Administration
If previous knowledge and/or experience in a selected core course is demonstrated, then URS 722 may be substituted for that selected core course. Prerequisite: Urban administration core curriculum or permission of director.

723-4 Urban Internship
One quarter supervised internship of at least 200 hours in a selected urban government or agency, arranged in consultation with student’s advisor or intern director. Graded pass/unsatisfactory. Prerequisite: URS 710, 714, 715, 716 or permission of director.

724-4 Urban Research Project
Research project for the master’s degree in urban administration. Prerequisite: URS 710, 713, 714, 715, 716, 718, or permission of director.

Vocational Education/VOE
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

670-1 to 4 Workshop in Vocational Education
Intensive practical study in vocational education.

706-3 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. (Previously listed as ED 606.)
725-3 Administration and Supervision in Vocational Education
In-depth study of the principles, theories, and practices in the supervision of vocational education programs. (Previously listed as ED 725.)

726-3 Adult Programs in Vocational Education
Investigation of vocational education programs for adults, including curriculum, special methods, development of curriculum materials suitable to such programs, and field participation. (Previously listed as ED 726.)

824-3 Curriculum for Vocational Education
Comprehensive study of curriculum designs including occupational task analysis, innovations, sequential structuring, preparation and development of teaching units, evaluation, and change in the vocational education programs. (Previously listed as ED 824.)

825-3 Facilities and Management of Vocational Education
Planning, evaluation, and management of vocational education laboratories and related areas. (Previously listed as ED 825.)

826-3 Coordination Techniques for Vocational 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. (Previously listed as ED 826.)

827-3 Evaluation of Vocational Education
Developing procedures and involvement in the use of instruments for conducting evaluations for programs including teachers, students, facilities and equipment, and curriculum. (Previously listed as ED 827.)

828-3 Teaching Strategies and Equipment Adaptations for the Disadvantaged and Handicapped Student in Vocational Education
Develops teaching strategies and equipment adaptations for disadvantaged and handicapped students in vocational education. (Previously listed as ED 828.)
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The Graduate Faculty

Ackerly, Gary D. Assistant Professor of Professional Psychology; Adjunct Assistant Professor of Education B.A., 1971, M.Ed., 1973, Ph.D., 1977, University of Missouri

Adams, Robert W. Associate Professor of Political Science and Urban Affairs A.B., 1965, Utica College; M.A., 1961, Syracuse University; Ph.D., 1969, The Ohio State University

Ahmad, Khurshid Associate Professor of Real Estate and Insurance B.A., 1953, Karachi, M.A., 1955, Punjab University (India); Ph.D., 1970, University of Pennsylvania

 Ainina, M. Fall Associate Professor of Finance H.E.C., 1977, Universite de Tunis; M.B.A., 1980, Ball State University; Ph.D., 1986, Arizona State University

Allen, Arnold Professor Emeritus of Psychiatry B.S., 1940, University of Cincinnati; M.D., 1943, Cincinnati Medical College; Certified in Psychoanalysis, 1962, Chicago Institute for Psychoanalysis

Alter, Gerald M. Associate Professor of Biochemistry B.A., 1968, Albion; Ph.D., 1975, Washington State University

Amon, James P. Associate Professor of Biological Sciences B.S., 1965, University of Cincinnati; M.A., 1968, Ph.D., 1974, College of William and Mary

Amos, Oris E. Professor Emeritus of Education A.B., 1951, Virginia State College; M.A., 1963, Ph.D., 1971, The Ohio State University

Anon, Norman Professor Emeritus of Economics B.A., 1948, M.S., 1951, Ph.D., 1954, University of Wisconsin

Arasu, K. T. Associate Professor of Mathematics B.S., 1976, M.Sc., 1977, Punjab University (India); Ph.D., 1983, The Ohio State University

Arbage, Martin Associate Professor of History A.B., 1961, Georgetown University; M.A., 1967, Ph.D., 1969, Rutgers University

Arlian, Larry G. Professor of Biological Sciences and Program Director, Biomedical Sciences Ph.D. Program B.S., 1966, M.S., 1968, Colorado State University; Ph.D., 1972, The Ohio State University

Awgal, A. A. S. Assistant Professor of Computer Science and Computer Engineering B.S., 1984, Bangladesh University of Engineering and Technology (Bangladesh); M.S., 1986, The Wichita State University; Ph.D., 1989, University of Dayton

Back, Kenneth C. Adjunct Professor of Biochemistry B.S., 1951, Muhlenberg College; M.S., 1954, Ph.D., 1957, University of Oklahoma

Backs, Richard W. Assistant Professor of Psychology B.S., 1978, University of Missouri; M.A., 1981, Ph.D., 1984, University of Southern California


Ballantyne, Jeanne H. Professor of Sociology and Department Chair, Sociology and Anthropology B.S., 1963, The Ohio State University; M.A., 1966, Columbia University; Ph.D., 1971, Indiana University

Bambakidis, Gust Professor of Physics and Department Chair B.S., 1956, University of Akron; M.S., 1963, Ph.D., 1966, Case Western Reserve University

Barbour, Clyde D. Associate Professor of Biological Sciences A.B., 1958, Stanford University; Ph.D., 1966, Tulane University of Louisiana

Barlow, Gary C. Professor of Art Therapy and Art Education; University Professor, Coordinator, Art Therapy B.S., 1957, M.Ed., 1958, Miami University; Ed.D., 1967, Pennsylvania State University

Barnhart, Michael Assistant Professor of Education B.A., 1963, Ohio University; M.Ed., 1969, Wright State University; Ph.D., 1981, Miami University

Barr, David L. Professor of Religion; Director, University Honors Program A.B., 1965, Fort Wayne Bible College; M.A., 1969, Ph.D., 1974, Florida State University

Bashe, Winslow J., Jr. Professor Emeritus of Community Health and of Pediatrics B.S., 1942, Seton Hall College; M.D., 1945, Loyola University of Chicago School of Medicine; M.P.H., 1959, Columbia University

Batra, Prem P. Professor of Biochemistry B.S., 1955, M.S., 1958, Punjab University (India); Ph.D., 1961, University of Arizona

Battino, Rubin Professor of Chemistry B.S., 1953, Community College of New York; M.A., 1954, Ph.D., 1957, Duke University

Becker, Carl Professor of History B.A., 1949, Otterbein College; M.A., 1950, University of Wisconsin; Ph.D., 1971, University of Cincinnati

Beers, Kenneth N. Associate Professor of Family Practice and Community Health; Training Coordinator, Aerospace Medicine B.S., 1952, Muhlenberg College; M.D., 1956, Jefferson Medical College; M.P.H., 1963, University of California School of Public Health

Bellissari, Anna Assistant Professor of Anthropology B.A., 1962, Wittenberg University; M.A., 1976, Ph.D., 1984, The Ohio State University

Benner, Carl V. Professor of Education B.S., 1957, Rio Grande College; M.A., 1960, University of Northern Iowa; M.S., 1960, Purdue University; Ed.D., 1965, Bowling Green State University; Ph.D., 1970, The Ohio State University

Benett, Kevin B. Assistant Professor of Psychology A.B., 1979, Ohio University; M.A., 1982, Ph.D., 1984, The Catholic University of America

Bent, Russell J. Professor of Professional Psychology and Associate Dean for Psychological Services, School of Professional Psychology B.S., 1953, Saint Peter's College; M.A., 1955, Ph.D., 1961, Fordham University

Bernhardt, Gregory R. Associate Professor of Education, Chair, Department of Human Services B.A., 1971, Colorado State University; M.S., 1973, Kansas State Teachers College; Ed.D., 1979, University of Northern Colorado

Berry, Charles R. Professor of History B.A., 1954, George Washington University; M.A., 1963, Ph.D., 1967, University of Texas at Austin

Bethke, Richard J. Associate Professor of Electrical Engineering; Interim Chair, Mechanical and Materials Engineering B.S.M.E., 1966, Ph.D., 1970, University of Wisconsin

Bigley, Nancy J. Professor of Microbiology and Immunology B.S., 1953, Pennsylvania State University; M.Sc., 1955, Ph.D., 1957, The Ohio State University

Bland, Leland D. Professor of Music B.S., 1962, M.A., 1963, Northeast Missouri State University; Ph.D., 1973, University of Iowa

Bogner, Bela J. Associate Professor of Social Work and Community Health B.S., 1962, Ecole Sociale de Louvain (Belgium); M.S.W., 1966, University of Wisconsin–Milwaukee; Ph.D., 1974, University of Wisconsin–Madison

Bombick, Daniel D. Assistant Professor of Chemistry B.S., 1979, M.S., 1981, Wright State University; Ph.D., 1986, Michigan State University

Bona, Michael Assistant Professor of Biochemistry B.S., 1980, Michigan State University; Ph.D., 1985, University of California, Berkeley

Bracher, Peter S. Professor of English B.A., 1948, Wittenberg University; M.A., 1956, University of Washington; Ph.D., 1966, University of Pennsylvania

Bradford, Jerry W. Assistant Professor of Mathematics and Statistics B.A., 1976, Indiana Wesleyan University; M.S., 1986, Ph.D., 1990, University of Iowa

Brandeberry, James E. Professor of Computer Science, Computer Engineering, and Electrical Engineering; Dean, College of Engineering and Computer Science B.S.E.E., 1961, M.S.E.E., 1963, University of Toledo; Ph.D., 1969, Marquette University

Brecha, Sonia A. Assistant Professor of Accounting B.S., 1996, Ohio University; M.S., 1974, D.B.A., 1983, Kent State University; C.P.A.

Brown, Herbert E. Professor of Marketing and Department Chair B.S., 1961, M.S., 1962, Southern Illinois University; Ph.D., 1969, The Ohio State University

Brown, William E. Professor of Education B.S., 1962, M.A., 1964, Ball State University; Ph.D., 1969, Indiana University

Bullock, John D. Professor of Ophthalmology and Surgery; Chair, Department of Ophthalmology A.B., 1963, Dartmouth College; B.S.M.S., 1966, Dartmouth Medical School; M.D., 1968, Harvard Medical School; M.S., 1982, University of Illinois

Bullock, Richard H. Associate Professor of English and Director of Writing Programs B.A., 1973, Ohio University; M.A., 1977, Ph.D., 1981, University of Virginia

Burton, G. Allen Associate Professor of Environmental Health B.S., 1976, Ouachita Baptist University; M.S., 1978, Auburn University; M.S., 1980, Ph.D., 1984, University of Texas at Dallas

Byrum-Robinson, Beverly A. Professor of Communication B.A., 1964, M.A., 1967, Miami University; Ph.D., 1974, The Ohio State University

Cacioppo, Anthony J. Visiting Professor of Human Factors Engineering; Interim Chair, Biomedical and Human Factors Engineering B.S., 1973, Queens University; M.P.S., 1978, Pratt Institute; Ed.D., 1985, Rutgers University

Campbell, Janis M. Associate Professor of Nursing B.S.N., 1963, M.S., 1966, Ph.D., 1978, The Ohio State University

Campbell, Patrick E. Associate Professor of Psychology B.S., 1960, M.S., 1966, Kansas State College; Ph.D., 1968, University of Kansas

Cantelupe, Eugene B. University Professor Emeritus of English and Art History B.A., 1942, State University of New York at Buffalo; M.F.A., 1950, University of Iowa; Ph.D., 1959, Washington University


Carmichael, W. Assistant Professor of Biological Sciences B.S., 1969, Oregon State University; M.S., 1972, Ph.D., 1974, University of Alberta

Carney, Cindy K. Assistant Professor of Geological Sciences B.S., 1980, Youngstown State University; Ph.D., 1987, West Virginia University

Carusone, Peter S. Professor of Marketing B.A., 1962, University of Cincinnati; M.B.A., 1965, Xavier University; Ph.D., 1969, The Ohio State University


Cary, Norman R. Professor of English B.A., 1958, Asbury College; M.A., 1960, University of Arkansas; Ph.D., 1966, Wayne State University

Castellano, Joseph F. Professor of Accountancy B.S., 1964, M.S., 1965, Ph.D., 1971, Saint Louis University

Chance, Larry L. Associate Professor of Education B.S., 1966, M.A., 1967, Ball State University; Ph.D., 1973, University of Kansas

Chen, C. L. Philip Assistant Professor of Computer Science and Computer Engineering B.S., 1979, National Tsing Hua University (Taiwan); M.S., 1985, The University of Michigan; Ph.D., 1988, Purdue University

Chen, Chien-In Assistant Professor of Electrical Engineering B.S., 1991, National Taiwan University (Taiwan); M.S., 1996, University of Iowa; Ph.D., 1999, University of Minnesota

Chen, Ker-Sen Assistant Professor of Computer Science and Computer Engineering B.S., 1981, M.S., 1985, National Taiwan University (Taiwan); Ph.D., 1989, University of Southern California

Cheng, Songlin Assistant Professor of Geological Sciences B.S., 1972, National Cheng Kung University (Taiwan); M.S., 1979, Wright State University; Ph.D., 1984, University of Arizona

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Citera, Maryalice Associate Professor of Psychology B.A., 1981, New College; M.A., 1984, Indiana University; Ph.D., 1989, Purdue University

Clark, Jerry D. Associate Professor of Physics B.S., 1976, University of Texas at Arlington; Ph.D., 1982, University of Texas at Dallas

Cleary, Michael J. Professor of Management Science B.S., 1961, Norwich University; M.A., 1969, Ph.D., 1971, University of Nebraska

Cole, Donna Associate Professor of Education; Coordinator, Phase I Teacher Education B.A., 1971, Cleveland State University; M.A., 1975, West Virginia University; Ph.D., 1980, University of Utah

Coleman, Joseph W. Assistant Professor of Management Science B.S., 1967, Pennsylvania State University; M.B.A., 1975, Golden Gate University; Ph.D., 1982, Arizona State University

Colle, Herbert A. Associate Professor of Psychology and Department Chair B.S., 1965, University of Wisconsin; Ph.D., 1969, University of Washington

Constable, Gordon K. Associate Professor of Management Science B.S., 1966, M.S., 1968, Ph.D., 1972, Purdue University
Corbett, Adrian M.  Assistant Professor of Physiology and Biophysics B.S., 1978, Texas A&M University at Galveston; Ph.D., 1984, University of Miami

Cornelius, Kenneth C.  Assistant Professor of Mechanical Engineering B.S., 1968, M.S., 1971, Ph.D., 1978, Michigan State University

Correale, Robert M.  Associate Professor of English A.B., 1955, Saint Bonaventure University; M.A., 1960, Siena College; Ph.D., 1971, University of Cincinnati

Courtney, Donna S.  Assistant Professor of Education; Coordinator, Business Education and Vocational Education B.S., 1965, Miami University; M.Ed., 1975, Ed.D., 1987, University of Cincinnati

Craighead, Robert L.  Department Chair 1978, Michigan State University; M.S., 1957, Massachusetts Institute of Technology and State University; B.S., 1952, Pennsylvania State University; M.S., 1973, Ph.D., 1991, The Ohio State University

Crampton, George H.  Mathematics and Statistics B.S., 1964, Tennessee A&I State University; M.S., 1970, University of Wyoming; Ph.D., 1991, The Ohio State University

Crampton, George H.  Professor Emeritus of Psychology B.S., 1949, Washington State University; M.S., 1950, Ph.D., 1954, University of Rochester

Cross, Lawrence J.  Professor Emeritus of Sociology A.B., 1943, M.A., 1951, Loyola University, Ph.D., 1962, University of Pennsylvania

Crum, Larry A.  Professor of Computer Science and Computer Engineering B.S., 1964, The Ohio State University; Ph.D., 1971, Marquette University

Cummings, Sue C.  Professor of Chemistry and Department Chair B.A., 1963, Northwestern University; M.S. 1965, Ph.D., 1968, The Ohio State University

Curry, Donna Miles  Assistant Professor of Nursing B.S.N., 1976, M.S.N., 1979, St. Louis University; Ph.D,. 1991, The Ohio State University

Curry-Jackson, Anita E.  Assistant Professor of Social Work B.A., 1969, LeMoyne-Owen College; M.S.S.A., 1970, Case Western Reserve University; Ph.D., 1987, Atlanta University

Dadras, Parviz  Professor of Mechanical Engineering and Materials Science and Engineering B.S., 1964, Abadan Institute of Technology (Iran); M.S., 1968, Ph.D., 1972, University of Delaware

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Dasigi, Venugopala R.  Assistant Professor of Computer Science and Computer Engineering B.E., 1979, Andhra University (India); M.E., 1981, Philips International Institute of Technological Study (Netherlands); M.S., 1985, Ph.D., 1988, University of Maryland at College Park

Davis, Harry N.  Associate Professor of Psychology B.A., 1968, Eckerd College; M.S., 1971, Ph.D., 1974, University of Florida

Davis, Henry W.  Professor of Computer Science and Computer Engineering B.A., 1959, Rice University; M.A., 1961, Ph.D., 1965, University of Colorado; M.S., 1974, State University of New York at Stony Brook

Dean, Jay B.  Assistant Professor of Physiology B.S., 1979, Central Michigan University; M.S., 1981, Michigan Technological University; Ph.D., 1986, The Ohio State University

Deane, Donna M.  Professor of Nursing B.S.N., 1961, M.S., 1973, Ph.D., 1978, The Ohio State University

Demmy, W. Steven  Associate Professor of Management Science B.S., 1966, M.S., 1967, Ph.D., 1971, The Ohio State University

Derry, Charles D.  Professor of Theatre Arts B.S., 1973, Northwestern University; M.A., 1975, University of Southern California; Ph.D., 1978, Northwestern University

Dishon, Robert D.  Professor of Computer Science and Computer Engineering B.S., 1958, M.S., 1960, Ph.D., 1962, The Ohio State University

Dobbins, James E.  Associate Professor of Professional Psychology B.S., 1969, The Ohio State University; M.S., 1974, Ph.D., 1977, University of Pittsburgh

Dodge, Robin E.  Assistant Professor of Community Health, Assistant Director, Residency Program B.S.C., 1972, University of New Brunswick; B.M.D.Sc., 1974, Memorial University; M.D., 1976, Memorial University of Newfoundland (Canada); M.S., 1981, Wright State University School of Medicine

Dodson, Melvin G.  Professor of Obstetrics and Gynecology and of Microbiology and Immunology and Department Chair; Nicholas J. Thompson Professor M.D., 1967, University of Miami School of Medicine; Ph.D., 1980, Loyola University

Dolson, David A.  Assistant Professor of Chemistry B.S., 1976, Eastern Illinois University; Ph.D., 1981, Indiana University

Dombrowski, Joanne M.  Professor of Mathematics B.S., 1968, Marygrove College; M.S., 1970, Ph.D., 1973, Purdue University

Dominic, David F.  Assistant Professor of Geological Sciences B.S., 1980, University of Dayton; M.S., 1983, State University of New York at Binghamton; Ph.D., 1988, West Virginia University

Dorn, Jacob H.  Professor of History B.A., 1960, Wheaton College; M.A., 1962, Ph.D., 1965, University of Oregon

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Richard Williams 1986–87
Robert Dixon 1985–86
Elizabeth Harden 1984–85
James Jacob 1983–84
Charles Hartmann 1982–83
Donald Pabst 1981–82
Lilburn Hoehn 1980–81
James Sayer 1979–80
Joseph Castellano 1978–79
Jacob Dorn 1977–78
Glenn Graham 1976–77
Barbara Dreher 1975–76
John Treacy 1974–75
Ira Fritz 1972–74
Lawrence Hussman 1971–72
Emil Kmetec 1968–71

Presiding Officers of Faculty Meetings
Norman Anon 1967–68
Edward Cox 1966–67

Chair of Academic Council
Nicholas Piediscalzi 1966–67
APPENDIXES
Criteria for Ohio Residency

Ohio Board of Regents Rule 3333-1-10
Ohio student residency for state subsidy and tuition surcharge purposes

(A) Intent and Authority
(1) It is the intent of the Ohio Board of Regents in promulgating this rule to exclude from treatment as residents, as that term is applied here, those persons who are present in the state of Ohio primarily for the purpose of receiving the benefit of a state-supported education.
(2) This rule is adopted pursuant to Chapter 119 of the Revised Code, and under the authority conferred upon the Ohio Board of Regents by section 3333.31 of the Revised Code.

(B) Definitions
For purpose of this rule:
(1) A "resident of Ohio for all other legal purposes" shall mean any person who maintains a twelve-month place or places of residence in Ohio, who is qualified as a resident to vote in Ohio and receive state welfare benefits, and who may be subjected to tax liability under section 5747.02 of the Revised Code, provided such person has not, within the time prescribed by this rule, declared himself or herself to be or allowed himself or herself to remain a resident of any other state or nation for any of these or other purposes.
(2) "Financial support," as used in this rule, shall not include grants, scholarships, and awards from persons or entities that are not related to the recipient.
(3) An "institution of higher education," as used in this rule, shall mean any university, community college, technical institute or college, general and technical college, medical college, or private medical or dental college that receives a direct subsidy from the state of Ohio.
(4) For the purpose of determining residency for tuition surcharge purposes at Ohio's state-assisted colleges and universities, "domicile" is a person's permanent place of abode; there must exist a demonstrated intent to live permanently in Ohio, and a legal ability under federal and state law to reside permanently in the state. For the purpose of this policy, only one domicile may be maintained at a given time.
(5) For the purpose of determining residency for tuition surcharge purposes at Ohio's state-assisted colleges and universities, an individual's immigration status will not preclude an individual from obtaining resident status if that individual has the current legal status to remain permanently in the United States.

(C) Residency for Subsidy and Tuition Surcharge Purposes
The following persons shall be classified as residents of the state of Ohio for subsidy and tuition surcharge purposes:
(1) A dependent student, 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 such student in an institution of higher education.
(2) A person who has been a resident of Ohio for the purpose of this rule for at least twelve consecutive months immediately preceding his or her enrollment in an institution of higher education and who is not receiving, and has not directly or indirectly received in the preceding twelve consecutive months, financial support for persons or entities who are not residents of Ohio for all other legal purposes.
(3) A dependent child of a parent or legal guardian, or the spouse of a person who, as of the first day of a term of enrollment, has accepted full-time, self-sustaining employment and established domicile in the state of Ohio for reasons other than gaining the benefit of favorable tuition rates.

Documentation of full-time employment and domicile shall include both the following documents:
(a) A sworn statement from the employer or the employer's representative on the letterhead of the employer or the employer's representative certifying that the parent or spouse of the student is employed full time in Ohio.
(b) A copy of the lease under which the parent or spouse is the lessee and occupant of rented residential property in the state; a copy of the closing statement on residential real property located in Ohio of which the parent or spouse is the owner and occupant; or if the parent or spouse is not the lessee or owner of the residence in which he or she has
established domicile, a letter from the owner of the residence certifying that the parent or spouse resides at that residence.

(D) Additional criteria that may be considered in determining residency for the purpose may include but are not limited to the following:

(1) Criteria evidencing residency:
   (a) If a person is subject to tax liability under section 5747.02 of the Revised Code;
   (b) If a person qualifies to vote in Ohio;
   (c) If a person is eligible to receive state welfare benefits;
   (d) If a person has an Ohio’s driver’s license and/or motor vehicle registration.

(2) Criteria evidencing lack of residency:
   (a) 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);
   (b) 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 paragraph (D)(2)(a) of this rule).

(E) Exceptions to the general rule of residency for subsidy and tuition surcharge purposes:

(1) A person who is living 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 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 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.

(F) Procedures

(1) A dependent person classified as a resident of Ohio for these purposes under the provisions of paragraph (C)(1) of this rule and who is enrolled in an institution of higher education when his or her parents or legal guardian removes 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 paragraph (C)(1) or (C)(2) of this rule.

(3) For students who qualify for residency status under paragraph (C)(3) of this rule, residency status is lost immediately if the employed person upon whom resident student status was based accepts employment and establishes domicile outside Ohio less than twelve months after accepting employment and establishing domicile in Ohio.

(4) 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.

(5) 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.

(6) 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 his or her 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 to a full and complete determination under this rule.

Guidelines for Interpretation and Application of Ohio Board of Regents’ Residency Rule 3333-1-10

1. Section (B)(1)

a. A “twelve-month place or places of residency in Ohio,” within the meaning of this section, shall mean the maintenance of living quarters in the state. This may be fulfilled in whole or in part by the rental of a dormitory room. It should not be interpreted so as to require unbroken physical presence in the state, so long as the “place” of residence is maintained. Residency is not lost, therefore, by vacationing out of the state. However, should an individual leave for the entire summer to be employed out of state, the legitimacy of a claim that twelve-month residency in Ohio has been maintained should be seriously questioned.

b. A person who is “qualified as a resident to vote in Ohio and receive state welfare benefits” need only be physically present here for thirty days and have declared himself or herself to be a resident. This should not be interpreted so as to require anyone to actually register to vote or apply for welfare benefits.

c. Persons “who may be subjected to tax liability under section 5747.02 of the Revised Code” are defined in Revised Code 5747.01 (0) as follows:

“(i) ‘Resident’ means:
(1) an individual who is domiciled in this state;
(2) an individual who lives in and maintains a permanent place of abode in this state, and who does not maintain a permanent place of abode elsewhere, unless such individual, in the aggregate, lives more than 335 days of the taxable year outside this state.”

The essential reason for this requirement is to insure that persons who do enjoy residency benefits also have such income as they have subjected to Ohio taxation.

d. A person who has not “declared himself or herself to be or allowed himself or herself to remain” a resident of another state for “these and other purposes” shall mean one who does not retain an out-of-state driver’s license, automobile registration, or voting residence, or who does not receive such things as loans or scholarships from another state when residency in that state is a prerequisite therefore. This total disavowal of residency in another state must be for a full year’s time before Ohio residency can be granted under this rule.

2. Section (B)(2)

The purpose of this section is to insure that persons receiving direct and substantial parental or family support from out of state shall not be allowed Ohio residency. Occasional small gifts that are not a substantial part of a person’s maintenance should not disqualify that person from achieving residency. Similarly, the receipt of grants, loans, or scholarships from the federal government, corporations, foundations, or banks that are not simply conduits for family support, or from other states when this is not precluded by section (B)(1), should not disqualify a person.

3. Section (B)(5)

a. Certain immigration visas carry with them the current legal status, by virtue of federal treaties and agreements, to enable the holder to remain in the United States and establish resident status. A student who holds one of these visas can therefore be considered for resident status for tuition surcharge purposes in the same manner as any other student assuming that the requirements specified in section (B)(1) of this rule are met.

b. The determination of the twelve-month residency requirement for an alien admitted for permanent residence, if necessary, shall include any portion, up to twelve months, of the elapsed time between the date of application for adjustment of status to lawful permanent resident and the date of
application for residency for these purposes. All other relevant requirements under section (C) of this rule must also be adhered to in making the residency determination.

c. To change his or her immigration status from temporary to permanent, an alien must file INS form I-845. The college or university residency official can obtain the date an application was accepted by INS through an information release form (G-641) signed by the alien. There is also a nominal service fee that must accompany the release form.

d. In instances where, prior to August 10, 1978, aliens, for reasons of quota, have not been permitted to officially file for permanent residency (INS form I-845), but have had their visa preference petition approved by INS, and have been allowed to remain and to work in the United States, the residency official may use the INS verified petition approval date* to document intent to become a permanent resident. In these cases, the visa preference petition must be filed by the individual seeking Ohio residency, if adult, and not by another party. In the case of minors, the head of the family's application for such minors is acceptable. All other relevant requirements under section (C) of this rule must be adhered to in making the residency determination.

4. Section (C)(1)
The intent of the term "dependent student" is to tie the residency of persons who have never emancipated themselves from their parents to those parents. This connotes a continued, unbroken dependency. Children who emancipate themselves from parents who are Ohio residents and later return to dependency on those parents may be awarded immediate residency status by providing satisfactory documentation of renewed dependence and evidence of compliance with other pertinent provisions of the rule, including physical presence in the state. "Enrollment" under this section shall commence with the first day of classes at the institution attended.

5. Section (C)(2)
The term "resident" in this section shall mean a person who meets the requirements of section (B)(1).

6. Section (C)(3)
The intent of this provision is to speed up the "residency clock" for family members (i.e., spouse, dependent children) whose domicile follows that of a full-time employed person who has moved into Ohio for employment purposes. Rather than being subject to out-of-state tuition rates for the first twelve months of the employed person's presence in Ohio, the dependent children and spouse of the full-time employed person are eligible for resident tuition rates immediately—provided that the move to Ohio was not for the purpose of gaining favorable tuition rates, and that appropriate documentation is provided.

In accordance with the provisions of section (F)(5) of the rule, residency officers may request such documentation in addition to the materials specifically described in (C)(3) as they deem necessary to conclusively determine employment status and/or domicile. Also, residency officers may request documentation of application and acceptance dates pertaining to employment and instructional programs as necessary to weigh questions of intent.

7. Section (E)(1)
a. "Gainfully employed," as used in this section, shall mean engaged in an income-producing occupation. The spouse of the person gainfully employed may also be considered gainfully employed provided he or she is providing full-time services as a homemaker.

b. "Full-time" employment, as used in this section, shall be construed in light of the standards applicable to a given occupation.

c. A "part-time program of instruction" for these purposes is to be defined by an institution as that term is otherwise applied.

8. Section (E)(2)
a. The "United States military service," as used in this section and in section (E)(3), shall mean persons holding status in the branches of military service, whether performing actual military duty or on assignment elsewhere.

b. "Dependents" under this section and under section (E)(3) shall be limited to members of the immediate family who are in fact dependent on the member of the military for a substantial part of their financial support.

c. Active service of commissioned officers of the Public Health Service shall be deemed to be active military service in the armed forces of the United States for determining residency for tuition purposes.

d. "Domicile," under this section, shall mean the place a person declares to be his or her home for voting and taxation purposes.
9. Section (E)(4)
“Domicile,” under this section, is to be interpreted in the same manner as (E)(2).

10. Section (E)(5)
   a. For purposes of this rule, a migrant is defined as someone who makes or has made his or her livelihood in hiring out to do seasonal work and has traveled interstate for this purpose.
   b. The income earned in Ohio shall have been subjected to Ohio taxation.
   c. In making a determination under this section, an institution may consider any probative evidence submitted by a person. Any evidence taken may be required to be sworn.

11. Sections (F)(1), (F)(2), and (F)(3)
   a. A person’s parents or legal guardian shall be deemed to have removed their residency from Ohio when the person with whom a student resides and upon whom he or she is financially dependent leaves the state with no present intention of returning to resume residency.
   b. An “academic degree program” shall not include the associate degree when the person receiving such degree continues full-time pursuit of a baccalaureate degree.
   c. For students who qualify for residency status under (C)(1) or (C)(2), a period of twelve months following removal of the independent student or dependent student’s parents or legal guardian is permitted during which residency is not lost.
   d. Students who qualify for residency status under (C)(3) will lose residency status immediately if the employed person upon whom immediate resident student status was based accepts employment and establishes domicile outside Ohio less than twelve months after accepting employment and establishing domicile in Ohio. If the employed person retains Ohio employment and domicile for twelve months or more, the student would qualify for residency under (C)(1) and would retain residency status as described in a., b., and c. above.

12. Section (F)(4)
   a. A change in residency status under this section is never automatic, and must be initiated by an application for such change by the person seeking it.
   b. “Clear and convincing proof” is that standard of evidence that is beyond mere preponderance, but falling short of the “beyond a reasonable doubt” test. It requires that there exist no substantial evidence, direct or circumstantial, conflicting with that proffered by a person applying for a change in residency status.
   c. In making a determination under this section, an institution may consider any probative evidence submitted by a person. It may require, however, submission of only those things which the person himself or herself can secure. Any evidence taken may be required to be sworn.

13. Section (F)(5)
   It is incumbent upon a person to apply for a change in residency, and his or her failure to do so as soon as he or she is entitled to a change shall preclude the granting of residency retroactive to that date. A change in residency shall be prospective only from the date such application is received.

14. Section (F)(6)
   No person need be afforded the opportunity for personal appearance before the person or body making a determination under this rule; however, any such opportunity that is afforded any one person must be equally granted to others. A person or body making a determination under this section should allow the student an opportunity to submit all documentary evidence that such student wishes in support of a claim of residency, and shall consider all such evidence that is relevant and probative.
Appendix 2

Notice to Students


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 Programs 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 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, University Placement Services, Admissions, Financial Aid, University Division, Veterans Affairs, Bursar, Athletics, Student 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.
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