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WRIGHT STATE UNIVERSITY

1998-2000

GRADUATE CATALOG

DAYTON • OHIO
## Academic Calendar 1998–2000

**Fall Quarter 1998** | **September 16–December 5, 1998**
---|---
September 16, Wednesday/First Day of Class |  
November 11, Wednesday/Veterans' Day Observed (No Classes) |  
November 24, Tuesday/Last Day of Class |  
November 25–29, Wednesday–Sunday/Thanksgiving Holiday (No Classes) |  
November 30–December 5, Monday–Saturday/Final Examinations |  
December 5, Saturday/Fall Commencement |  

**Winter Quarter 1999** | **January 4–March 20, 1999**
---|---
January 4, Monday/First Day of Class |  
January 18, Monday/Martin Luther King Jr. Day Observed (No Classes) |  
March 13, Saturday/Last Day of Class |  
March 15–20, Monday–Saturday/Final Examinations |  

**Spring Quarter 1999** | **March 29–June 12, 1999**
---|---
March 29, Monday/First Day of Class |  
May 31, Monday/Memorial Day (No Classes) |  
June 5, Saturday/Last Day of Class |  
June 7–12, Monday–Saturday/Final Examinations |  
June 12, Saturday/Spring Commencement |  

**Summer Quarter 1999** | **June 14–August 19, 1999**
---|---
June 14, Monday/First Day of Class, Terms A and C |  
July 5, Monday/Independence Day Observed (No Classes) |  
July 15, Thursday/Last Day of Class, Term A |  
July 19, Monday/First Day of Class, Term B |  
August 19, Thursday/Last Day of Class, Terms B and C |  

**Fall Quarter 1999** | **September 15–December 4, 1999**
---|---
September 15, Wednesday/First Day of Class |  
November 11, Thursday/Veterans' Day Observed (No Classes) |  
November 23, Tuesday/Last Day of Class |  
November 24–28, Wednesday–Sunday/Thanksgiving Holiday (No Classes) |  
November 29–December 4, Monday–Saturday/Final Examinations |  
December 4, Saturday/Fall Commencement |  

**Winter Quarter 2000** | **January 3–March 18, 2000**
---|---
January 3, Monday/First Day of Class |  
January 17, Monday/Martin Luther King Jr. Day Observed (No Classes) |  
March 11, Saturday/Last Day of Class |  
March 13–18, Monday–Saturday/Final Examinations |  

**Spring Quarter 2000** | **March 27–June 10, 2000**
---|---
March 27, Monday/First Day of Class |  
May 29, Monday/Memorial Day (No Classes) |  
June 3, Saturday/Last Day of Class |  
June 5–10, Monday–Saturday/Final Examinations |  
June 10, Saturday/Spring Commencement |  

**Summer Quarter 2000** | **June 12–August 17, 2000**
---|---
June 12, Monday/First Day of Class, Terms A and C |  
July 4, Tuesday/Independence Day Observed (No Classes) |  
July 13, Thursday/Last Day of Class, Term A |  
July 17, Monday/First Day of Class, Term B |  
August 17, Thursday/Last Day of Class, Terms B and C |  

*The 1999–2000 Academic Calendar was tentative and not formally approved as this catalog went to press.*

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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, Nursing and Health Science and Mathematics; the School of Professional Psychology; 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, E148 Student Union. 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 Wright State University, School of Graduate Studies, 3640 Colonel Glenn Hwy., Dayton, Ohio 45435-0001, telephone (937) 775-2976.

This catalog was prepared by the Office of Communications and Marketing, with the cooperation of the School of Graduate Studies and the colleges and schools of Wright State University, Dayton, Ohio.

Composition by Printing Service. Photography by Media Services.
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General Information
Information Center
E005 SU Administration Office
775-5740

WSU Home Page Address
http://www.wright.edu

Offices and Facilities
Admissions
Graduate Admissions
Gerald C. Malicki, Assistant Dean and Director of Graduate Admissions and Records
106 Oelman Hall
775-2976

International Admissions
Harriet C. Dadras, Coordinator of International Admissions
E190 Student Union
775-5745

School of Medicine, Student Affairs/Admissions
Dr. Paul G. Carlson, Associate Dean for Student Affairs and Admissions
210 Medical Sciences Building
775-2934

School of Professional Psychology, Office of Student Affairs
Omintha R. Petrie, Director of Student Services/Admissions
110 Health Sciences Building
775-3492

Undergraduate Admissions, Office of
Ken Davenport, Director of Undergraduate Admissions
E148 Student Union
775-5700

Affirmative Action Programs
Juanita Wehrle-Einhorn, Director
224 Millett Hall
775-3207

Asian/Hispanic/Native American Center
Mai Nguyen, Director
144 Allyn Hall
775-2798

Bolinga Cultural Resources Center
Lillian M. Johnson, Director
E107 Student Union
775-5645

Bookstore, University
Marcia Stewart, Manager
E182 Student Union
775-5600

Bursar, Office of the
Carol Stevenson, University Bursar and Director of Treasury Services
E236 Student Union
775-5650

Career Services, Office of
Cheryl Krueger, Director
126 Allyn Hall
775-2326

Disability Services, Office of
Stephen H. Simon, Director
E186 Student Union
775-5680

Educational Resource Center
Francis C. Yu, Director
244 Millett Hall
775-2883

Financial Aid, Office of
David R. Darr, Director
E136 Student Union
775-5721

Libraries, Wright State University
Paul Laurence Dunbar Library
Victoria Montavon, Associate Provost for Libraries and Information Services
775-4125
126 Paul Laurence Dunbar Library
775-2525 Circulation
Fordham Health Sciences Library
Sarah Timmons, Director of Public Services
125D Medical Sciences Building
775-2003

Registrar, Office of the
Gail Fred, Registrar
E244 Student Union
775-5588

Residence Services
Dan Bertos, Director
6 Palms, Forest Lane
775-4172

University Testing Services
Jeanne M. Frazer, Director of University Division
Pamela L. Wallace-Johnson, Assistant Director for Academic Advising, University Division
E334 Student Union
775-5771

Veterans Affairs, Office of
Mary Thomas, Coordinator
E132 Student Union
775-5550

Colleges and Schools
College of Business and Administration
110 Rike Hall
775-2437

College of Education and Human Services
228 Millett Hall
775-2821

College of Engineering and Computer Science
405 Russ Engineering Center
775-5001

College of Liberal Arts
445 Millett Hall
775-2225

College of Nursing and Health
401 Allyn Hall
775-3131

College of Science and Mathematics
134 Oelman Hall
775-2611

School of Graduate Studies
106 Oelman Hall
775-2976

School of Medicine
114 Medical Sciences Building
775-3010

School of Professional Psychology
117 Health Sciences Building
775-3490

Wright State University Lake Campus
100 Dwyer Hall
7600 State Route 703
Celina, Ohio 45822
1-800-237-1477
(419) 586-0300
Graduate Program Officers

School of Graduate Studies
Joseph F. Thomas Jr., Dean and Associate Provost 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

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Roger Sylvester, Director of M.S. in Social and Applied Economics Program

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   Certification Advisor for Educational Personnel
   Reginald Green
   Certification Advisor for Library/Media
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   Student Personnel Services in Higher Education—Administration
   Charles W. Ryan
   Teacher Leader
   June K. Ovington

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   Community Mental Health
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   Counseling Exceptional Children
   Diane E. Frey
   Gerontology
   Jan La Forge
   Marriage and Family Counseling
   Gregory R. Bernhardt
   School Counseling
   Phyllis Henderson
   Rehabilitation Counseling—Severely Disabled
   Jan La Forge

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   Larry Chance
   Mathematics
   Jeri A. Nichols
   Susann Mathews
   Social Studies
   Ron Helms
   Special Education
   Michael Williams

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Giorgio M. McBeath, Assistant Dean
Richard K. Rathbun, Assistant Dean

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Kathleen Glaus, Associate Dean for Academic Affairs

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Joyce Corban, Assistant Dean

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Biological Sciences
Michele Wheatly, Chair

Chemistry
Paul Serve, Chair

Geological Sciences
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Physiology and Biophysics
Peter K. Lauf, Chair

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Edgar A. Rutter, Chair

Physics
Gust Bambakidis, Chair

Psychology
Robert Gilkey, Interim Chair

Other Graduate Programs

Biomedical Sciences
Robert E. W. Fyffe

Selected Graduate Studies
Joseph F. Thomas Jr.

Graduate Council Members

School of Graduate Studies
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College of Business and Administration
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George Polak, Faculty Member, 1997–99
Ann Wendt, Faculty Alternate

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Bonnie Mathies, Dean’s Alternate
Charles Ryan, Faculty Member, 1996–98
Eileen Self, Faculty Member, 1997–99
Donna Cole, Faculty Alternate

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Donald Swanson, Faculty Member, 1997–98
David Orenstein, Faculty Member, 1997–98
Sharon Nelson, Faculty Alternate

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Norma Adragna-Lauf, Faculty Member, 1997–99
Lawrence Prochaska, Faculty Alternate

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Barbara O’Brien, Dean’s Alternate
Barbara Fowler, Faculty Member, 1997–99
Susan Praeger, Faculty Member, 1996–98
Kristine Scordo, Faculty Alternate

College of Science and Mathematics
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Robert Weisman, Dean’s Alternate
Joanne Dombrowski, Faculty Member, 1996–98
Barbara Mann, Faculty Member, 1997–99
Larry Turyn, Faculty Alternate

College of Engineering and Computer Science
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Richard Bethke, Dean’s Alternate
Marian Kazimierczuk, Faculty Member, 1996–98
Joseph Slater, Faculty Member, 1997–99
Scott Thomas, Faculty Alternate

College of Professional Psychology
Leon VandeCreek, Dean
Kathleen Glaus, Dean’s Alternate
Kathy Malloy, Faculty Member, 1996–98
Sanford Pederson, Faculty Member, 1996–98
Steve McConnell, Faculty Alternate

Biomedical Sciences Ph.D. Program
Robert Fyffe, Director

Computer Science and Engineering Ph.D. Program
Bruce Bera, Director

Engineering Ph.D. Program
James Brandeberry, Director

Human Factors and Industrial/Organizational Psychology Ph.D. Program
Robert Gilkey, Director

Ex Officio

Perry Moore, Provost
This Is Wright State University

In the tradition of the nation's best universities, Wright State University is dedicated to teaching, research, and service. In addition, as a metropolitan university near Dayton, Ohio, Wright State has the distinct mission of providing leadership to improve the quality of life for the people of the Miami Valley. Wright State is an affordable, comprehensive, state university with a diverse range of high-quality academic programs and strong links to Miami Valley schools and business, government, and community organizations.

The university serves over 16,000 students with programs leading to more than 100 undergraduate and 40 graduate and professional degrees through six colleges and three schools. Wright State offers innovative educational programs, including doctoral programs in biomedical sciences, engineering, human factors and industrial/organizational psychology, medicine, and professional psychology; Ohio's only combined computer science and engineering Ph.D. program; one of only two aerospace medicine residency programs for civilians in the nation; and a post-master's educational specialist degree program. Wright State's theatre, accounting, chemistry, geology, and engineering programs are recognized for excellence. The WSU Lake Campus near St. Mary's and Celina, Ohio, offers associate and prebaccalaureate degrees.

Wright State University's faculty is dedicated not only to advancing the frontiers of knowledge but also to applying knowledge to real problems. Most classes are small and taught by fully affiliated faculty members, 80 percent of whom hold the most advanced degrees in their fields. In addition, students gain hands-on experience through a variety of community-based programs, cooperative education, internships, and research projects operated with industry and government.

Over 2,000 of Wright State's students live in university-affiliated residences on or adjacent to the 557-acre main campus. An extensive underground tunnel system links most campus buildings, whose modern architecture is nationally recognized for being completely accessible to people with disabilities. Although most students hold jobs on or off campus, many are involved in one or more of the 150 student clubs and organizations that give vibrancy to campus life.

The university offers 14 Division I intercollegiate athletic programs, and many students participate in intramural sports programs. The Ervin J. Nutter Center, a state-of-the-art sports and entertainment complex, and other recreational facilities are available to students on a daily basis. Besides intercollegiate athletic events, the Nutter Center hosts convocations, concerts, and other cultural and entertainment events, seating up to 12,000. A new student union opened in January 1995 and serves as a hub for campus activity.

History

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. A major turning point was reached in October 1967, when Wright State became an independent state institution.

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.

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 just over 16,000 contains representatives from 46 states and 59 foreign countries. Many students live in the surrounding community, and half of our 54,000 graduates have kept their expertise in the local community by choosing to live and work in the greater Dayton area.

The average age of the university's 4,156 graduate and professional students is 33.7 years. Wright State has developed many of its graduate programs so students can attend classes after work hours, and over half of the university's graduate students attend all of their classes after 4 P.M.
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 provost 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 over 3,500 students in the fall quarter of 1997, 70 percent of them part-time. In addition, 483 students were enrolled in the Schools of Medicine and Professional Psychology. The graduate school offers four Ph.D. programs, 35 master's degree programs, and one post-master's educational specialist 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 and supervision in higher education.

Academic Units

Academically, the university is organized into 10 units. Undergraduate degrees are awarded through the Colleges of Business and Administration, Education and Human Services, Engineering and Computer Science, Liberal Arts, Nursing and Health, and Science and Mathematics. The WSU Lake Campus offers associate's degrees. 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. degrees in computer science and engineering, and in engineering, through the College of Engineering and Computer Science, the Ph.D. degree in human factors and industrial/organizational psychology through the College of Science and Mathematics, 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 comprises 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 Faculty Senate 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 Ombuds. The ombuds 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 pursue the following 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 provost 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 resulting awards to the university.
Producing new knowledge, an essential part of graduate education, can be enhanced by sponsored research programs. *Research News*, a quarterly publication of the Office of Research and Sponsored Programs, highlights grant-seeking skills and lists trends in federal and private funding, and awards received by Wright State University faculty. *Funding Update* is a monthly publication that provides information on upcoming deadlines for funding programs.

**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, (937) 775-3207.

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, E186 Student Union, (937) 775-5680.

**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, statewide programs, federal laboratories, and Ohio industry. General memberships include the Council of Graduate Schools and the Midwestern Association of Graduate Schools.

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

University Libraries

Serving the diverse needs of graduate students and faculty, the University Libraries are integral to the research and instructional programs of Wright State University. Besides traditional collections and services, the libraries use the latest technology to provide access to information. The on-line library system provides information about local library collections and, through OhioLINK, provides access to the major academic collections throughout the state of Ohio. The LIBNET workstations, located in the reference areas of both libraries, provide access to numerous electronic journal indexes, research databases, and Internet resources in a wide range of subject areas. Reference librarians are available seven days a week to help students and faculty in the use of collections and on-line resources. Both libraries also offer group instruction sessions on various topics every quarter. Through a variety of cooperative agreements, Wright State users can borrow materials directly from many academic libraries in the local and statewide area.

The Paul Laurence Dunbar Library

The Dunbar Library collections, among the largest in the Dayton area, include over 570,000 bound volumes, one million microforms, 350,000 U.S. and Ohio documents, and 4,100 current periodical subscriptions. The library building is open over 100 hours per week. The facilities include study tables and carrels for group and individual study, a current periodicals/microforms reading room, and photocopiers on each floor. Staff at the information desk on the second floor assist users with brief factual or directional questions while professional librarians provide in-depth assistance at the research consultation office.

Special collections of note include one of the largest depositories of information about the Wright brothers in the world. The over 6,000 items include manuscripts, records, and books, as well as some 4,000 photographs made from the Wrights' own negatives. Other early aviation history materials and collections relating to local and regional history draw researchers from afar. A collection of materials relating to the history and culture of African Americans is maintained in a reading room on the second floor. In addition, a separate collection of music materials is housed in the Creative Arts Center.

Other services include library orientation tours, classroom instructional sessions and demonstrations, course reserves, and interlibrary loan for materials unavailable locally or through the OhioLINK system.

The Fordham Health Sciences Library

The Fordham Library, located in the Medical Sciences Building, serves as the primary library for the Schools of Medicine, Nursing, and Professional Psychology and for graduate students in the biomedical sciences. The collections number over 106,000 volumes and 1,200 current serial subscriptions.

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. Seven of the hospital libraries participate in OhioLINK, over 108,000 volumes in these affiliated libraries complement the university collections.

Special collections of the Fordham Library 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 American eighteenth and nineteenth-century medical books.

The Center for Teaching and Learning

The Center for Teaching and Learning provides comprehensive development and instructional support services for students and faculty. The center conducts numerous workshops for the professional development of faculty and teaching assistants in areas including improving instructional skills and developing an appreciation of, and the ability to apply, both traditional and evolving technologies to the instructional process. Distributed learning, a new addition to the center, encourages faculty to engage in new modes of instruction for students far removed from traditional campus classrooms. Additionally, the center provides a wide variety of support services to the entire campus community.

The center's production services include a full range of photographic services, graphic design and production, audio and video services, multimedia, and web development. The campus nonprint materials collection, comprising over 4,500 titles, is housed and distributed by the center. The Media Store carries a full line of photographic, audio, video, and other media supplies. The center's technical service units provide for the selection, delivery, setup, and operation of media and computer equipment in classrooms and for other campus activities and events.

For more information, including our on-line materials and equipment catalogs, see the center's web site at http://www.media.wright.edu
Computer Services

Computing and Telecommunication Services (CaTS) 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.

Computing and Telecommunication Services includes University Computing Services, which 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 Help Desk. Graduate students' accounts are valid throughout their degree programs.

Electronic mail (e-mail) is used by students, faculty, and administrative staff to communicate on campus and with colleagues at remote sites on the Internet. 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 e-mail.

Access to Turnpike is available through modern 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 Center.

Integration of microcomputers into curricula is a goal of the university, and includes providing computer labs to all current students. CaTS maintains networked IBM-compatible, Apple Macintosh, and a lab accessible to persons with disabilities in the computer center, which provide students with the use of software. Various colleges and departments maintain microcomputer labs for specific student populations. In addition to the labs in the computer center, CaTS maintains remote locations throughout campus.

Client Services provides support for the research and instructional clients. A staff of consultants is available to provide support and expertise within a variety of areas.

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 African American Collection, comprising over 3,000 books and periodicals relating to the African American experience (located in the university's main library), and the Peer Supportive Services Program, a program of advising, mentoring, and tutoring services.
Asian/Hispanic/Native American Center

The Asian/Hispanic/Native American Center was created in October 1997 to support the academic, social, and cultural needs of Asian, Hispanic, and Native American students, faculty, and staff at the university. It also serves as an informational resource center regarding the Asian, Hispanic, Native American experience and creates an appreciation and understanding of the diverse Asian, Hispanic, and Native American cultures represented within the community. The center's programs consist of guest speakers, workshops, film series, and celebrations of the Hispanic, Native American, and Asian Heritage Months.

Women’s Center

The Women’s Center serves as an information clearinghouse on women’s issues and services, fostering greater ties between women at Wright State and women in the community. The center promotes gender equity through educational programs and activities that honor the roles, contributions, and experiences of all women. The center also provides resource support for the Women’s Studies program and accommodates meetings, workshops, and other small group gatherings that address the concerns and interests of women on campus.

Student Affairs and Enrollment Services

The Office of the Vice President for Student Affairs and Enrollment Services establishes broad goals and a vision for Student Affairs consistent with the mission of the university. Department directors manage planning, policy implementation, research, and evaluation, as well as maintain an advocacy role for all Wright State University students. In that capacity, the division provides many services, facilities, and co-curricular activities designed to create an environment in which students can grow intellectually, culturally, emotionally, physically, and socially. Student Affairs administrators manage budget and personnel services, publications, communications, data analysis and reporting, and resolve student issues. The office is dedicated to creating a strong student voice on campus and supporting excellence in education.

The departments within the Division of Student Affairs and Enrollment Services include Undergraduate Admissions, Financial Aid, Residence Services, Career Services, Disability Services, Veterans Affairs, Student Life, Campus Recreation, Intercollegiate Athletics, Student Union, Public Safety, Psychological Services, and Student Health Services. Select services are highlighted in this section of the catalog. Students are encouraged to refer to the Student Handbook.
available in the Student Union Information Center, for a complete description of each of these services.

Career Services

Wright State offers a number of services to help students find temporary employment or further their search for career employment through Career Services. Students may avail themselves of individual career advising, a career resources center, student employment and career employment job fairs, and interviewing opportunities. Academic courses are available that focus on career choices, career development, and changing from college to career employment. Students find temporary employment through both the Student Employment and Cooperative Education Programs. Through Cooperative Education/Internships, students gain practical, career-related experience that is essential in acquiring career employment upon graduation. Career Services offers a variety of services and information on its home page at http://careers.wright.edu.

Center for Psychological Services

Students seeking assistance with personal, social, and educational concerns are encouraged to seek services through the Center for Psychological Services, located in the Frederick A. White Health Center. Confidential individual and group counseling sessions are available. Positive Choices, a clinic for stress management and relaxation, offers group, individual, and self-study formats.

The center also provides consultation services, workshops on various topics, and support groups for university clubs, organizations, and residence halls. Registered students receive six sessions for free with a fee assessed for additional services. Fees may be reimbursed through insurance.

Student Health Services

Located in the lower level of Allyn Hall, Student Health Services provides limited medical services to students and numerous health screening programs, including confidential HIV screening each quarter. Students needing the services of a physician are referred to the Frederick A. White Health Center or a local physician of the student's choice. The student health insurance program is administered through Student Health Services.

International Programs

The University Center for International Education Office offers assistance to the more than 350 international students with immigration and cultural adjustment issues. It also coordinates an international exchange program for students interested in visiting another culture. Month-long cultural exchange programs are offered each summer in Japan, Brazil, and China. More traditional term or year-long study abroad opportunities are offered in Australia and several European and South American countries.

Services for Students With Disabilities

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 assistance for dressing and hygiene needs; adapted campus parking; assistance in locating on- or off-campus adapted housing. Training in activities of daily living to achieve a greater degree of independence; campus mobility orientation for visually impaired students; and other related services.

The academic support services are designed to assist physically and learning-disabled students in meeting all academic requirements. These include textbooks in alternative formats for students who have a visual impairment, learning disability, or an extensive physical disability; test proctoring for students who need reading or writing assistance, adaptive computers, and/or extra time to complete a test; and academic aids that accommodate individuals with disabilities in meeting class requirements and coursework in adaptive computer technology.

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.
Public Safety

Public Safety, the official law enforcement agency for the university, provides police services 24 hours a day. Among the services provided are personal safety escorts, a crime prevention unit, and educational programs that focus on the topics of crime awareness and prevention. To increase safety within the campus community, emergency phones are located throughout the campus in buildings, parking lots, and other remote areas. These phones ring directly into the Public Safety Communications Center to ensure an immediate response to all potential emergency situations.

Student Union

The Student Union is the community center of the university, providing services and conveniences that students, faculty, staff, and alumni need in their daily lives. The facility houses student clubs, study lounges, the University Bookstore, an art gallery, fitness center, arcade, billiards room, swimming pool, gymnasium, meeting rooms, student services, and more. Dining services include the Union Station food court, The Depot convenience store, cafeteria, Faculty Dining Room, and the Rathskeller.

The Student Union sponsors programs and leadership initiatives that help individuals get to know and understand one another. The Student Union complements the academic experience by offering an extensive variety of cultural, educational, social, and recreational programs, ranging from comedians and bands to classical concerts. The student-centered programs provide opportunity to balance course work and free time as cooperative factors in education.

Housing

Wright State University offers accommodations for graduate and professional students in The Village. This apartment community offers efficiency and one- and two-bedroom style units. All apartments have wall-to-wall carpet, window coverings, and modern kitchens.

The Village is conveniently located on campus, within walking distance of all university facilities. A variety of shopping centers, restaurants, and attractions are minutes away from The Village community.

Once students are admitted to graduate school, they receive information regarding campus housing options. To be eligible for The Village, a student must be admitted to the university and meet one of the following criteria: graduate or professional student, 23 years of age or older, in an exclusive relationship, or have legal dependent(s). As space allows, undergraduate students with junior or senior status may be allowed to reside in The Village.

Other housing options are also available in Wright State’s residence halls and campus apartments. Information about off-campus housing can be obtained through the Office of Student Life at (937) 775-5570.

Additional information concerning graduate student housing can be obtained by contacting the Office of Residence Services at (937) 775-4172 (Voice or TDD).

Campus Recreation

The Office of Campus Recreation is dedicated to providing quality recreational opportunities for the Wright State community. To meet the diverse needs and interests of students, faculty, and staff, a comprehensive and innovative program has been developed. A variety of activities exist to promote healthy lifestyles, positive human relationships, productive leadership skills, responsible attitudes, sportsmanship, and fair play.

The Student Union’s recreational facilities include a fitness center, gymnasium, swimming pool, racquetball and squash courts, billiards room, game arcade, the Campus Recreation offices, and outdoor playfields. The Nutter Center is home for evening open recreation and intramural sports activities in the gymnasiums, weight room, indoor running track, and outdoor tennis courts.

The Campus Recreation program offers a variety of activities in competitive intramural
sports, recreational sports, tournaments and special events, fitness, noncredit instruction, adapted recreation and athletics, outdoor recreation, and sport clubs in which graduate students are encouraged to participate. Leagues exist in team sports including basketball, bowling, flag football, inner-tube water-polo, soccer, softball, volleyball, wallyball water basketball and volleyball, and various wheelchair sports. Individual sports include badminton, golf, racquetball, table tennis, and tennis. Outdoor recreation activities include biking, canoeing, downhill skiing, horseback riding, and whitewater rafting, as well as instructional clinics in rock climbing, kayaking, sailing, and scuba. Noncredit instruction is available in numerous aerobics and spinning sessions.

All sports and recreational activities are inclusive. Please contact our office if you need assistance or adaptations to participate fully in any of our programs. Additional information can be obtained by contacting the Office of Campus Recreation, E009 Student Union, (937) 775-5815.

Sports

The university offers a broad program of both intercollegiate and intramural sports for men and women. Wright State's student-athletes compete in NCAA Division I and the Midwestern Collegiate Conference. Men's and women's sports opportunities include basketball, cross country, soccer, swimming, and tennis. In addition, the university offers baseball and golf for men, and softball and volleyball for women. Under certain NCAA rules, graduate students may be eligible to compete. All students are admitted free to on-campus Wright State athletic events.

Organizations and Activities

Many opportunities for cocurricular 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 interests with a group. In addition, the Department of Student Life conducts leadership training programs and offers community service learning opportunities.

The Union Activities Board (UAB), operated by students for students, schedules a wide variety of events including videos, guest speakers, comedy/novelty entertainment, concerts, recreational tournaments, and cultural activities. 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 weekly 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. 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 Union Activities Board sponsors a variety of concerts, speakers, and cultural events and offers a highly regarded film series featuring foreign, cult classics, and avant garde films. By bringing to the area innovative and internationally acclaimed performing artists and groups, the Wright State University Artist Series enriches the lives of students and area residents.
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

Accountancy/M.Acc.

Administration of Nursing and Health Care Systems/M.B.A. and M.S.

Aerospace Medicine/M.S.

Anatomy/M.S.

Applied Behavioral Science/M.A.
Criminal Justice and Social Problems

Applied Statistics/M.S.

Biochemistry and Molecular Biology/M.S.

Biological Sciences/M.S.

Biological Sciences, Environmental Sciences

Business Administration/M.B.A.


Business Administration/M.B.A. and Social and Applied Economics/M.S.

Chemistry/M.S.
Chemistry, Environmental Sciences

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

As a result of recently passed legislation, certification/licensure programs for teachers are in the process of being changed. No student will be admitted to current Teacher Education programs which lead to initial certification/licensure after the end of summer quarter 1996.
All subsequent admissions (effective beginning fall quarter 1998) will be for the new licensure programs. For the most current details and information, please contact the College of Education and Human Services Office of Student Services, 321 Millett Hall, (937) 775-4508. Current information will also be posted on the College’s web site at www.ed.wright.edu


Computer Engineering/M.S.C.E.

Computer Science/M.S.

Counseling/M.A., M.R.C., M.S.
Business and Industrial Management, Exceptional Children, Community Counseling, Marriage and Family, Mental Health Counseling, Rehabilitation Counseling: Severe Disabilities and Chemical Dependency

Earth Science/M.S.T.

Educational Leadership/M.A., M.Ed.
Educational Leadership General; Curriculum and Supervision; Vocational Supervisor; Teacher Leader; Student Affairs in Higher Education—Administration

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

English/M.A.
English Literature English Composition and Rhetoric Teaching English to Speakers of Other Languages (TESCL)

Geological Sciences/M.S.
Environmental Sciences, Environmental Geology, Geological Sciences, Geophysics, Hydrogeology, Petroleum Geology

History/M.A.

Humanities/M.Hum.

Logistics Management/M.S.

Mathematics/M.S.
Applied Mathematics, Mathematics

Microbiology and Immunology/M.S.

Music Education/M.Mus.

Nursing/M.S.
Administration of Nursing and Health Care Systems, Adult Health and Illness, Child and Adolescent Health, Community Health, Education, Family Nurse Practitioner

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

Physiology and Biophysics/M.S.

Psychology/M.S.
Human Factors and Industrial/Organizational Psychology

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

Social and Applied Economics/M.S.

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

Urban Administration/M.U.A.
Post-Master’s Degree Programs

Educational Specialist Degree/Ed.S.

Educational Leadership
Curriculum and Instruction
Higher Education/Adult Continuing Education
Superintendency Administrative

Doctoral Degree Programs

Doctor of Philosophy/Ph.D.

Biomedical Sciences
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 Science and Mathematics and the School of Medicine, this program is interdisciplinary, innovative, and staffed by more than 80 faculty from numerous departments across the campus.

The first year of the curriculum consists of an interdisciplinary core, laboratory rotations, and seminars, followed by a second year of advanced courses in preparation for dissertation research.

Upon successful completion of the candidacy examination, students pursue dissertation research under the guidance of an advisor and supervisory committee. 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.

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. 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 Qualifying Examinations. Those who pass the exams 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.

**Engineering**

The Ph.D. in engineering is an interdisciplinary program that involves the Departments of Electrical, Biomedical/Human Factors, and Mechanical/Materials Engineering. The Ph.D. in engineering is a nontraditional program because it is interdisciplinary and collaborative. The program incorporates (1) an interdisciplinary core curriculum that spans the commonality of the various engineering fields involved; (2) both major and breadth course specialization areas; and (3) significant research in one of six focus areas. In addition, the program provides for substantial collaboration among several graduate engineering programs at five different institutions.

**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 interdisciplinary curriculum with instruction in 21 departments and
programs. Integrated or affiliated graduate medical education (residency) programs are conducted in the following disciplines: aerospace medicine, dermatology, emergency medicine, family practice, general surgery, internal medicine, internal medicine/pediatrics, obstetrics and gynecology, orthopedic surgery, pediatrics, plastic surgery, psychiatry, and transitional.

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 (Psy.D.) degree. 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/Licensure/Endorsement Programs

In addition to graduate degree programs, Wright State offers two additional types of structured curricula. One such program leads to certification/licensure/endorsement status for teachers and consists of a series of courses that will qualify a teacher for certification/licensure/endorsement in a specific area (see Education and Human Services section). The College of Education and Human Services also offers certificate/licensure/endorsement programs for school counselors, administrative specialists, school administrators, and in vocational and technology education.
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 concerned department/college and the School of Graduate Studies, graduate credit (courses) completed at another regionally accredited academic institution may be transferred to a student’s graduate academic record and applied toward the requirements of the student’s graduate degree program at Wright State.

A student may transfer graduate credit if all of the following conditions are met:

- The student’s advisor reviews the transfer of credit request and recommends that the course(s) be accepted for transfer credit.
- The student was admitted and enrolled as a graduate student at the institution where the graduate credit was completed. In addition, the student must be or have been in good standing at that institution.
- The graduate credit to be transferred is within the seven-year time limit for completing a master’s degree. Graduate credit transferred toward a program’s elective credit requirement does not have to meet the seven-year time limit.
- The amount of credit to be transferred does not exceed 12 quarter hours.
- The student has a program of study on file in the School of Graduate Studies. The program of study must clearly reflect the student’s required (professional, core, advanced, introductory, general, etc.) and elective courses. Transfer courses do not have to be placed on the program of study until the courses have been approved by the School of Graduate Studies.
- The grade for the credit is “B” or better, or equivalent as determined by the School of Graduate Studies. The School of Graduate Studies may require additional information from the student and/or the institution in order to determine grade equivalency.
- The credit to be transferred has not been applied toward a previously awarded degree.
- An official transcript reflecting the credit to be transferred is on file in the School of Graduate Studies.
- The student is actively pursuing a graduate degree program at Wright State and has currently completed at least three credit hours of degree requirements.
- The transfer of credit request is approved by the School of Graduate Studies.

In order to be awarded a master’s degree, a student must complete at least 45 hours of graduate credit in a graduate program. At least 33 of the 45 hours must be completed at Wright State and must be within the seven-year time limit.
All required (other than elective) program course requirements must be completed within the seven-year time limit.

A student wishing to transfer credit should consult with his or her program advisor. If the advisor approves the courses for transfer credit and the courses meet all of the School of Graduate Studies requirements, then the advisor should request in writing that the courses be posted on the student's academic record. The request should indicate the courses and number of hours to be transferred (the hours to be transferred cannot exceed the number of hours the student earned for the course or courses).

Graduate courses completed at Wright State in non-degree status and later applied toward degree requirements are not considered as transfer credit from outside the university.

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.

Before taking the examination, students should obtain a Credit by Examination form from the Office of the Registrar, and pay a non-refundable $25 examination fee to the Bursar's Office. Signatures of the examiner and the department chair on the form 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 for graduate courses; given only for specially approved courses. (Credit is earned but is not computed in grade point averages.)
- **M** Satisfactory progress; final grade will be assigned upon completion of the project.
- **U** Unsatisfactory performance; indicates work of C quality or below for graduate courses; 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 date agreed upon, the I grade automatically becomes an F, unless the instructor submits another I grade. The maximum time allowed for the make up of an incomplete is the last day of class of the following quarter, except for spring quarter; spring quarter incompletes must be made up by the last day of class of the fall quarter.
- **W** Withdrew; given for courses from which the student officially withdrew or dropped during the fourth through fifth weeks of classes or equivalent or for which the student successfully petitioned for withdrawal.

Grade reports are sent at the end of each quarter to the addresses on file in the Registrar's Office.
FINANCIAL ASSISTANCE, FEES, AND TUITION
Financial Assistance

Introduction
Financial aid available to graduate students includes graduate assistantships, graduate fellowships, Federal Perkins Loans, Federal Subsidized and Unsubsidized Stafford Loans, Federal 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. Students must be enrolled in a degree or certification program to process Federal aid eligibility.

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. Financial need is not a criterion for selection of graduate assistants; the Free Application for Federal Student Aid (FAFSA) discussed in the section on Financial Aid applies to other forms of financial assistance.

Graduate Tuition Fellowships
A limited number of fellowships, which cover a graduate student’s tuition for two years or program completion (whichever is less), are offered by the Colleges of Business and Administration, Education and Human Services, Engineering and Computer Science, Liberal Arts, Nursing and Health, Science and Mathematics, and the School of Professional Psychology.

The goals of the fellowship program are to recruit and retain master’s and doctoral students who have demonstrated academic excellence in the past and who exhibit the potential for continued academic excellence in the future. The fellowships are awarded primarily to new incoming graduate students who intend to pursue a graduate degree program as a full-time student. To be eligible for the fellowships, students must qualify for regular admission into a master’s or doctoral program. Questions regarding the tuition fellowship program should be addressed to the college or school of interest.
Graduate Council Scholars Program

Stipends and tuition remissions are awarded annually to full-time graduate students who are recommended by their respective college/school dean, and selected by the Graduate Council Student Affairs Committee. The stipend and tuition remission is awarded for up to two years. This program not only eases graduate students' financial burdens but recognizes their academic achievements.

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 must complete the Free Application for Federal Student Aid (FAFSA) or Renewal Application and send it to the Federal Processing Agency. The FAFSA or Renewal Application can be submitted on the Internet at http://www.fafsa.ed.gov/. The FAFSA may be obtained from the Office of Financial Aid, but the Renewal Application will be mailed from the Federal Processing Agency to the student applicant. Please note: the Renewal Application will be mailed to students who have applied for financial aid through the FAFSA in the previous academic year. Those students receiving a Renewal Application will not have to complete the FAFSA. The FAFSA or Renewal Application must be mailed to the Federal Processing Agency no later than the March 1 prior to the start of the academic year to determine priority eligibility for the Federal Perkins Loan, the Federal Nursing Student Loan, Subsidized and/or Unsubsidized Stafford Loan, and the Federal Work-Study employment program. Applications received after the priority deadline date will be considered for financial aid through the FAFSA or Renewal Application, and by applying before the priority deadline.

Federal Perkins Loans

Eligibility for the Federal Perkins Loan is determined by the student having high computed financial need through the FAFSA or Renewal Application, and by applying before the priority deadline.

The repayment period and interest accrual for the Federal Perkins Loan does not begin until nine months after the student terminates at least half-time enrollment. The loan has a 5 percent interest rate, and repayment may be extended over a 10-year period.

Federal Nursing Student Loan

Graduate nursing students who have high computed need through the FAFSA or Renewal Application, and who apply by the priority deadline, may receive funding through the Federal Nursing Student Loan. The Nursing Student Loan has the same interest rate, repayment period, and grace period as the Perkins Loan. Nursing Loan award amounts are based on yearly funding.

Federal Stafford Loan Program

Through the cooperation of lending institutions that participate in the Subsidized and Unsubsidized Stafford Loan program, students who are enrolled in a certification or degree-seeking program, and are registered for a minimum of 4 credit hours, may receive long-term educational loans. The yearly Stafford loan limit for graduate students is $8,500. A brief description of each loan follows:

Stafford Loan (Subsidized)

The federally funded Subsidized Stafford Loan program enables students to borrow money to help meet educational costs. Repayment begins six months following graduation or termination of at least half-time enrollment. The minimum repayment is $50 per month and the variable interest rate begins at the time of repayment. The student will be expected to pay a 4 percent fee, which is deducted from the proceeds of the loan.

Stafford Loan (Unsubsidized)

The terms and conditions of the federally funded Unsubsidized Stafford Loan are the same as for the Subsidized Stafford Loan, except that the borrowers of the Unsubsidized Stafford Loan will be responsible for payment of the interest that accrues while they are in school. The interest rate is variable, not to exceed 8.25 percent.

Unsubsidized Stafford Loans are available to students who do not qualify for the Subsidized Stafford or have minimum eligibility through the Subsidized Stafford Loan. Graduate and
professional students can borrow the loan limit based on their year of study, and up to an additional $10,000 through the Unsubsidized Stafford Loan.

Federal Work-Study Program

Employment through the Federal Work-Study Program is available to students who demonstrate financial need, according to federal guidelines, and who apply by the priority deadline.

Graduate students who are registered for at least four 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 are registered for classes during the summer sessions they plan to work.

Short-Term Loans

Students who have earned at least three credit hours at Wright State University, and a minimum grade point average of 2.0, are eligible to borrow up to $300 for books or personal needs. You must be registered for at least 4 credit hours for the quarter for which you are requesting the loan. There is a $7 processing fee for the short-term loan. Short-term loans cannot be used for tuition installment payments. There is a two-day processing time for a short-term loan, and applications are available through the Office of Financial Aid. Short-term loans that are borrowed at the beginning of a quarter must be paid in full by the sixth week of the quarter in which the money is borrowed.

Veterans’ Benefits

Active duty personnel and Vietnam-era veterans are eligible for the new G.I. Bill if they served without a break in service after October 19, 1984, through June 30, 1985. Only veterans separating after June 30, 1985, 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 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 Department of Veteran Affairs office. Educational opportunities are available for children and surviving spouses of veterans whose deaths or permanent total disabilities were service-connected. Spouses and children of servicemen and service-women declared missing in action or prisoners of war are also eligible.

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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 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 Discover, VISA, or MasterCard 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 Raider Express Drop Box adjacent to the Office of the Bursar in the Student Union. 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 to complete the registration process.

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, a hold will be placed on their account. Transcripts will be released and future quarter registration will be permitted when payment in full is received.

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 eight 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 installation 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 within 30 days of 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 and late registration 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 the Appendix of this catalog, which lists Rule 3333-1-10 in its entirety, or contact the Office of the Registrar (937) 775-5588.
Fees*
1998–99 Quarterly Fees as of Fall 1998**

<table>
<thead>
<tr>
<th>Master's, Ed.S., Ph.D. 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>$161</td>
<td>$148</td>
</tr>
<tr>
<td>11 through 18 credit hours†</td>
<td>$1,703</td>
<td>$1,569</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>$282</td>
<td>$269</td>
</tr>
<tr>
<td>11 through 18 credit hours†</td>
<td>$3,013</td>
<td>$2,879</td>
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</tbody>
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**Additional Fees and Charges**

<table>
<thead>
<tr>
<th>Fee Description</th>
<th>Main Campus</th>
<th>WSU Lake Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late registration fee/all students</td>
<td>$25</td>
<td>$25</td>
</tr>
<tr>
<td>Nondegree application fee</td>
<td>$10</td>
<td>$10</td>
</tr>
<tr>
<td>Application fee to change from nondegree to degree student</td>
<td>$15</td>
<td></td>
</tr>
<tr>
<td>Audit fee/per credit hour (laboratory and special courses not open to audit) same as for credit courses</td>
<td>$25</td>
<td>$25</td>
</tr>
<tr>
<td>Transcript fee/first request</td>
<td>$3</td>
<td>$3</td>
</tr>
<tr>
<td>each additional at same time—$1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcript fee/same day/first request</td>
<td>$10</td>
<td>$10</td>
</tr>
<tr>
<td>each additional at same time—$1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate degree student and certification student application fee</td>
<td>$25</td>
<td>$25</td>
</tr>
<tr>
<td>Returned check penalty/per check</td>
<td>$25</td>
<td>$25</td>
</tr>
<tr>
<td>Applied music fee</td>
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<td>$25</td>
</tr>
<tr>
<td>one half-hour lesson per week</td>
<td>$120</td>
<td></td>
</tr>
<tr>
<td>one-hour lesson per week</td>
<td>$240</td>
<td></td>
</tr>
<tr>
<td>Proficiency credit/per credit hour</td>
<td>$15</td>
<td>$15</td>
</tr>
<tr>
<td>Credit by examination proficiency test fee</td>
<td>$25</td>
<td></td>
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<tr>
<td>Graduation fee</td>
<td>$35</td>
<td>$35</td>
</tr>
<tr>
<td>International student fee</td>
<td>$52</td>
<td></td>
</tr>
<tr>
<td>Student's Installment Payment Plan application fee/late payment fee</td>
<td>$20/$25</td>
<td></td>
</tr>
<tr>
<td>Technology fee/per credit hour per quarter</td>
<td>$15‡</td>
<td></td>
</tr>
</tbody>
</table>

* 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.
‡ Up to a maximum of $100 per quarter per student will be assessed on all courses taught within the College of Engineering and Computer Science.

**The fees on this page were recommended to, but not formally approved by, the Wright State University Board of Trustees as of this catalog's publication deadline. Fee schedules are subject to change depending on action by the state legislature and approval by the Ohio Board of Regents and the University Board of Trustees. For an up-to-date list, contact the Office of the Registrar, (937) 775-5588.
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 admission to an advanced degree. Such admission 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. Should students be accepted into degree status at a later date, a maximum of one-half (50 percent) of the graduate hours required for completion of degree requirements may consist of applicable graduate courses completed in nondegree status (see Retroactive Graduate Credit, page 44 of this catalog, for additional information).

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

A student who wishes to complete teacher certification requirements at the graduate level but who does 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 admission into a degree program and program approval, a maximum of one-half (50 percent) of the graduate hours required for completion of degree requirements may consist of applicable graduate courses completed in certification status (see Retroactive Graduate Credit, page 44 of this catalog, for additional information).

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. Should students be accepted into degree status at a later date, a maximum of 12 quarter hours of graduate workshop credit can be applied with program approval toward degree requirements (see Retroactive Graduate Credit, page 44 of this catalog, for additional information).

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 bachelor's 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 bachelor's, master's, or doctoral 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. Students having master's degrees from regionally accredited institutions may be admitted into Wright State graduate degree programs regardless of their undergraduate grade point averages provided the appropriate academic departments or programs recommend them for admission.

Nondegree Status
To be admitted into nondegree status, a student must have a bachelor's, master's, or doctoral degree from a regionally accredited college or university.

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 college/school petitions committee. The petition with the committee’s recommendation is then 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, regardless of previous academic record, must submit satisfactory scores on the Graduate Management Admission Test 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 completed at least one course in four consecutive quarters. The term “course” includes formal courses, independent study, thesis research, continuing registration, etc.
4. A graduate student who has completed the degree requirements for which he or she was originally admitted and wants to take additional graduate courses as a nondegree student or start a new degree program.

International Students

Wright State welcomes applications from qualified international students. Approximately 400 students on F-1 and J-1 student visas currently attend the university. Application materials may be requested from the University Center for International Education. 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 a regionally 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 550 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. 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 50 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. All admitted international students are required to purchase and maintain student health insurance for themselves and their dependents during their studies.

Registration

Students must be admitted to the School of Graduate Studies in order to register for and earn graduate credit. 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 and one 10-week term). Registration dates 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 economics are advised in their admission
Admission and Registration

4.

Registration must be completed by the date indicated in the quarterly class schedule. Students who register early will be mailed fee statements and their confirmation of registration.

Registration will not be accepted after the first week of the quarter unless the department chair or dean of the college or school approves the late registration. Fees must be paid by the date indicated in the quarterly class schedule. No registration will be accepted after the second week of the quarter. No students may be admitted to classes for which they have not been properly registered.

Telephone Registration

After new students have met with their advisor, they are ready to register for classes. Registration information and dates are announced in the quarterly schedule of classes. Once students have advisor approval (if required), they may register through the Raider Express Telephone System using a touch-tone phone or in person at the windows of the Office of the Registrar. Students in the School of Professional Psychology and the Department of Biomedical Sciences may not use Raider Express for registration.

Continuing students should check the quarterly class schedule or their registration information form for the specific date they may begin to register. Currently registered students receive the registration information form in their campus mailboxes located in Allyn Hall Lounge. Students who are not currently registered, but who have been registered anytime during the past year, will receive the information form in the mail.

Paying Fees

Students will find fee payment information and deadlines in the quarterly class schedule. Students who register before a quarter begins but do not pay the fees by the required due date may have their registration canceled in order to make classroom space available to other students. Mailed payments received after the deadline will be returned.

Registrations will not be canceled for students who register after a quarter begins but do not pay their fees on time. These students will be responsible for payment of fees and are subject to deadline dates as stated in the quarterly class schedule for dropping and receiving refunds.

Students may pay fees by check or money order, made payable to Wright State University, and sent to the Office of the Bursar. Students may also use Discover, MasterCard, or Visa credit cards to charge most fees paid to the university. In addition, 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.

Refunds

A current schedule of refund dates and other information about refunds can be found in the quarterly class schedule and in the Office of the Registrar.

Subsequent Registration

Students who have registered for graduate classes at Wright State University for any of the four preceding quarters will be authorized to register for the current quarter. Students who have not registered during the preceding year must reapply to the School of Graduate Studies to have their files updated.

Auditing Courses

If class space permits, students admitted to the School of Graduate Studies may audit a course with written approval from the instructor before they enroll. The amount of participation required of auditing students is left to the discretion of the instructor, but it cannot exceed that required of regular students. Audited courses may not be used to establish full-time status, and students may not change their registration from audit to credit or from credit to audit after the first week of class.

Change in Courses

A change in registration is made by submitting a drop and add form to the Office of the Registrar or by calling the Raider Express Telephone System. Students should refer to the quarterly class schedule for specific deadlines for dropping courses and receiving refunds. The deadline for adding classes is the end of the first week of classes. There is no fee for adding courses, although instructional and general fees are charged where applicable.

Withdrawal From Courses

Students may drop a course without a grade of W appearing on their transcript if the course is dropped by the date specified in the quarterly class schedule. Students should refer to the
quarterly class schedule for deadline dates for dropping a class or withdrawing. A student who stops attending a course and does not officially withdraw will receive a grade of F or X at the instructor's discretion. The X grade remains on the student's permanent record and is computed in the grade point average as an F.

Course Repeat

Students may repeat once any graduate course previously taken for credit in which the grade received was below a B. Only the hours and grade points earned from the repeated course will be included in the computation of the grade point average and in meeting degree requirements.

Students should indicate that they are repeating a course when registering. Repeats are permitted only twice in any master's degree program.

Continuing Registration

A student's registration each quarter should reflect the level of academic participation in university life and anticipated progress toward the degree. This is particularly true of students involved in thesis, dissertation, and special project research. Academic units may set minimum registration requirements for continuing and readmitted students which represent the unit's supervision of those students' efforts to complete degree requirements.

Students must be registered for at least one hour of graduate credit as designated by the department during the quarter in which the successful defense of a thesis or dissertation is accomplished.

Any exception must be approved by the student's advisor, department chair, and the dean of the School of Graduate Studies.
ACADEMIC POLICIES AND GRADUATE DEGREE REQUIREMENTS
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 of 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.

Wright State graduate students in certification and nondegree statuses who later are admitted into a graduate degree program may apply, with program approval, a limited number of hours completed in these statuses toward degree requirements. A maximum of one-half (50 percent) of the graduate hours required for completion of degree requirements may consist of applicable graduate courses completed in nondegree and certification statuses. Students earning workshop credits under special status who subsequently are admitted into a degree program may apply, with program approval, a maximum of 12 quarter hours of applicable graduate credit toward degree requirements. For example, if a program of study stipulates that 50 graduate hours are required for the award of a degree, then up to 25 hours of applicable graduate credit completed in certification or nondegree status may be applied toward degree requirements (12 of the 25 hours may be workshop credit).

Colleges/programs may set lower nondegree credit hour limits for completion of a degree program. While the nondegree hours that can be applied toward degree requirements may be a mixture of courses completed in nondegree, certification, and special graduate status, workshop credit is limited to a total of 12 hours.

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 the quarter the student completes 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 then bound and 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 that is 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 for two dual programs: a Master of Business Administration (M.B.A.) degree and the Master of Science (M.S.) degree in social and applied economics; and the Master of Business Administration (M.B.A.) degree and the Master of Science (M.S.) degree in administration of nursing and health care systems. The requirements for these programs are contained in this catalog under College of Business and Administration and College of Nursing and Health programs.

**Working On Two Master's Degrees**

Graduate students desiring to work on two master's degrees at Wright State at the same time may do so provided:

1. The student formally applies and is admitted into the second master's degree program before registering for any courses for that program.
2. Within two quarters from the start of the programs, approved programs of study are on file in the School of Graduate Studies for both graduate programs.
3. The first program must have a minimum of 45 graduate hours. The second program must have a minimum of 33 graduate hours (programs may require more hours than the minimum requirement).
4. Courses required for one program cannot be applied toward the second program's requirements.
5. Only 12 hours of transfer credit can be applied, with program and Graduate Studies approval, toward the requirements of the first master's degree. No transfer credit can be applied toward the 33 graduate hours required for the second master's degree.
6. Students may graduate with the two degrees at the same commencement exercise.

**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).

- June 1 to September 1 (December)
- September 1 to December 1 (March)
- December 1 to March 1 (June)
- March 1 to June 1 (August)

Applications for graduation may be obtained in the School of Graduate Studies. A fee of $35 must be paid to the bursar, then the completed application should be returned to the School of Graduate Studies.

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.

**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 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 (and grades earned) 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 in 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 new Stage II Program of Study form to the director of the M.B.A. program. Approval is granted by both the College of Business and Administration and the School of Graduate Studies.

All other requests for change of program must be processed by completing 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 students 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. Submission of 3 letters of recommendation
4. Earned cumulative grade point average of 3.5 in master’s degree study
5. Acceptance by faculty interviewing team
6. Satisfactory scores on either the GRE or the MAT

An applied research thesis 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 presented to the thesis committee.

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 and the School of Medicine.
An interdisciplinary Ph.D. program in engineering is offered by faculty in the College of Engineering and Computer Science. Ph.D. programs in computer science and engineering and in engineering are offered by program faculty in the College of Engineering and Computer Science. A Ph.D. program in human factors and industrial/organizational psychology is offered by the psychology department faculty in the College of Science and Mathematics.

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 hour requirement.

Residence Requirements
Students in a Ph.D. program are considered to be in residence whenever they are registered for at least eight credit hours of Wright State graduate courses. A minimum residence of three consecutive full-time academic quarters at Wright State University, devoted wholly to graduate work, is required. In addition, completion of a minimum of 90 credit hours toward the program must be completed at Wright State.

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

Dissertation
The dissertation is an original contribution to scholarly or scientific knowledge in a specialized area. Students are expected to demonstrate in the dissertation the highest level of mastery in the techniques of research and a thorough understanding and application of the subject matter.

Before undertaking the dissertation, the student must (1) pass the qualifying examination, (2) be admitted into candidacy status, and (3) gain approval of the proposed dissertation topic from the student's dissertation or advisory committee. Students must complete the dissertation within the time frame established for candidacy. All course work associated with the dissertation must earn a grade of "A", "B", or "P" in order to qualify the student for graduation. The dissertation must be written in English.

The final defense of the dissertation will normally be open to the public. The dissertation committee may also elect to privately question the candidate following the public presentation. The procedures for the defense of the dissertation will be established by the program's graduate committee. The dissertation must be approved by at least three (3) members of the dissertation committee.

Qualifying Examination
All students in a Ph.D. program are expected to take and pass the qualifying examination before they will be admitted into candidacy status. The purpose of the qualifying examination is to determine if a student has acquired and is able to apply fundamental knowledge and acumen in the program area. The examination may be written, oral, or both. The type of examination and the procedures for the examination will be determined by the graduate committee of the Ph.D. program. Students will normally not take the examination until they are familiar with the material in the core courses of the program. Failure to pass the examination may result in dismissal from the program regardless of performance in other aspects of the program. Depending on the committee's recommendation, a student failing the examination may repeat it once. Students will normally be expected to repeat the examination at its next scheduled date. Passing the examination does not guarantee a student's admission into candidacy. The program may establish additional criteria to determine students' eligibility for candidacy.

Students will be provided written notification of the results of the examination and of any actions to be taken within 10 days of having taken the examination.

The Ph.D. program will notify, in writing, the School of Graduate Studies of the administration and results of the qualifying examination and the actions to be taken for those students who have failed to pass the examination. If dismissal action is to be taken, the School of Graduate Studies will formally notify the student by letter.
Candidacy

Acceptance into candidacy in a Ph.D. program indicates that students have the basic potential to undertake work on the dissertation and to successfully complete all other requirements of the program.

Students in a Ph.D. program may achieve candidacy by passing the preliminary or qualifying examination and having obtained approval of their dissertation topic from their dissertation committee. The programs will determine the requirements for achieving dissertation approval. Candidacy is valid for five years. The program can, however, terminate candidacy for unsatisfactory progress. Students may petition for an extension to the candidacy term.

Time Limit

Students must complete all the requirements for a Ph.D. degree within 10 years from the date the student matriculated in the program. Courses older than 10 years on the students' programs of study cannot be used toward degree requirements.

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 the qualifying 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 of the final dissertation defense.
9. Present one copy of the approved dissertation to the graduate school office.
10. Fulfill all requirements within 10 years of matriculation into the program.
Doctor of Medicine (M.D.) Degree

The Wright State School of Medicine offers an innovative, four-year interdisciplinary 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.

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.
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 various airmen and airwomen.

The Graduate Faculty

Professor
Stanley R. Mohler (director), aerospace medicine

Associate Professors
Robin E. Dodge, aerospace medicine
Satya P. Sangal, biostatistics

Assistant Professor
Farhad Sahiar, 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; MBA 551

Anatomy

The Department of Anatomy offers a program leading to the Master of Science degree (M.S.). The major purpose of the Master of Science program 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

Professors
Robert Fyffe, neuroanatomy, neuropsychology
Joseph Zambard (Emeritus), cell biology of oncogenic viruses

Associate Professors
Andrew J. Kuntzman, kinetics of the musculoskeletal system
Frank Nagy, ultrastructure, cell division, kinetics, male reproductive system, embryology, computer software development
Gary L. Nieder, early embryo development, embryo implantation
John C. Pearson, neuroanatomy
Larry J. Ream, neuroanatomy, immunohistochemistry
Jane N. Scott (chair), embryology, reproductive systems

Assistant Professors
Francisco J. Alvarez, neuroanatomy
Patrick A. Carr, developmental neurobiology, neurobiology of disease

Admission

Minimum requirements include an overall undergraduate grade point average of 3.0-plus. Although there are no uniform prerequisites, it is recommended that applicants have completed at least two years of biology, including vertebrate anatomy, and two years of chemistry, including organic chemistry. Letters of recommendation are an important admission consideration.

Students who do not plan to complete the degree program or who do not meet the admission requirements of the School of Graduate Studies may be admitted on a nondegree basis in order to take selected anatomy courses. Written permission by the appropriate course director is required to enroll in each anatomy course. Contact the Anatomy Department for information concerning enrollment procedures.
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 or 50 graduate credit hours (see number 4) in courses that have prior approval of the department. Approval is normally given through the student's faculty advisor.

2. The graduate credits must include 33 credit hours of core courses in anatomy.

3. Required courses are human gross anatomy, human microanatomy, advanced human embryology, human neurobiology, and four seminars.

4. There are two program-of-study options leading to a master's degree:
   a. Course Option (50 credits): In addition to the 33 credits listed above, students are required to take an oral comprehensive examination covering the core anatomy courses, assist with teaching an anatomy department course, learn a research technique, and write a scholarly paper. The remaining 3 credits include elective graduate courses in the anatomy or other science department.
   b. Thesis Option (45 credits): 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:
   a. Course Option: 6–7 quarters
   b. Thesis Option: Two years

Applied Behavioral Science

A Master of Arts degree in criminal justice and social problems is offered through the Applied Behavioral Science Program. The program provides excellent preparation for students intending to continue their education in a Ph.D. or comparable advanced program.

Through graduate seminars and independent study, students acquire an in-depth understanding of relevant scholarship pertaining to their field. Students learn research methods applicable to the criminal justice system and social problems such as teen pregnancy, aging, family violence, homelessness, and substance abuse. These skills are demonstrated through the capstone experience. The field experience component of the curriculum provides opportunities to develop and practice skills related to the student's intended career field.

The ABS program strives to provide students flexibility to pursue individual interests and needs. Students may enroll on either a full-time or part-time basis. Courses are offered primarily in the evenings to accommodate employed students.

Participating Faculty

Professors

Jeanne Ballantine, relations in complex organizations, role transitions
Harvey Siegal, substance abuse, AIDS and health care delivery
Jim Walker, constitutional law, local politics

Associate Professors

Anna Bellisari, ethnic conflicts, gender issues
Bela Bognar, social gerontology, community mental health
Anita Curry-Jackson, social work
Ed Fitzgerald, criminal law, civil rights
Thomas Koebernick (director), methods, community, bureaucracy
David Orenstein, social communication, interaction theory
Norma Shepelak, criminology, deviance, social psychology
Jim Steinberg, family dysfunctions, child welfare

Assistant Professors

David Bogumil, family, conflict resolution, substance abuse, social psychology
Carl Brun, child welfare, qualitative methods
Marleece Durr, affirmative action and management systems, work and occupations
Tracey Steele, crime and social control, gender, medical sociology
Norma Wilcox, deviance, criminal justice, corrections, social welfare

Admission

In addition to meeting the admission requirements of the School of Graduate Studies, students are expected to have undergraduate training in research related skills as well as advanced courses appropriate for their field of interest. Applicants demonstrate preparation for advanced work by having earned a grade of B in
at least one computer, one research methods, and one statistics course. These courses are prerequisites for the Research Methods course sequence. Examples of WSU courses that meet this requirement include the following:

Computer Skills: CS 205, MIS 100
Research Methods: SOC 306-406
Statistics: STT 160, PLS 210-211

Students with deficiencies in required undergraduate courses may be considered for admission on the condition they remove deficiencies prior to enrollment. All students must take a statistics placement test prior to the fall quarter they begin the Research Methods course sequence. Students are admitted in either the fall or winter quarters. For those seeking full-time enrollment, preference is given to fall quarter applicants. Applications for fall must be submitted by July 15; winter applications by December 1. All application materials should be submitted by the above deadlines. The ABS director should also be notified by the student when his/her application is submitted.

**Financial Aid**

The ABS program offers several graduate assistantships. Graduate fellowships for both part-time and full-time students may be available through the School of Graduate Studies. Awards of financial assistance are generally for the entire academic year, which begins with the fall quarter. Applications for assistantships are obtained from the ABS office and should be submitted to that office by March 15. There are a limited number of graduate assistantships available in nonacademic university departments each year. The ABS director can provide more information about these.

**Certificate Programs**

Wright State University offers a certificate program in Social Gerontology that may be earned at the graduate level. It is possible to incorporate certificate requirements within the ABS degree requirements. ABS electives can also be used to meet a portion of state requirements for certification in substance abuse counseling.

**Program of Study**

The four components of the ABS master's degree program are research methodology, substantive courses in the specialization area, a field experience (practicum or other applied experience), and a capstone experience requiring original research. A minimum of 47 hours of graduate credit must be earned. No more than 12 hours of transferred graduate credit will be allowed subject to departmental approval. These requirements can be summarized as follows:

**Research Methods Sequence**

- ABS 705 Computer Scholarship 2
- ABS 701 Research Methods 4
- ABS 702 Social Statistics 5
- ABS 703 Issues in Applied Research 4

**Substantive Core**

- ABS 761 Seminar in Social Deviance 4
- ABS 771 Seminar in Criminal Justice 4
- ABS 781 Seminar in Family Problems 4

**Field Experience**

- ABS 798 Graduate Project 3
- ABS 799 Thesis Research 8

**Substantive Specialization**

- Possible Criminal Justice Electives: ABS 788, SOC 639, PLS 640, PLS 542, PSY 635, COM 653, SW 681, MBA 751, URS 719, URS 717
- Social Problems Electives: ABS 741, ABS 788, SOC 670, SOC 639, COM 632, COM 653, PSY 635, PSY 647, SW 681, SW 683, RHB 730, RHB 731, MGT 700, URS 675, URS 713, URS 720, URS 721

**Total** 47

**Applied Mathematics**

See Mathematics

**Applied Statistics**

See Statistics

**Art Education**

See Education and Human Services
The Department of Biochemistry and Molecular Biology offers a program of study leading to the Master of Science degree in biochemistry and molecular biology. 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 and Molecular Biology 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: molecular structure and function, 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
Michael Leffak, DNA replication and cloning
Daniel T. Organisciak (chair), visual biochemistry, membrane metabolism, neuronal lipid metabolism
Lawrence J. Prochaska, energy-transducing membranes, cytochrome oxidase
Robert A. Weisman, in vivo magnetic resonance, positron emission tomography

**Associate Professors**

Gerald M. Alter, enzyme structure, hemoglobin conformation, site directed mutagenesis
John V. Paietta, gene expression, recombinant DNA
Nicholas V. Reo, carbohydrate metabolism, in vivo magnetic resonance
John J. Turchi, mechanisms of eukaryotic DNA replication and repair

**Assistant Professors**

Steven J. Berberich, regulation of cell proliferation, oncogenes
Mengfei Ho, enzyme inhibitors, protein kinases, peptides and peptide analogs
Brenda A. Wilson, structure/function of bacterial protein toxins

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
John C. Lipscomb, assistant professor (WPAFB), comparative xenobiotic metabolism

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 (BMB 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 BMB 750 and/or 752 must be completed within a year of the quarter in which the deficiency occurs.
2. Research Perspectives (BMB 702).
3. Research Ethics (BMB 703).
4. Graduate seminars: a total of 6 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. BMB 899 (or BMB 699) must be taken each quarter the student performs laboratory 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 specialization 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 two 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. Although there is no specific course work requirement for this option, candidates will be advised to enroll in graduate-level courses deemed appropriate for successful understanding of the research to be undertaken. Option Two is a course work option that requires the successful completion of 45 quarter credits of graduate-level course work, writing a critical review, and passing an oral examination. The desired option can be elected by students only after consultation with the chair of the graduate committee.

All candidates 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.

Environmental Sciences Core

The requirements for the Master of Science degree in biology are quite flexible, and include a thesis and nonthesis option. The department also permits a student to pursue an advanced course of study that ensures an interdisciplinary environmental perspective. When selecting this option, a student's advisory committee includes a member from outside the department, e.g., a member of the geology or chemistry faculty. And, in addition to meeting the general requirements for the Master of Science degree in biology, course requirements for the environmental core include:

- Environmental chemistry
- Geologic and environmental applications of geographic information systems
- Environmental statistics
- Risk assessment
- Environmental sciences seminar
- Two environmental sciences electives outside the biology department

The Graduate Faculty

Professors

Larry G. Arlian, medical entomology, immunoparasitology, physiology
G. Allen Burton, ecotoxicology
Wayne W. Carmichael, aquatic biology/toxicology, isolation, culture, toxicology of toxic algae, biotechnology
Larry D. Isaacs, human lifespan motor development
James R. Runkle, plant ecology, general ecology
Michele G. Wheatly, crustacean physiology, calcium transport
Timothy S. Wood, invertebrate ecology, biology of freshwater bryozoans


**Associate Professors**
James P. Amon, microbial ecology, including molecular biology, cell biology, and electron microscopy
Clyde D. Barbour, systematics and ecology of fishes
David L. Goldstein, comparative physiology of osmoregulation, physiological ecology, ornithology
Barbara E. Hull, cell biology, histology, electron microscopy, reconstruction of skin in vitro
Kay Low, immunohematology (blood transfusion medicine), immunology
Mark D. Mamrack, cellular biochemistry, signal transduction, carcinogenesis
Robert L. Scott

**Assistant Professors**
Scott E. Baird, developmental genetics
Maria J. González, aquatic ecology, aquatic toxicology
Keith A. Grasmen, wildlife toxicology and immunotoxicology
Dan E. Krane, molecular and genome evolution; human population substructuring
Mill W. Miller, cellular and developmental biology/nuclear transport
Linda Ramey-Gassert, environmental/science education (forest ecology)
James H. Tomlin, science education, learning theory

**Lecturer**
Hunting W. Brown, Institute for Environmental Quality

**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 the following requirements:

1. The candidate must complete a minimum of 45 quarter credits. A maximum of 12 credits of graduate courses may be transferred from other institutions. At least 30 quarter hours must be at the 600-800 level in biological sciences and related fields.
2. One course in scientific or technical writing (such as BIO 608 or ENG 533, 544, 600, or 602) is required.

3. Candidates must be registered in the quarter in which they defend their thesis.

4. The candidate must maintain a 3.0 cumulative average; no more than 9 credit hours of "C" grades may be applied to the degree.

5. The degree options have the following requirements:
   
   **Option 1:**
   
   a. Candidates must complete at least four graduate seminars (BIO 800). Three of the four graduate seminars must be offered by the Department of Biological Sciences faculty.
   
   b. The College of Science and Mathematics requires a Program of Study to be filed with the School of Graduate Studies by the start of the third quarter of enrollment for full-time students, and by the time 18 hours have been taken for part-time students.
   
   c. Candidates must submit an approved thesis proposal with the Graduate Committee by the end of the second quarter. This proposal should be prepared in consultation with the student’s Advisory Committee. Students who have not done so will not be permitted to continue enrollment in BIO 899 (Graduate Research). Upon acceptance of the thesis proposal by the Advisory Committee, one copy is filed in the graduate student's file. Research may deviate from the original proposal, however, suitable supplementary information must be submitted to the Advisory Committee.
   
   d. Candidates must submit and orally defend a thesis based on original research performed while enrolled as a graduate student at the university.
   
   **Option 2:**
   
   a. Candidates must complete 45 credit hours of graduate course work. A maximum of 12 credits can be earned in departments other than life science departments.
   
   b. Four seminar credits are required, two of which must be taken in the Department of Biological Sciences.
   
   c. Candidates must form an Advisory Committee and file a Program of Study before the end of their third quarter (or 25 credit hours).
   
   d. Candidates must complete 4-6 credit hours of BIO 699 (Special Problems in Biology). A copy of their written report must be put in the student’s department file.
   
   e. Candidates must write a critical review (BIO 799, six hours maximum) and pass an oral exam administered by the Advisory Committee upon completion of course work.

### Biomedical Engineering

The Department of Biomedical and Human Factors Engineering offers a program of graduate study leading to a Master of Science in Engineering (M.S.E.) degree with a major in biomedical engineering. The M.S.E. program is broad in scope and emphasizes portable concepts in the design and analysis of complex physical systems using modeling, synthesis, and optimization techniques, and bridges interdisciplinary engineering areas such as controls, robotics, electronics, and communications. A Ph.D. in engineering with a major in biomedical engineering is also available. For details see Engineering Ph.D. Program.

### The Graduate Faculty

**Professors**

Thomas N. Hangartner, biomedical engineering, medical imaging, CAT scanning, instrumentation, computers

Rick Koubek (chair), human factors, usability of medical devices

Chandler A. Phillips, mathematical modeling of biomechanics, fuzzy decision making in rehabilitation, functional electrical stimulation

Blair A. Rowley, biomechanical engineering, rehabilitation engineering, computer applications to augmentative communication, instrumentation, bioelectric effects of low-level electrical currents on tissue growth and healing

**Associate Professors**

Ping He, biomedical engineering, medical imaging, ultrasonics, instrumentation, computers

David B. Reynolds, biomedical engineering, biofluid mechanics, engineering approaches to respiratory/pulmonary physiology

**Assistant Professors**

Manoop Bhutani, medical imaging, ultrasonics
Admission

Students must satisfy the requirements of the School of Graduate Studies. International students must have a TOEFL score of at least 550. In addition, the basic requirement for admission to the Master of Science in Engineering program is a bachelor's degree in engineering or a related area with an overall undergraduate grade point average of at least 2.7 (on a 4.0 scale) or an overall undergraduate grade point average of at least 2.5 with an average of 3.0 or better for the last 90 quarter hours (60 semester hours) earned toward the undergraduate degree.

Facilities

Graduate students have access to a wide range of computer systems interconnected by local and wide-area networks. Access is available to three DEC Alpha AXP 4000/610's; numerous Sun, DEC, and Silicon Graphics 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

Research in biomedical engineering currently encompasses two main areas: medical imaging and rehabilitation engineering. Included are neural prosthetics 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 at 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 biomedical engineering work on real-life problems.

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.

Collaboration

The Dayton Area Graduate Studies Institute, provides collaboration opportunities through the graduate engineering courses, faculty, and research resources of the Air Force Institute of Technology, the University of Dayton, The Ohio State University, and the University of Cincinnati.

Graduate Assistantships

Assistantships are available to students on a competitive basis. Students awarded assistantship 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 should plan a program of study in consultation with a faculty advisor. The program of study should be finalized by the time the student completes 12 credit hours of graduate study.

The following requirements must be met for the Master of Science in Engineering degree:

1. Completion of 45 graduate credit hours in courses that have prior approval by an 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 in 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. 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.

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 science.

Course Option: Students must complete 12 credit hours of courses numbered 700 or above in addition to the 12 hours specified in requirement 3.
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 and the School of Medicine.

The program faculty at Wright State reside in a number of departments including anatomy, biochemistry and molecular biology, 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. In addition, the 85 faculty members who participate in the program include scientists from affiliated institutions including the Tri-Service Toxicology Laboratory at Wright-Patterson Air Force Base, the Kettering/Scott Magnetic Resonance Laboratory, and the Veterans Affairs Medical Center in Dayton.

Admission Information

Entrance Requirements

Applicants 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
7. Acceptable scores on the Graduate Record Examination (GRE).

Prospective students 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. All application material should be submitted by March 1.

Financial Assistance

Predoctoral assistantships are available to students on a competitive basis. Students awarded assistantship support are eligible for stipends and remission of tuition fees. There are no special forms to submit for financial assistance. Students interested in financial support should indicate their interest 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, human physiology, and intercellular communication. The advanced curriculum is organized into interdisciplinary areas of concentration.

The program requires students to take 18 credit hours of advanced courses and six seminars, pass a preliminary examination, and produce an acceptable dissertation based on original research.

Waiver of Program Requirements

Students may petition for exemption from all or part of the core curriculum. 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 above, (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.
The Curriculum

Interdisciplinary Core

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Biochemistry and Molecular Biology</td>
<td>8</td>
</tr>
<tr>
<td>Mammalian Cell Biology</td>
<td>4</td>
</tr>
<tr>
<td>Human Physiology</td>
<td>5</td>
</tr>
<tr>
<td>Intercellular Communication</td>
<td>4</td>
</tr>
<tr>
<td>Research Ethics</td>
<td>1</td>
</tr>
<tr>
<td>Introduction to Research</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>2</td>
</tr>
</tbody>
</table>

Advanced Courses                                  18 

Advanced Seminars (a minimum of two)               2-4

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 five years. Graduate credit applied toward the doctoral degree is valid for only nine years from the date the student enters the program. Extenuating circumstances must be acceptable to the Academic Policies Committee of the Biomedical Sciences faculty, the program director, and the dean of the School of Graduate Studies.

A minimum of 76 credit hours toward the doctoral degree must be completed at Wright State University.

Curriculum Overview

Year I

<table>
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<tr>
<th>Quarter I</th>
<th>Course</th>
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<td></td>
<td>Introduction to Research</td>
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<td></td>
<td>BMS Seminar</td>
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<td></td>
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<tr>
<td></td>
<td>Research Ethics</td>
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<td></td>
<td>BMS Seminar</td>
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<th>Quarter IV</th>
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<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Core Seminar</td>
<td>2</td>
</tr>
</tbody>
</table>

Advanced Course

Research Seminar Lab Rotation

Year II-Year IV

Complete advanced courses

Take preliminary examination (by end of Year II)

Research leading to dissertation and defense

Dissertation

Each 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 between the student, the faculty advisor, and the committee is central to the program. The committee determines when the research may be considered complete 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. Dissertation research will receive grades of satisfactory (M) or unsatisfactory (U) until the dissertation is accepted; these will then be converted to a standard letter grade. A 3.0 GPA and the recommendation of the student's supervisory committee and the program director are required for graduation.

Probation

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.

A first-year student enrolled in the core curriculum must achieve an overall grade point average of at least 3.0 after completing Year I. A student who completes 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 attain 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 non-academic 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
4. Prepare a written dissertation proposal
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
7. Be certified by the program director as having completed all requirements for the Ph.D. degree
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

Faculty research interests represent a broad spectrum of the biomedical sciences and are concentrated in the areas of specialization described in subsequent sections. Within each area of specialization, and across areas, there are extensive interactions and collaborations that enhance the interdisciplinary approaches and training opportunities available to students in the advanced curriculum and dissertation phases of the program. In the advanced curriculum, course requirements will be tailored to fit the needs of individual students according to their area of specialization. Through this series of lecture, laboratory, seminar, and independent study experiences, students will be trained to draw on a multidisciplinary background to attack current problems in the biomedical sciences.

Some of the most important aspects of biomedical research today concern the elucidation of the regulatory mechanisms of cellular and molecular processes and the genetic factors that determine the structural and functional differences between cells. These important areas are central to the teaching and research activities of faculty and students in the areas of molecular biology/biochemistry and cell biology and physiology:

Molecular Biology/Biochemistry

It is well recognized that an understanding of the etiology of disease, of normal human growth and development, of tissue differentiation, and of the ontogenetic development of the immune system is dependent upon basic research in a variety of regulatory processes, including cell-cell interactions, energy metabolism and control of enzyme activity, macromolecular conformation, hormonal effects, gene expression, and the correlation of observed characteristics of cells with the information carried by their DNA. The program has extensive resources to train students in these exciting areas, from a molecular/biochemical perspective.

The molecular biology and genetics of cellular metabolic processes, signal transduction pathways, gene expression and development are studied in a variety of models ranging from bacterial and mammalian cell lines to animal models and computer simulations. The methodologies include recombinant DNA techniques, cloning, sequencing, electrophoresis and hybridization, macromolecular conformation studies, enzymatic activity, immunological reactions, biophysics, and other state-of-the-art molecular and biochemical approaches. Students will be trained to take an interdisciplinary approach to problems in molecular and cellular biology, including training in modern methods of isolating nucleic acids and characterizing their structure and biological activities. The advanced curriculum in the area of molecular biology/biochemistry normally includes at least one course from each constituent discipline (defined broadly as molecular, cellular, and genetics).
Research in these areas obviously has a great bearing on the mechanisms of cancer, heart disease and aging, and on the diagnosis of certain inherited diseases. The faculty presently offer research projects in the following major areas: mechanisms of DNA replication and repair, molecular genetics, macromolecular structure and function, development and differentiation, molecular evolution, oncogenes, bacterial transformation, cell proliferation, retroviruses, cellular transduction mechanisms, retinal degeneration, and ion channel function.

Cell Biology and Physiology

The impact of cardiovascular diseases, pulmonary and blood disorders, diabetes, drug resistance, brain trauma, muscular dystrophy, and other pathophysiological processes in society is enormous. Research into normal and abnormal cellular processes, at the level of cells, organs, and whole organisms, is vital to progress in the treatment and prevention of such diseases. Physiological, biophysical, cellular, and molecular approaches provide valuable insights into critical processes, such as cellular differentiation, signal transduction, and ion channel function, which underlie normal and abnormal function in various organs, and also help us to understand how different organ systems interact with each other.

Researchers in this area of concentration use a variety of models relevant to disease states, such as sickle cell anemia and ischemic damage to the heart. Approaches include the use of cell lines, including normal and abnormal (e.g., leukemic) cells, and tissue and organ preparations, as well as invertebrate and vertebrate animal models. Students can expect to be trained in a wide range of techniques including membrane biophysics, electrophysiology, molecular biological methods, spectrophotometric techniques, and other biochemical analyses, all of which will be used in efforts to dissect intracellular (and intercellular) signaling pathways and transport systems. The faculty presently offer research projects in the following major areas: cell pH and volume regulation, membrane transport systems, the role of ion channels and second messenger pathways in cellular differentiation and other regulatory processes, calcium homeostasis, comparative physiology, bioenergetics, excitation-contraction coupling, cloning, and functional characterization of ion channels.

The immune system and the nervous system act, often in concert, to regulate body function and responses to external influences. Neurological disorders, degenerative diseases that affect nerve cells, traumatic brain injury, infectious diseases, autoimmune diseases and AIDS represent some of the most significant causes of hospitalization and health care expenditure in this country. Interdisciplinary approaches target some of the fundamental mechanisms underlying nervous and immune system function and are pursued by faculty and students in the areas of immunology and neuroscience:

Immunology

This area of concentration presents students with the challenge of probing fundamental cellular and molecular mechanisms related to immunity and infection. Following from concepts presented in the core curriculum the faculty offer a wide range of advanced courses and research opportunities in immunology, virology, pathogenicity, and parasitology, with both basic and clinical relevance. The faculty presently have major research interests in: basic and clinical immunology (reproductive immunology, autoimmune diseases, skin graft rejection), retrovirology (retroviral variation, HIV, endogenous retroviruses), viral pathogenicity (picornavirus infection and diabetes/heart disease), bacterial pathogenicity (superantigens, vaccine development, role of cytokines), and parasitology (scabies).

Neuroscience

Understanding brain function is among the greatest of scientific challenges. The elucidation of mechanisms underlying brain development, synaptic transmission and plasticity provides insight into neurological disorders such as senile dementia (Alzheimer's disease), amyotrophic lateral sclerosis (Lou Gehrig's disease), and Parkinson's disease, to name just a few of the devastating disorders that await the continued impact of the efforts of multidisciplinary groups of neuroscientists. Researchers are also beginning to glimpse the fundamental processes involved in such critical functions as learning and memory. The practice of neuroscience research provides students with the exciting opportunity to pursue a fundamental biomedical science with immediate clinical applications. Following introductory courses, advanced courses and laboratory rotations, and training in related fields such as molecular biology and immunocytochemistry, specialization may be directed toward research opportunities in systems, cellular and molecular neuroscience in any of the broad subdisciplines of neuroanatomy, neurophysiology, neurochemistry, behavioral neuroscience, neuropharmacology, membrane biophysics, or cell biology. Structure-function relationships in the central nervous system are studied with a variety of interdisciplinary techniques including intracellular and patch clamp recording (in vivo and in vitro), membrane biophysics, intracellular staining, immunohistochemistry, electron microscopy, neuropharmacology, and theoretical...
approaches. The faculty offer research opportunities in several major areas including: integrative neuroscience, the molecular biology and biophysics of ion channel function, neurotransmitter receptor expression and cellular localization, brainstem cardiorespiratory control mechanisms, gap junction coupling, theoretical studies of action potential propagation, segmental motor control, sensory processing and its modulation, behavioral endocrinology, and developmental psychobiology.

The basic and clinical aspects of biomedical science described above have many points of overlap and convergence. Likewise, the fields of biomedical engineering and toxicology, which are multidisciplinary in themselves, impact on and interact with the research objectives, techniques, and conceptual advances made in the foregoing areas. The interdisciplinary training obtained in the core curriculum and advanced course work prepares students well to contribute in these areas of specialization:

**Biomedical Engineering**

The scope of current health care is increasingly dependent on sophisticated technology used in research, diagnostic, and therapeutic procedures, and prosthetic and other medical devices. Furthermore, design considerations in advanced manufacturing technology, aircraft cockpit instrumentation design, and better understanding of the effects of microgravity or acceleration on human performance demand knowledge of engineering concepts and biomechanics and the influence of human factors. Advanced study of biomedical and human factors engineering and biodynamics has emerged as a valuable approach to our understanding of and intervention into complex biological systems. The faculty offer a wide range of expertise and courses, and provide training and research opportunities in several major areas: medical imaging, human factors engineering, rehabilitation engineering, biomechanics, biomaterials, medical instrumentation, and mathematical modeling and computer simulation. Noninvasive procedures including nuclear magnetic resonance (NMR) spectroscopy are used for metabolic and structural measurements in organs and bone. Other major interdisciplinary research areas include exercise and rehabilitation physiology, which has direct relevance to the patient populations who participate in development of instrumentation, visual performance and aerospace systems applications, and three-dimensional display visualization.

**Toxicology/Pharmacology**

This area of concentration is concerned with educating and training scientists dedicated to resolving problems of compatibility between chemicals and life processes. The interdisciplinary studies and research opportunities deal with issues at multiple levels including molecular, subcellular, and organ systems, using aquatic and terrestrial models relevant to ecological concerns and/or to human and animal health care. Students will learn modern methods of detecting and characterizing natural or synthetic chemicals and drugs, while measuring the effects of these on simple or complex biological systems. Training and research opportunities are offered in a number of more specialized areas including: environmental toxicology, aquatic toxicology, ecotoxicology, immunotoxicology, risk assessment, analytical chemistry, medicinal chemistry, pharmacokinetics, and molecular pharmacology.

**Human Risk Factors**

The Fels Longitudinal Study, which has now been in existence for several decades, conducts research related to changes in human growth and body composition with respect to risk factors for cardiovascular and other diseases. Students receive advanced training in a range of epidemiological and statistical methods. Research projects include: genetic epidemiology; the development, implementation, and validation of new methods for the study of body composition and of new statistical methods and models; and determination of causal relationships among body composition, adipose tissue distribution, lifestyle, and risk factors for cardiovascular disease.

**Business and Administration**

Note: Beginning fall quarter 1996 a completely revised M.B.A. curriculum was implemented. Any returning student who was previously enrolled will need to consult with a graduate advisor prior to enrolling.

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; and to exceeding the high standards of personal and professional conduct advanced by AACSB, The International Association for Management Education, which accredited the college’s graduate business
programs in 1979. As a result of this commitment to teaching, research, service, and outreach, the university’s mission extends to the growth and development of the metropolitan Dayton area and Miami Valley, and explores problems that have local, state, regional, national, and international applications.

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

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 M.B.A. Degree

The mission of the Wright State M.B.A. degree program is to develop managers and leaders whose understanding and vision encompass the total organization. Graduates will work effectively within and across functional areas and understand the entire organization and its environment. Consistent with this mission, the overarching learning objectives of the program are to develop in our students a cross-functional understanding of organizational operations; further develop students' critical and analytical thinking skills; enhance students' communication skills—oral, written, interpersonal; and develop the ability to work collaboratively in group situations.

The M.S. Degree in Logistics Management

Logistics management is concerned with the flow of goods from point-of-origin to point-of-consumption. It provides competitive advantage by providing goods with higher quality, lower cost, faster delivery, and better product availability. Sometimes called supply chain management, the field has strategic importance in a large number of organizations.

The M.S. in Logistics Management Program provides students with detailed knowledge of the concepts, tools, and strategies required to effectively manage all components of the supply chain. 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 purchasing, acquisition, systems management, materials management, production planning, inventory control, distribution, and logistics planning.

The program consists of three major components: core courses, advanced courses in logistics management, and program electives. The core courses provide skills in professionalism, quantitative methods, and approaches for managing quality, cost, people, and operations. These courses are followed by in-depth studies of major logistics management functions and concepts. Courses in project management, forecasting and inventory control, production and capacity planning, purchasing, physical distribution, and world class production systems provide the detailed knowledge for optimizing all segments of the supply chain. Finally, the program offers the student the flexibility to select four elective courses that best fit their individual career objectives. Among the choices are courses in international business, information systems, project management, marketing, and team leadership.

The M.S. Degree in Social and Applied Economics

For more information about the Master of Science in social and applied economics program, see Economics section on pages 78 and 79 of this catalog.

The M.Acc. Degree

The Master of Accountancy is designed to prepare students for careers in public accounting. Completion of the M.Acc. program will permit students to sit for the CPA exam beginning in May 2000. At that time, Ohio state law requires candidates to have completed 150 semester hours or 225 quarter hours of university work before they take the exam.

Internships are available for full-time students who have no work experience in public accounting.

The Graduate Faculty

Accountancy

Professors
Joseph F. Castellano, managerial and governmental accounting
Nabil Hassan (Emeritus), managerial and financial accounting
Donald F. Pabst (Emeritus), financial and managerial accounting
Hans Dieter Sprohge, managerial and financial accounting
John C. Talbott Jr., taxation and managerial accounting

Associate Professors
J. Gregory Bushong, financial accounting
Russell H. Hereth, taxation
Susan Lightle, (chair), auditing, financial

Assistant Professors
Kennard S. Brackney, 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
Robert J. Sweeney (chair), financial management

Associate Professors
Khurshid Ahmad, insurance, real estate, personal finance
M. Fall Ainina, financial management, investments
James E. Larsen, real estate, financial institutions
Richard E. Williams, financial management, investments, estate planning

Management

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

Associate Professors
Francis J. (Bud) Baker, project management, leadership, organizational behavior, strategic management
Jeanette Davy, organizational behavior, organization development, compensation, human resource strategy
Crystal L. Owen (chair), organizational behavior, organizational development, human resource management
Joseph A. Petrick, international management, management ethics, quality management, leadership studies, environmental management
William M. Slonaker, legal environment of business, legal aspects of business organizations, legal aspects of commercial transactions, labor law, real estate law
Robert Wagley (Emeritus), management, public policy issues management, business ethics
Ann C. Wendt, labor relations, human resource management, public policy

Management Science and Information Systems

Professors
Michael J. Cleary (Emeritus), quantitative methods, computer applications, quality management
W. Steven Demmy, management information systems, logistics, production and inventory management
Nada R. Sanders, forecasting, decision theory, materials management, expert systems
Li D. Xu, systems theory, integrated information systems, artificial intelligence
Vincent Yen, operations research, statistics, management information systems, systems development, decision support systems

Associate Professors
Joseph W. Coleman, statistical analysis, simulation, management information systems
Gordon K. Constable (Emeritus), logistics management, production operations, quality, statistics
Jon R. Hobbs, logistics modeling, simulation, reliability, management information systems
Andrew W. Lai (Emeritus), quantitative methods for business, logistics systems, computer simulation, decision support systems
George G. Polak, network optimization, queuing theory, simulation
Assistant Professors
Barbara B. Denison (chair), small business applications, systems analysis and design
Rebecca B. Koop, management information systems
Frederick R. Watson, linear and integer programming, network modeling and optimization
Larry B. Weinstein, integration of production and maintenance planning, TQM in manufacturing and education environments, issues concerning ISO/OS 9000 registration

Marketing

Professors
Herbert E. Brown (Emeritus), pricing management, direct marketing, marketing management
Frank J. Carmone, marketing strategy, marketing research
Peter S. Carusone, product management, entrepreneurship, marketing strategy
Robert J. Kegerreis (Emeritus), marketing management and strategy
Inder P. Khosla, marketing strategy, consumer behavior, international marketing, marketing of services
Gordon L. Wise (Emeritus), advertising, credit management

Associate Professors
Thomas D. Doval (chair), nonprofit marketing, marketing planning, marketing strategy
Robert A. Ping Jr., marketing management, marketing research
Paula M. Saunders, marketing strategy, service marketing, direct marketing

Assistant Professor
Charles S. Gulas, advertising, consumer behavior, marketing management

Admission

Admission to the M.B.A., M.S. in logistics management, or Master of Accountancy program requires submission of the form “Application for Admission to a Graduate Status” to the School of Graduate Studies. All applicants for admission to a degree program must pay the application fee, submit official transcripts from all colleges/universities attended, and direct Educational Testing Service to forward an official score report to Wright State for the Graduate Management Admission Test (GMAT). International applicants must submit an official score report for the Test of English as a Foreign Language (TOEFL). Applicants must have an earned baccalaureate degree (or the equivalent) from a regionally accredited institution.

Applicants for the M.Acc. degree program should have an undergraduate degree with a major or concentration in accounting in addition to the above requirements. Those with deficiencies may be required to successfully complete selected preparatory courses. Students without the undergraduate accounting major will be required to take undergraduate preparatory courses before beginning the M.Acc.; all such students should contact the chair of the Department of Accountancy before enrolling.

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

Regular Admission in Business

Applicants who have met the minimum standards for admission to the program will be considered by the college's graduate admission committee for regular admission. An admission index (AI), overall or last half, is computed for each applicant. The overall AI is computed by multiplying the overall undergraduate GPA by 200 and adding the total GMAT score. The last half AI is computed by multiplying the last 93 quarter credit hours undergraduate GPA by 200 and adding the total GMAT score. The minimum overall AI to be considered for regular admission is 1000, the minimum last half AI is 1050.

Applicants who have completed any graduate course work must have a minimum graduate GPA of 3.0. International applicants must have a score of 550 or greater on the TOEFL. Once these minimums are met the admissions committee of the college will review the application package and make a decision as to whether to admit the applicant into regular admission status or deny the applicant regular admission status.

Conditional Admission in Business

Applicants who have been denied regular admission, but who believe they are qualified for graduate work, may petition for conditional admission status. Applicants seeking such status must petition the School of Graduate Studies and the College of Business and Administration for conditional admission status. Graduate credit earned while in this status can be applied toward degree requirements. Regular admission status will be granted once all admission requirements are satisfied and the student completes 12 hours of graduate credit with a cumulative GPA of 3.0. A student who does not meet these conditions will be dismissed.
Provisional Admission in Business

Under certain conditions, an applicant may be admitted provisionally (for one quarter) pending receipt of the official credentials. Provisional admission is granted for one quarter to allow the applicant the time necessary for Wright State to receive the official documents. Provisional admission is not a final admission category. Once all official documents are received, the college will make a final decision to admit or not.

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.

Provisional Admission in Accountancy

Students without the undergraduate accounting major (or business degree) will be required to complete 29 hours of undergraduate and graduate preparatory courses with a minimum GPA of 3.0 before they can attain regular admission status.

Nondegree or Transient Admission in Business

Applicants who meet all School of Graduate Studies requirements for nondegree admission or transient admission will be admitted into these categories. Students wanting to switch to degree status must reapply to the School of Graduate Studies for such status and may apply only 12 credit hours of Stage II requirements toward the degree.

M.B.A. Degree Requirements

Stage I—Foundation Course Work

The following outlines the preparatory foundation course requirements for the M.B.A. degree program. Candidates should consult with a graduate advisor in the College of Business and Administration for information on the policies and procedures to waive the foundation courses.

All candidates must have or obtain a knowledge of the fundamentals in the following areas: accountancy, computing, economics, finance, law, management, marketing, mathematics, and statistics. Students deficient in any of these areas are required to successfully remedy the deficiency by completing the appropriate State I course(s). Stage I courses may be waived for individuals who have completed comparable courses at regionally accredited institutions. Waiver of foundation course work is based on the grade received, credit hours, course content, focus, and other factors. Additionally, students may demonstrate competency by successfully passing a proficiency test. The Stage I Program of Study form must be completed by the student prior to registering for graduate business courses.

<table>
<thead>
<tr>
<th>Stage I—Foundation Courses</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 523 Survey of Microeconomics</td>
<td>2</td>
</tr>
<tr>
<td>EC 524 Survey of Macroeconomics</td>
<td>2</td>
</tr>
<tr>
<td>MBA 511 Survey of Accounting</td>
<td>2</td>
</tr>
<tr>
<td>MBA 531 Financial Reporting and Analysis</td>
<td>2</td>
</tr>
<tr>
<td>MBA 532 Survey of Finance</td>
<td>2</td>
</tr>
<tr>
<td>MBA 541 Survey of Law</td>
<td>2</td>
</tr>
<tr>
<td>MBA 551 Survey of Management</td>
<td>2</td>
</tr>
<tr>
<td>MBA 561 Survey of Marketing</td>
<td>2</td>
</tr>
<tr>
<td>MBA 581 Survey of Mathematics for Business</td>
<td>2</td>
</tr>
<tr>
<td>MBA 582 Survey of Statistics</td>
<td>2</td>
</tr>
<tr>
<td>MBA 571 Research and Reports</td>
<td>1</td>
</tr>
<tr>
<td>MBA 572 Database Construction</td>
<td>1</td>
</tr>
<tr>
<td>MBA 573 Spreadsheets</td>
<td>1</td>
</tr>
</tbody>
</table>

M.B.A. Program of Study

Stage II—Competency, Functional, Integrated, and Concentration Course Work

After completion of the necessary Stage I foundation courses, students undertake the Stage II course work, a 51 minimum credit hour program. Thirty-nine credit hours of graduate business course work is common to all M.B.A. students. This common course work is broken into three areas. The first area encompasses 15 credit hours of business competency course work, which includes a course in economics for managers, quality management, business professionalism, managing people, and quantitative methods. The second area consists of 12 credit hours of functional course work, which includes a course in accounting, marketing, finance, and managing operations. The third area includes 12 credit hours of integrated course work covering topics in information and technology; international business; regulation, government and law; and competitive strategies. The final 12 hours (minimum) of course work is completed in one, and if the student so chooses, or more area(s) of concentration. Additional hours will be required for each added concentration. Students have the flexibility to choose and structure concentration(s) to meet their career objectives. Areas of concentration are offered in business economics, finance, financial administration, health care management, international business, logistics management, management, management information systems, marketing, operations management, and project management. Foundation courses cannot be used as electives within the concentration area(s). Students taking graduate business courses should follow course prerequisite requirements.
Candidates for the M.B.A. degree will complete a Stage II—Program of Study form, in consultation with their assigned faculty advisor, in accordance with university and college policy. Students must coordinate with a graduate advisor prior to starting their Stage II course work and prior to meeting with the faculty advisor.

### Business Competency Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 722</td>
<td>Economics for Managers</td>
<td>3</td>
</tr>
<tr>
<td>MBA 751</td>
<td>Managing People in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MBA 762</td>
<td>Business Professionalism</td>
<td>3</td>
</tr>
<tr>
<td>MBA 781</td>
<td>Quantitative Methods for Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>MBA 783</td>
<td>Quality Management and Continuous Improvement</td>
<td>3</td>
</tr>
</tbody>
</table>

### Functional Area Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 711</td>
<td>Strategic Cost Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 731</td>
<td>Financial Analysis and Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>MBA 761</td>
<td>The Marketing Process</td>
<td>3</td>
</tr>
<tr>
<td>MBA 782</td>
<td>Managing Operations</td>
<td>3</td>
</tr>
</tbody>
</table>

### Integrative Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 723</td>
<td>International Business and the Global Economy</td>
<td>3</td>
</tr>
<tr>
<td>MBA 741</td>
<td>Law, Regulation, Politics, and the Social Environment of Business</td>
<td>3</td>
</tr>
<tr>
<td>MBA 753</td>
<td>Developing and Implementing Organizational Competitive Strategies</td>
<td>3</td>
</tr>
<tr>
<td>MBA 771</td>
<td>Information, Technology and Organizations</td>
<td>3</td>
</tr>
</tbody>
</table>

### Area of Concentration Courses (minimum) 12

See the following for Stage II area of concentration course work (M.B.A.)

### Total (minimum) 51

Integrative courses should be taken only after a minimum of seven (21 credit hours) of the Business Competency and Functional Area courses have been completed.

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

#### Business Economics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 609</td>
<td>Applied Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>EC 712</td>
<td>Forecasting Economic Activities</td>
<td>3</td>
</tr>
<tr>
<td>EC 715</td>
<td>Applied Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>EC 717</td>
<td>Applied Macroeconomics</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Finance

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN 710</td>
<td>Investment Management</td>
<td>3</td>
</tr>
<tr>
<td>FIN 742</td>
<td>Seminar in Financial Theory</td>
<td>3</td>
</tr>
<tr>
<td>FIN 790</td>
<td>Seminar in International Financial Management</td>
<td>3</td>
</tr>
</tbody>
</table>

### Required Concentration Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN 710</td>
<td>Investment Management</td>
<td>3</td>
</tr>
<tr>
<td>FIN 742</td>
<td>Seminar in Financial Theory</td>
<td>3</td>
</tr>
<tr>
<td>FIN 790</td>
<td>Seminar in International Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>Another 700-level finance course</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Health Care Management**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 755</td>
<td>Economics of Health and Health Policy</td>
<td>3</td>
</tr>
<tr>
<td>FIN 760</td>
<td>The Financial Management of Health Service Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MBA 755</td>
<td>Health Care Management</td>
<td>3</td>
</tr>
<tr>
<td>PHIL/REL 578</td>
<td>Ethics and Medicine</td>
<td>3</td>
</tr>
<tr>
<td>MKT 720</td>
<td>Service and Nonprofit Organization Marketing</td>
<td>3</td>
</tr>
</tbody>
</table>

**International Business**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 753</td>
<td>International Accounting</td>
<td>3</td>
</tr>
<tr>
<td>EC 641</td>
<td>International Trade and the Economy</td>
<td>3</td>
</tr>
<tr>
<td>FIN 790</td>
<td>Seminar in International Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>MKT 716</td>
<td>International Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MBA 721</td>
<td>International Management</td>
<td>3</td>
</tr>
</tbody>
</table>

**Logistics Management**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 753</td>
<td>Inventory Management</td>
<td>3</td>
</tr>
<tr>
<td>MS 757</td>
<td>Production Planning and Control</td>
<td>3</td>
</tr>
<tr>
<td>MS 759</td>
<td>Procurement Management</td>
<td>3</td>
</tr>
</tbody>
</table>

**Management**

The management concentration is highly flexible. The general structure the student must follow is that of the 12 concentration credit hours; at least 9 but not more than 12 credit hours must be management (MGT) or law (LAW) course work.

### Management Information Systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS 521</td>
<td>Survey of Information Systems Technology</td>
<td>3</td>
</tr>
</tbody>
</table>

**Prerequisite**

*MIS concentration requires an introductory information systems course and a programming language course at the undergraduate level to waive MIS 521. See the MIS faculty advisor.

**Choose four of the following:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS 710</td>
<td>Database Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS 720</td>
<td>Telecommunications Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS 750</td>
<td>Information Systems Planning</td>
<td>3</td>
</tr>
<tr>
<td>MIS 760</td>
<td>Systems Analysis Methodologies</td>
<td>3</td>
</tr>
<tr>
<td>MIS 761</td>
<td>Systems Design Methodologies</td>
<td>3</td>
</tr>
<tr>
<td>MIS 770</td>
<td>Information Systems Implementation</td>
<td>3</td>
</tr>
</tbody>
</table>

**Operations Management**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 753</td>
<td>Inventory Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 755</td>
<td>Quality Management</td>
<td>3</td>
</tr>
<tr>
<td>MS 757</td>
<td>Production Planning and Control</td>
<td>3</td>
</tr>
</tbody>
</table>
Select one of the following:

- MS 759 Purchasing and Materials Management 3
- MS 771 World Class Strategies 3
- MKT 713 Logistics Systems 3

Marketing 12

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

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

Project Management 12

- MGT 770 Fundamentals of Project Management 3
- MGT 772 Project Contract Management 3
- MGT 773 Project Planning, Evaluation, and Control Techniques 3
- Elective 3

Dual Degree with Economics

Students may obtain both the M.B.A. degree and the M.S. degree in Social and Applied Economics under the dual-degree program, which permits common course work to apply to both programs as long as the courses are completed within the time limit set for completion of graduate degree programs. This policy does not apply to students who received a M.B.A. degree or M.S. degree in economics from schools other than Wright State. Contact the director of graduate programs in business and logistics management and the director of M.S. in social and applied economics program for further details.

Dual Degree with Nursing

Students may obtain both the M.B.A. degree and the M.S. degree in administration of nursing and health care systems under the dual-degree program, which permits common course work to apply to both programs. Students who receive a M.B.A. degree or M.S. degree in nursing from schools other than Wright State cannot enter this program. For further information, contact the director of graduate programs in business and logistics management and director of M.S. in nursing program.

M.S. in Logistics Management

Degree Requirements

Stage I—Preparatory Course Work

The following outlines the foundation course requirements for the M.S. in logistics management degree program. All candidates must have or obtain a knowledge of the fundamentals in the following areas: accountancy, computing, management, marketing, mathematics, and statistics. Students deficient in any of these areas are required to successfully remedy the deficiency by completing the appropriate Stage I course(s). Stage I courses may be waived for individuals who have completed comparable undergraduate or graduate courses at regionally accredited institutions. Waiver of foundation course work is based on the grade received, credit hours, course content, focus, and other factors. Additionally, students may demonstrate competency by successfully passing a proficiency test. The Stage I Program of Study form must be completed by the student in consultation with a graduate advisor prior to registering for graduate business courses.

Stage I—Foundation Courses 0–13

- MBA 511 Survey of Accounting 2
- MBA 551 Survey of Management 2
- MBA 561 Survey of Marketing 2
- MBA 581 Survey of Mathematics for Business 2
- MBA 582 Survey of Statistics 2
- MBA 571 Research and Reports for Business 1
- MBA 572 Business Applications Using Databases 1
- MBA 573 Business Applications Using Spreadsheets 1

Stage II—Logistics Management Course Work

After completion of the necessary Stage I courses, students undertake the Stage II course work, a 51 credit hour program. Thirty-nine hours of graduate course work is common to all M.S. in logistics management students. This common course work is broken into two areas. The first area encompasses 18 hours of core course work. The core includes courses in business professionalism, qualitative methods, quality management and continuous improvement, strategic cost management, managing people, and managing operations. The second area consists of 21 hours of advanced study in the logistics management body of knowledge. These
courses cover the concepts and techniques involved in forecasting, inventory management, production planning and control, purchasing, and world class production systems. The final 12 hours of course work are selected from the list of concentration electives given below.

Candidates for the Master of Science in logistics management degree will complete a Stage II—Program of Study form in consultation with their assigned faculty advisor, in accordance with university and college policy. Students must coordinate with a graduate advisor prior to starting their Stage II course work and prior to meeting with the faculty advisor.

### M.S. in Logistics Management

**Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 711</td>
<td>Strategic Cost Management</td>
</tr>
<tr>
<td>MBA 751</td>
<td>Managing People</td>
</tr>
<tr>
<td>MBA 762</td>
<td>Business Professionalism</td>
</tr>
<tr>
<td>MBA 781</td>
<td>Quantitative Methods</td>
</tr>
<tr>
<td>MBA 782</td>
<td>Managing Operations</td>
</tr>
<tr>
<td>MBA 783</td>
<td>Quality Management</td>
</tr>
</tbody>
</table>

**Advanced Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKT 713</td>
<td>Logistics Systems</td>
</tr>
<tr>
<td>MS 753</td>
<td>Inventory Management</td>
</tr>
<tr>
<td>MS 755</td>
<td>Quality Management II</td>
</tr>
<tr>
<td>MS 757</td>
<td>Production Planning and Control</td>
</tr>
<tr>
<td>MS 759</td>
<td>Purchasing and Materials Management</td>
</tr>
<tr>
<td>MS 771</td>
<td>World Class Production Systems</td>
</tr>
<tr>
<td>MGT 770</td>
<td>Fundamentals of Project Management</td>
</tr>
</tbody>
</table>

**Electives (pick four courses)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 753</td>
<td>International Accounting</td>
</tr>
<tr>
<td>EC 722</td>
<td>Economics for Managers</td>
</tr>
<tr>
<td>EC 723</td>
<td>International Business in the Global Economy*</td>
</tr>
<tr>
<td>EC 740</td>
<td>Cost-Benefit Analysis and Social Project Evaluation*</td>
</tr>
<tr>
<td>MBA 731</td>
<td>Financial Analysis</td>
</tr>
<tr>
<td>MBA 741</td>
<td>Law, Regulation, Politics and Social Environment</td>
</tr>
<tr>
<td>MBA 753</td>
<td>Organizational Strategies</td>
</tr>
<tr>
<td>MBA 761</td>
<td>Marketing Process</td>
</tr>
<tr>
<td>MBA 771</td>
<td>Information, Technology, and Organizations</td>
</tr>
<tr>
<td>MGT 763</td>
<td>Systems Management</td>
</tr>
<tr>
<td>MGT 772</td>
<td>Project Contract Management</td>
</tr>
<tr>
<td>MGT 773</td>
<td>Project Planning Techniques</td>
</tr>
<tr>
<td>MIS 760</td>
<td>Information Systems Analysis*</td>
</tr>
<tr>
<td>MIS 761</td>
<td>Information Systems Design*</td>
</tr>
<tr>
<td>MS 770</td>
<td>Selected Topics</td>
</tr>
</tbody>
</table>

**Total** 51

*Students selecting Economics (EC) or Management Information Systems (MIS) as electives may need to take additional foundation courses. EC courses require a year of principles of economics (EC 201, 202, 203) or EC 523, 524 as prerequisite foundation courses. MIS courses require an introductory information systems course (MIS 300) and a programming language course or MIS 521 as prerequisite course.*

### M.Acc. Degree Requirements

#### Stage I—Preparatory Course Work

The following information outlines the preparatory requirements for the M.Acc. degree program. Candidates should consult with an academic graduate advisor in the College of Business and Administration for further details concerning policies and procedures.

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 29 credit hours of undergraduate and graduate preparatory courses. 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.

**Business Preparatory Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAW 350, LAW 360 or 370 Business Law</td>
<td>6</td>
</tr>
<tr>
<td>FIN 301, FIN 302 Finance</td>
<td>6</td>
</tr>
<tr>
<td>MIS 300 Introduction to Management Information Systems</td>
<td>4</td>
</tr>
<tr>
<td>EC 523, EC 524 Survey of Microeconomics, Macroeconomics</td>
<td>4</td>
</tr>
<tr>
<td>MBA 551 Survey of Management</td>
<td>2</td>
</tr>
<tr>
<td>MBA 582 Survey of Statistics</td>
<td>2</td>
</tr>
<tr>
<td>MBA 561 Survey of Marketing</td>
<td>2</td>
</tr>
<tr>
<td>MBA 581 Survey of Mathematics for Business</td>
<td>2</td>
</tr>
<tr>
<td>MBA 573 Business Applications Using Spreadsheets</td>
<td>1</td>
</tr>
</tbody>
</table>

*Students selecting Economics (EC) or Management Information Systems (MIS) as electives may need to take additional foundation courses. EC courses require a year of principles of economics (EC 201, 202, 203) or EC 523, 524 as prerequisite foundation courses. MIS courses require an introductory information systems course (MIS 300) and a programming language course or MIS 521 as prerequisite course.*
In addition to the above courses, the following undergraduate accounting courses are prerequisites for the M.Acc. program:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Accounting</td>
<td>9</td>
</tr>
<tr>
<td>Intermediate Accounting</td>
<td>9</td>
</tr>
<tr>
<td>Management Accounting</td>
<td>6</td>
</tr>
<tr>
<td>Accounting Systems I</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Accounting</td>
<td>3</td>
</tr>
<tr>
<td>Auditing I</td>
<td>3</td>
</tr>
<tr>
<td>Income Tax Accounting—Individual and Corporate</td>
<td>6</td>
</tr>
<tr>
<td>Seminar in Management Accounting</td>
<td>3</td>
</tr>
</tbody>
</table>

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

After completion of required prerequisites, students may begin the 45-hour M.Acc. Program. Twenty-four credit hours of accounting courses are required of all M.Acc. candidates. Up to six credit hours may be earned in internships. The additional 15 hours of course work must be outside of the accounting curriculum. They may be additional graduate business or nonbusiness courses.

Required Accounting Courses 24

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 717 Research in Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACC 731 Financial Accounting V</td>
<td>3</td>
</tr>
<tr>
<td>ACC 732 Auditing II</td>
<td>3</td>
</tr>
<tr>
<td>ACC 733 Governmental and Not-for-Profit Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACC 736 Accounting Systems II</td>
<td>3</td>
</tr>
<tr>
<td>ACC 738 Tax Planning</td>
<td>3</td>
</tr>
<tr>
<td>ACC 739 Financial Accounting Seminar</td>
<td>3</td>
</tr>
<tr>
<td>ACC 753 International Accounting</td>
<td>3</td>
</tr>
</tbody>
</table>

Accounting Elective(s) 0–6

ACC 775 Accounting Internship

Non-accounting courses 15–21

Total 45

Students are encouraged to take English and/or communications courses. Possibilities are ENG 543, Advanced Composition; ENG 718, Study of Professional Writing; COM 643, Interviewing; COM 647, Organizational Communication. Other COM and ENG courses are available, depending on the interest of the student. All courses must be graduate-level courses.

Cartography, Photogrammetry, and Remote Sensing

Contact the Department of Urban Affairs and Geography for information about this certificate program.

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 (Emeritus), physical chemistry
Sue C. Cummings (Emerita), inorganic and bioinorganic chemistry
William A. Feld, organic and polymer chemistry
John J. Fortman, inorganic chemistry and chemical education
Roger K. Gilpin (dean), analytical chemistry
Ivan J. Goldfarb (Emeritus), polymer chemistry
Vladimir Katovic, analytical, inorganic, and environmental chemistry
M. Paul Servé (chair), organic and medicinal chemistry
Paul G. Seybold, physical and biophysical chemistry
Thomas O. Tiernan (Emeritus), physical, analytical, and environmental chemistry

Associate 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
George G. Hess, organic, analytical, and environmental chemistry
James J. Kane (Emeritus), organic and polymer chemistry  
Daniel M. Ketcha, organic and natural products chemistry  
Kenneth Turnbull, organic chemistry  
Assistant Professor  
Audrey E. McGowin, analytical and environmental chemistry

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 semester hours) of chemistry, including lecture and laboratory courses in general chemistry, quantitative analysis, and introductory courses in organic, inorganic, and physical chemistry. Students who do not meet these requirements will be asked to do some remedial work in addition to fulfilling the usual graduate degree requirements.

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.

Four copies of the final draft of the thesis must be submitted to the thesis advisory committee and the department chair for approval prior to binding. After approval by the School of Graduate Studies, one copy will be deposited in the library. One copy each is kept by the advisor, the graduate, and the department chair.

Classroom Teacher
See Education and Human Services

Computer Engineering
The Department of Computer Science and Engineering offers a program of graduate study leading to the Master of Science in Computer Engineering degree. The program balances theory, software, hardware, and practice with degree requirements concentrated in the areas of computer design and analysis. Most courses are offered in the late afternoon to allow practicing computer professionals to begin the program on a part-time basis.

The department also offers the Master of Science in Computer Science degree, and the Ph.D. in computer science and engineering, as well as graduate certificates in Database Management and Design, Software Engineering, and Software Management.
The Graduate Faculty

Professors

P. Bruce Barra, (director, Information Technology Research Institute), multimedia information systems, parallel processing for very large data and knowledge bases, optical database machines
James E. Brandeberry (dean), digital electronics, microprocessors, system theory
Larry A. Crum (Emeritus), microprocessors, distributed computing, hardware design, computer communications
Henry W. Davis (Emeritus), artificial intelligence, algorithm analysis
Robert D. Dixon (Emeritus), software design, real-time systems
Oscar N. Garcia (chair), speech recognition, knowledge-based systems, computer architecture, human-computer interaction, intelligent interfaces, machine intelligence
Terry A. McKee (Department of Mathematics and Statistics), graph theory, logic
Kuldip S. Rattan (Department of Electrical Engineering), digital control systems, robotics, fuzzy control, prosthetic/orthotic and microprocessor applications
Raymond E. Siferd (Department of Electrical Engineering), VLSI design and parallel computing
Thomas A. Sudkamp, approximate reasoning, machine intelligence

Assistant Professors

A. A. S. Awwal, digital optical computing, neural networks, computer arithmetic, digital systems, hardware systems and communications, pattern recognition
Chien-In Henry Chen, (Department of Electrical Engineering), simulation and test of VLSI circuits (design for testability, built-in self test, automated synthesis of digital systems, fault tolerant multicomputer systems)
C. L. Philip Chen, neural networks and applications, CAD/CAM and robotics, intelligent systems and interfaces, knowledge-based systems
Soon M. Chung, database, multimedia, parallel processing, computer architecture
A. Ardeshir Goshtasby, intelligent interfaces, machine vision, computer graphics and visualization, geometric modeling, medical image analysis
Jack Jean, parallel algorithms and architectures, intelligent interfaces, hardware systems and communications, neural networks

Joseph Kohler (Emeritus), compilers, software design, languages, microcomputers
Prabhaker Mateti, software systems, network security
Mateen M. Rizki, modeling, simulation, biological information processing, machine intelligence, pattern recognition, image processing
Charles B. Ross, hardware systems and communications, computer graphics and visualization
Robert C. Shock, software engineering, database systems
Krishnaprasad Thirunarayan, knowledge representation and reasoning, logic programming, hardware verification, programming languages

Admission

Students may be admitted to the graduate program in computer 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 professional career in computer science and/or computer engineering as evaluated by the department's admission committee.

Student's should come to the program with a knowledge of higher-level languages, 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.

Facilities

The program is supported by a wide range of computer systems interconnected by local and wide-area networks. Access is available to DEC Alpha 3000 workstations, DEC Alpha AXP 4000/610’s, numerous Sun and DEC file servers and workstations, Silicon Graphics INDY workstations, an ONYX 2 with eight parallel processors, an ONYX Reality Engine 2, X-windows terminals, and personal computers. Access is also available to the Ohio Academic and Research Network (OARNET). The program has laboratories dedicated to student
and faculty research in the areas of human-computer interaction; artificial intelligence; parallel and concurrent computing; control and robotics; graphics, operating systems; computer vision, imaging, and design; digital design; software engineering; and optical computing.

Research

A steadily increasing number of funded research projects support modern graduate research laboratories in such areas as human-computer interaction, 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.

Recent and current sources of research support include federal agencies, military agencies, and local industries. Research at Wright State University is not limited to on-campus laboratory facilities. Several industrial laboratories, Wright-Patterson Air Force Base laboratories, and the Major Shared Resource Center at Wright-Patterson Air Force Base are involved in joint research efforts with the university. The newly established Information Technology Research Institute is closely associated with the Department of Computer Science and Engineering in seeking and pursuing research and development opportunities with state and federal agencies and local information-intensive industries.

Graduate Assistantships

Teaching assistantships are available on a competitive basis for students who have established strong academic credentials and can demonstrate good communication and teaching skills. A number of departmental research assistantships are awarded annually based on exceptional performance or potential. Additional graduate support is available in the form of assistantships associated with research projects of the faculty. Scholarships are also available from the Dayton Area Graduate Studies Institute (DAGSI). Application forms for these assistantships and scholarships are available from the department for students admitted to the graduate program.

Master of Science in Computer Engineering Degree

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

Thesis Option

1. Completion of 48 graduate credit hours in an approved program of study, including 20 hours of formal coursework at the 700-800 level, of which at least 12 credit hours of formal coursework at the 700-800 level must be taken in the computer engineering specialty (courses with a CEG prefix).

2. Completion of at least one course at Wright State University in each of the following areas, selected from the courses listed for each area:
   - Systems: CEG 602, CS 607, CS 609, CEG 634, CS 714, CEG 730, CEG 830, EE 701, EE 710, EE 761
   - Software: CEG 660, CEG 760, CEG 763, CEG 860, CS 605, CS 701, CS 702
   - Hardware: CEG 653, CEG 658, CEG 659, CEG 720, CEG 750, CEG 751, CEG 752, CEG 753, CEG 754, CEG 758, CEG 820, EE 649
   - Engineering Applications: CEG 619, CEG 628, CEG 656, CEG 676, CEG 677, CEG 724, CEG 728, CEG 756, CEG 759, CEG 765

3. All CS and CEG graduate courses listed in the catalog, or approved to be listed in the next catalog (except CS 700 and CEG 700), may be used to complete the credit hour requirements beyond those course requirements specified above. Other courses may be used to satisfy the requirements only if they are listed in the topic areas above or in a program of study that has been approved by the department prior to enrollment in the course.

4. Satisfactory completion of a master’s thesis. A maximum of 12 hours of independent study (CEG 795) and thesis (CEG 799) may be included in the program of study.

Nonthesis Option

1. Completion of 48 graduate credit hours in an approved program of study, including 32 hours of formal coursework at the 700-800 level, of which at least 12 credit hours of formal coursework at the 700-800 level must be taken in the computer engineering specialty (courses with a CEG prefix).

2. Completion of at least one course at Wright State University in each of the following areas, selected from the courses listed for each area:
   - Systems: CEG 602, CS 607, CS 609, CEG 634, CS 714, CEG 730, CEG 830, EE 701, EE 710, EE 761
Software CEG 660, CEG 760, CEG 763, CEG 860, CS 605, CS 701, CS 702
Hardware CEG 653, CEG 658, CEG 659, CEG 720, CEG 750, CEG 751, CEG 752, CEG 753, CEG 754, CEG 758, CEG 820 EE 649

Engineering Applications CEG 619, CEG 628, CEG 656, CEG 676, CEG 677, CEG 724, CEG 728, CEG 756, CEG 759, CEG 765

3. All CS and CEG graduate courses listed in the catalog or approved to be listed in the next catalog (except CS 700 and CEG 700), may be used to complete the credit hour requirements beyond those course requirements specified above. Other courses may be used to satisfy the requirements only if they are listed in the topic areas above or in a program of study that has been approved by the department prior to enrollment in the course.

4. A maximum of 4 quarter hours of independent study (CEG 795) may be included in a program of study.

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 engineering degree program by petitioning the Graduate Study Committee.

Students employed as research assistants through the School of Graduate Studies are strongly encouraged to choose the thesis option. Students employed as teaching assistants are required to register for the masters thesis option.

Computer Science

The Department of Computer Science and Engineering offers a program of graduate study leading to the Master of Science in Computer Science degree.

The program balances theory, software, hardware, and practice, with degree requirements concentrated in the areas of theory and software. Most courses are offered in the late afternoon to allow practicing computer professionals to begin the program on a part-time basis.

The department also offers the Master of Science in Computer Engineering degree and the Ph.D. in computer science and engineering, as well as graduate certificates in Database Management and Design, Software Engineering, and Software Management.

The Graduate Faculty

Professors

P. Bruce Berra, (director, Information Technology Research Institute), multimedia information systems, parallel processing for very large data and knowledge bases, optical database machines

James E. Brandeberry (dean), digital electronics, microprocessors, system theory

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

Henry W. Davis (Emeritus), artificial intelligence, algorithm analysis

Robert D. Dixon (Emeritus), software design, real-time systems

Oscar N. Garcia (chair), speech recognition, knowledge-based systems, computer architecture, human-computer interaction, intelligent interfaces, machine intelligence

Terry A. McKee (Department of Mathematics and Statistics), graph theory, logic

Kuldip S. Rattan (Department of Electrical Engineering), digital control systems, robotics, fuzzy control, prosthetic/orthotic and microprocessor applications

Raymond E. Siferd (Department of Electrical Engineering), VLSI design and parallel computing

Thomas A. Sudkamp, approximate reasoning, machine intelligence

Associate Professors

A. A. S. Awwal, digital optical computing, neural networks, computer arithmetic, digital systems, hardware systems and communications, pattern recognition

Chien-In Henry Chen, (Department of Electrical Engineering), simulation and test of VLSI circuits (design for testability, built-in self test, automated synthesis of digital systems, fault tolerant multicomputer systems)

C. L. Philip Chen, neural networks and applications, CAD/CAM and robotics, intelligent systems and interfaces, knowledge-based systems

Soon M. Chung, database, multimedia, parallel processing, computer architecture
A. Ardeshir Goshtasby, intelligent interfaces, machine vision computer graphics and visualization, geometric modeling, medical image analysis
Jack Jean, parallel algorithms and architectures, intelligent interfaces, hardware systems and communications, neural networks
Joseph Kohler (Emeritus), compilers, software design, languages, microcomputers
Prabhaker Mateti, software systems, network security
Mateen M. Rizki, information processing, machine communications, computer graphics and visualization
Charles K. Shock, software engineering, database systems
Krishnaprasad Thirunarayan, knowledge representation and reasoning, logic programming, hardware verification, programming languages

Assistant Professors
Paul L. Bergstein, database systems, intelligent interfaces, object-oriented software engineering, algorithms
Karen A. Tomko, parallel computing, application optimization, compilation

Admission
Students may be admitted to the graduate program in computer science 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 professional career in computer science and/or computer engineering as evaluated by the department's admission committee.

Students should come to the program with a knowledge of higher-level programming languages, 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.

Facilities
The program is supported by a wide range of computer systems interconnected by local and wide-area networks. Access is available to DEC Alpha 3000 workstations, DEC Alpha AXP 4000/610's, numerous Sun and DEC file servers and workstations, Silicon Graphics INDY workstations, an ONYX 2 with eight parallel processors, an ONYX Reality Engine 2, X-windows terminals, and personal computers. Access is also available to the Ohio Supercomputer via the Ohio Academic and Research Network (CARNET). The program has laboratories dedicated to student and faculty research in the areas of human-computer interaction, artificial intelligence; parallel and concurrent computing; control and robotics; graphics, operating systems; computer vision, imaging, and design; computer-aided designs; digital design; VLSI; software engineering; and optical computing.

Research
A steadily increasing number of funded research projects support modern graduate research laboratories in such areas as human-computer interaction, 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.

Recent and current sources of research support include federal agencies, military agencies, and local industries. Research at Wright State University is not limited to on-campus laboratory facilities. Several industrial laboratories, Wright-Patterson Air Force Base laboratories, and the Major Shared Resource Center at Wright-Patterson Air Force Base are involved in joint research efforts with the university. The newly established Information Technology Research Institute is closely associated with the Department of Computer Science and Engineering in seeking and pursuing research and development opportunities with state and federal agencies and local information-intensive industries.

Graduate Assistantships
Teaching assistantships are available on a competitive basis for students who have established strong academic credentials and can demonstrate good communication and teaching skills. A number of departmental research assistantships are awarded annually based on exceptional performance or potential. Additional graduate support is available in the form of assistantships associated with research projects of the faculty. Scholarships are also available from the Dayton Area Graduate Studies Institute (DAGSI). Application forms for these assistantships and scholarships are available from the department for students admitted to the graduate program.
Degree Requirements

Master of Science Degree in Computer Science

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

**Thesis Option**

1. Completion of 48 graduate credit hours in an approved program of study, including 20 hours of formal coursework at the 700–800 level, of which at least 12 credit hours of formal coursework at the 700–800 level must be taken in the Computer Science specialty (courses with a CS prefix).

2. Completion of at least one course at Wright State University in each of the following areas, selected from the courses listed for each area:
   
   **Systems**
   - CEG 602, CS 607, CS 609, CEG 634, CS 714, CEG 730, CEG 830, EE 701, EE 710, EE 761
   
   **Software**
   - CEG 660, CEG 760, CEG 763, CEG 860, CS 605, CS 701, CS 702
   
   **Language**
   - CS 680, CS 774, CS 776, CS 780, CS 781, CS 784, CS 884
   
   **Computer Science Theory**
   - CS 610, CS 658, CS 666, CS 740, CS 840

3. All CS and CEG graduate courses listed in the catalog, or approved to be listed in the next catalog (except CS 700 and CEG 700), may be used to complete the credit hour requirements beyond those course requirements specified above. Other courses may be used to satisfy the requirements only if they are listed in the topic areas above or in a program of study that has been approved by the department prior to enrollment in the course.

4. Satisfactory completion of a master's thesis with maximum of 12 hours of independent study (CS 795) and thesis (CS 799) included in the program of study.

**Nonthesis Option**

1. Completion of 48 graduate credit hours in an approved program of study, including 32 hours of formal coursework at the 700–800 level, of which at least 12 hours of formal coursework at the 700–800 level must be taken in the Computer Science specialty (courses with a CS prefix).

2. Completion of at least one course at Wright State University in each of the following areas, selected from the courses listed for each area:

   - Systems CEG 602, CS 607, CS 609, CEG 634, CS 714, CEG 730, CEG 830, EE 701, EE 710, EE 761
   
   - Software CEG 660, CEG 760, CEG 763, CEG 860, CS 605, CS 701, CS 702
   
   - Language CS 680, CS 774, CS 776, CS 780, CS 781, CS 784, CS 884
   
   - Computer Science Theory CS 610, CS 658, CS 666, CS 740, CS 840

   - Computer Science Theory CS 610, CS 658, CS 666, CS 740, CS 840

3. A maximum of 4 quarter hours of independent study (CS 795) may be included in a program of study.

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.

Students employed as research assistants through the School of Graduate Studies are strongly encouraged to choose the thesis option. Students employed as teaching assistants are required to register for the Masters thesis option.

**Computer Science and Engineering Certificate Programs**

The Department of Computer Science and Engineering offers three graduate certificate programs designed to provide up-to-date technical knowledge and experience in the rapidly evolving computer software environment to practitioners desiring to upgrade their knowledge of modern software engineering, software management, or database management and design practices and methodologies.
The objective of these programs is to provide timely technical experience in the fundamentals and methodologies of modern software engineering practices, modern software management practices, and modern database management design practices for experienced practitioners of more classical approaches.

**Admission**

Admission requirements are a baccalaureate degree in computer science, computer engineering, or closely related field, and at least three years of industrial experience in the programming field. Students must be admitted to the School of Graduate studies in nondegree status, and must also submit a certificate program application to the department.

**Graduate Certificate in Software Engineering**

**Program Requirements** 16
- CS 600 Data Structures and Software Design
- CEG 660 Introduction to Software Engineering
- CEG 661 Object Oriented Programming and Design
- CEG 663 Personal Software Development Process

**Graduate Certificate in Software Management**

**Program Requirements** 16
- CS 600 Data Structures and Software Design
- CEG 660 Introduction to Software Engineering
- CEG 663 Personal Software Development Process
- CEG 668 Managing the Software Development Process

**Graduate Certificate in Database Management and Design**

**Program Requirements** 16
- CS 600 Data Structures and Software Design
- CEG 605 Introduction to Database Management Systems
- CS 701 Database Systems and Design I
- CS 702 Database Systems and Design II

**Note:** for all certificates, a minimum of 12 quarter credit hours of formal course work must be taken at Wright State University. The CS 600 requirement may be waived based on prior accredited relevant course work or very extensive industrial experience in the software area.

**Computer Science and Engineering Ph.D.**

The Department of Computer Science and Engineering offers a program of graduate study leading to 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. The program requires a concentration of study and research in specific areas of computer science and engineering. Programmatic strength lies in the unique blend of faculty expertise, in the combination of theory with software and hardware design and in the laboratory facilities available to the program.

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

The department also offers Master of Science in Computer Science and Master of Science in Computer Engineering degrees, as well as graduate certificates in Database Management and Design, Software Engineering, and Software Management.

**The Graduate Faculty**

**Professors**
- P. Bruce Berra, (director, Information Technology Research Institute), multimedia information systems, parallel processing for very large data and knowledge bases, optical database machines
- James E. Brandeberry (dean), digital electronics, microprocessors, system theory
- Larry A. Crum (Emeritus), microprocessors, distributed computing, hardware design, computer communications
- Henry W. Davis (Emeritus), artificial intelligence, algorithm analysis
- Robert D. Dixon (Emeritus), software design, real-time systems
- Oscar N. Garcia (chair), speech recognition, knowledge-based systems, computer architecture, human-computer interaction, intelligent interfaces, machine intelligence
- Terry A. McKee (Department of Mathematics and Statistics), graph theory, logic
- Kuldip S. Rattan (Department of Electrical Engineering), digital control systems, robotics, fuzzy control, prosthetic/orthosis and microprocessor applications
Raymond E. Siferd (Department of Electrical Engineering), VLSI design and parallel computing
Thomas A. Suck, approximate reasoning, machine intelligence

**Associate Professors**

A. A. Awal, digital optical computing, neural networks, computer architecture, digital systems, hardware systems and communications, pattern recognition
Chien-In Henry Chen, (Department of Electrical Engineering), simulation and test of VLSI circuits (design for testability, built-in self test, automated synthesis of digital systems, fault tolerant multicomputer systems)
C. L. Philip Chen, neural networks and applications, CAD/CAM and robotics, intelligent systems and interfaces, knowledge-based systems
Soon M. Chung, database, multimedia, parallel processing, computer architecture
A. Ardeshir Goshtasby, intelligent interfaces, machine vision, computer graphics and visualization, geometric modeling, medical image analysis
Jack Jean, parallel algorithms and architectures, intelligent interfaces, hardware systems and communications, neural networks
Joseph Kohler (Emeritus), compilers, software design, languages, microprocessors
Prabhaker Mateti, software systems, network security
Mateen M. Rizki, modeling, simulation, biological information processing, machine intelligence, pattern recognition, image processing
Charles B. Ross, hardware systems and communications, computer graphics and visualization
Robert C. Shock, software engineering, database systems
Krishnaprasad Thirunarayan, knowledge representation and reasoning, logic programming, hardware verification, programming languages

**Assistant Professors**

Paul L. Bergstein, database systems, intelligent interfaces, object-oriented software engineering, algorithms
Karen A. Tomko, parallel computing, application optimization, compilation

**Admission**

A student may be admitted to the Ph.D. program in Computer Science and Engineering with a baccalaureate degree or a master's 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 engineering research, as evaluated by the department's admission committee.

Students should come to the program with a knowledge of higher-level programming languages, data structures, real-time programming, computer organization, formal languages, operating systems, and computer systems design. It may be possible to make up minor background deficiencies after admission to the program by taking appropriate courses.

**Facilities**

The program is supported by a wide range of computer systems interconnected by local and wide-area networks. Access is available to DEC Alpha 3000 workstations, DEC Alpha AXP 4000/610's, numerous Sun and DEC file servers and workstations, Silicon Graphics INDY workstations, an ONYX 2 with eight parallel processors, an ONYX Reality Engine-2, X-windows terminals, and personal computers. Access is also available to the Ohio Supercomputer via the Ohio Academic and Research Network (OARNET). The program has laboratories dedicated to student and faculty research in the areas of human-computer interaction, artificial intelligence; parallel and distributed computing; control and robotics; digital communications; graphics; operating systems; computer vision, imaging, and design; computer-aided design; digital design; VLSI; software engineering; and optical computing.

**Research**

A steadily increasing number of funded research projects support modern graduate research laboratories in such areas as human-computer interaction, 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.

Recent and current sources of research support include federal agencies, military agencies, and local industries. Research at Wright State University is not limited to on-campus laboratory facilities. Several industrial laboratories, Wright-Patterson Air Force Base laboratories, and the Major Shared Resource Center at Wright-Patterson Air Force Base are involved in joint research efforts with the university. The newly established Information Technology Research Institute is closely associated with the Department.
of Computer Science and Engineering in seeking and pursuing research and development opportunities with state and federal agencies and local information-intensive industries.

Graduate Assistantships

Teaching assistantships are available on a competitive basis for students who have established strong academic credentials and can demonstrate good communication and teaching skills. A number of departmental research assistantships are awarded annually based on exceptional performance or potential. Additional graduate support is available in the form of assistantships associated with research projects of the faculty. Scholarships are also available from the Dayton Area Graduate Studies Institute (DAGSI), and through the Information Technology Research Institute. Application forms for these assistantships and scholarships are available from the department for students admitted to the graduate program.

Degree Requirements

Doctor of Philosophy Degree in Computer Science and Engineering

The Ph.D. program consists of two phases. The first phase requires approximately two years of study beyond the baccalaureate degree and culminates with the Qualifying 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. Credit Requirements:
   A student entering the program with a Bachelor of Science or Bachelor of Arts degree must complete a minimum of 136 credit hours.
   A student entering the program with a master's degree in computer science, computer engineering, or a related field from a regionally accredited university, must complete a minimum of 91 credit hours at Wright State University.
   The following course requirements must be satisfied in completing the necessary number of credits.

2. Course Requirements
   A student must complete a minimum, of 76 hours of formal course work at the graduate level. CS 600 and CEG 633 will not be counted toward meeting this requirement.

The 76 credit hours in formal courses must include a minimum of 56 hours available to graduate students only (CS/CEG 700/800 level and EE 701, 702, 710, 761). A course other than those listed may be used to satisfy the 56-hour credit requirement only if it is part of a coherent program and has received approval from the Graduate Studies Committee prior to enrollment in the course. The 76 credit hours must also include 12 hours of graduate courses in mathematics or statistics (600 level or above).

3. Core Courses:
   A student must complete a core set of courses that consist of four courses selected from
   CEG 720 Computer Architecture
   CEG 730 Distributed Programming Systems
   CEG 760 Advanced Software Engineering
   CS 784, Programming Languages
   CS 740, Algorithms, Complexity, and the Theory of Computation
   CEG 770 Computer Engineering Mathematics

   For two of the courses chosen that constitute the first quarter of a two quarter sequence, the second quarter of the graduate sequence must be taken. These courses are
   CEG 820 Computer Architecture II
   CS 830 Distributed Computing Systems II
   CEG 860 Object Oriented Programming
   CS 884 Advanced Topics in Programming Languages
   CS 840 Advanced Topics in the Theory of Computation

4. Mathematics and Statistics: A student must complete at least 12 credit hours of graduate courses in mathematics or statistics. These courses may be included in the 76 hours of formal course work, but not in the 56 hours of graduate level computer science/computer engineering course work.

5. At least six credit hours in the Computer Science and Engineering Ph.D. Seminar.

6. Passing the Ph.D. Qualifying Examination. The Ph.D. Qualifying Examination consists of the following six subject areas:
   Computer Architecture
   Computer Engineering Mathematics
   Operating Systems and Concurrency Programming Languages
   Software Engineering
   Theory of Computer Science

   There is a four-hour exam for each of the areas. The student must select four of the six areas on which to be tested. The examination will be given twice a year, approximately at
the end of the fall quarter and at the end of the spring quarter. The test will be administered by a committee of computer science and engineering graduate faculty. The qualifying exam must be passed in no more than two attempts.

7. Passing the Ph.D. Candidacy Examination. Students must reach an agreement with a computer science and engineering graduate faculty member on an area of dissertation research. A dissertation committee will be formed and this committee will examine a written proposal by the student describing the dissertation topic and proposed research. An oral exam, open to the public, over the specific area and recognized support areas for the dissertation field will be the final step of the candidacy examination. Unanimous support by the committee is required to pass the candidacy examination. A student may change dissertation topics only with the approval of the dissertation committee.

8. Ph.D. candidates must spend at least three quarters in two consecutive years in residence enrolled full-time for dissertation work after passing the qualifying exam. Whereas some portions of this time may be spent at remote locations where unique facilities necessary for the research work are located, it must be done under the supervision of the faculty.

9. Completion of a Ph.D. dissertation and its successful defense in an oral exam, which is open to the public, conducted by dissertation committee. The exam will concentrate on the subject matter of the dissertation, though it need not be confined exclusively to that topic. Unanimous support of the dissertation committee is required to pass the dissertation defense.

10. Students must complete all the requirements for a doctoral degree within 10 years from the date the student matriculated. Courses older than 10 years cannot be used toward doctoral degree requirements.

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.

Counseling, Human Services
See Education and Human Services

Counseling, School
See Education and Human Services

Curriculum and Supervision
See Education and Human Services

Database Management and Design
See Computer Science and Engineering Certificate Programs

Earth Science
See Geological Sciences

Economic Education

The Center for Economic Education has been established as a center of excellence to increase economic understanding in a designated 15-county area through a number of community outreach programs. The center offers courses designed for the special needs of kindergarten through twelfth grade teachers and administrators. Each course helps participants develop understanding of economic principles and concepts and demonstrates materials and methods useful in teaching the K–12 curricula. Participants are challenged to develop teaching units for their classrooms or schools.

Although graduate credit is awarded for these courses, this credit may not be applied toward the M.B.A. or M.S. in social and applied economics degrees.
The Department of Economics offers a professionally oriented 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, public finance
Rudy Fichtenbaum, econometrics, labor economics, macroeconomics, health economics
Rishi Kumar, international economics, economics of development, comparative economic systems, economic theory, monetary and fiscal policy
Robert Premus (chair), 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, microeconomics, public finance, energy economics, property rights
James A. Swaney, history of economic thought, methodology, environmental and resource economics

**Associate Professors**
Tran Huu Dung, microeconomics, international economics, physical economics
Paulette Olson, labor economics, history of economic thought, methodology, economics of gender
Thomas Traynor, forecasting, econometrics, industrial organization, microeconomics

**Assistant Professors**
Barbara E. Hopkins, comparative economic institutions, development economics, gender analysis, economics of the Pacific Rim
Evan W. Osborne, microeconomic theory, law and economics, public choice, international economics

**Admission**

An application for graduate study in the social and applied economics program is required to meet the general requirements of the School of Graduate Studies and also to be accepted by the Graduate Studies Committee of the Department of Economics. Students need not have an undergraduate degree in economics to enter this program. The Graduate Record Examination (GRE) general test is required. (Students selecting to do the dual degree with the MBA may substitute the GMAT for the GRE.)

Application forms for admission and for the GRE 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.

**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, 42 must be taken in the department (36 credit hours of courses plus six credit hours of internship). Students must achieve a cumulative grade point average of 3.0 in all graduate courses exclusive of the internship, which requires a grade of pass. No more than nine hours of C grades may be applied toward the degree.

The Graduate Studies Committee of the Department of Economics may require a student to take and pass a comprehensive written and/or oral examination as a degree requirement.

As many as 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 EC 609 and EC 712). 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**

A bachelor's degree in economics is not required 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 the equivalent should complete the courses 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: MBA 581 (for calculus), MBA 582 (for statistics), and EC 521 and 522 (for principles of micro- and macroeconomics). For full-time students, these requirements must be completed prior to the fall quarter entry date.

Program of Study

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

Required Courses 33

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 609</td>
<td>Applied Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>EC 625</td>
<td>Development of Economic Thought</td>
<td>3</td>
</tr>
<tr>
<td>EC 712</td>
<td>Forecasting Economic Activity</td>
<td>3</td>
</tr>
<tr>
<td>EC 715</td>
<td>Applied Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>EC 717</td>
<td>Applied Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>EC 721</td>
<td>Contemporary Political Economy</td>
<td>3</td>
</tr>
<tr>
<td>EC 725</td>
<td>Economic and Social Systems</td>
<td>3</td>
</tr>
<tr>
<td>EC 780</td>
<td>Economic Problems Seminars</td>
<td>3</td>
</tr>
<tr>
<td>EC 785</td>
<td>Internship*</td>
<td>6</td>
</tr>
</tbody>
</table>

Choose one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 635</td>
<td>Comparative Economic Systems</td>
<td>3</td>
</tr>
<tr>
<td>EC 641</td>
<td>International Trade and the Economy</td>
<td>3</td>
</tr>
<tr>
<td>EC 642</td>
<td>International Monetary Theory and Problems</td>
<td>3</td>
</tr>
<tr>
<td>EC 644</td>
<td>Economic Development and World Poverty</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives 15

Choose five courses:

- Three courses must be in economics, of which two must be at the 700 level. Two courses may be non-economics. Approval of advisor is required for electives taken outside of the College of Business and Administration.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics</td>
<td></td>
<td>9-15</td>
</tr>
<tr>
<td>Noneconomics</td>
<td></td>
<td>0-6</td>
</tr>
</tbody>
</table>

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. 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 the M.S. program in economics or the director of the M.B.A. program.

Graduate Assistantship

Assistantships are available on a competitive basis for the first year of study. Undergraduate GPA, GRE scores, letters of recommendation, TOEFL score, and other materials are used in the assistantship decision. Funding will be continued in the second year for those students making satisfactory progress. The department reserves the right to adjust the level of funding conditional on the availability of funds and the student's academic progress. Assistantships require students to spend a specified amount of time assisting either in instruction or in research. The balance of their time is devoted to graduate studies. Graduate assistants are required by the graduate school to register for a minimum of eight hours of graduate credit per quarter (a maximum of six credit hours for each five-week summer term is considered the normal load).

Financial Aid/Graduate Academic Fellowships

Other financial assistance programs are available for graduate students. This assistance may be provided through financial aid and/or graduate academic fellowships. For further information concerning financial aid, please contact the Office of Financial Aid. Information regarding graduate academic fellowships may be obtained by contacting the director of the graduate program.

Courses Offered

The economic course descriptions listed on pages 172–174 represent the range of graduate courses offered at Wright State by the College of Business and Administration. Not all courses described 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 quarters.
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: educational leadership, with programs in curriculum and supervision (M.A., M.Ed.) and school administration (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.Ed.); and teacher education, with a classroom teacher program (M.A., M.Ed.) that includes a variety of concentrations in elementary 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.

The Graduate Faculty

Professors
Gregory R. Bernhardt (dean), education, counselor education
William E. Brown, evaluation, educational psychology
Donna Cole, teacher education
Robert D. Earl (Emeritus), science education
Diane E. Frey, counselor education
William M. Gordon, educational leadership
Glenn T. Graham, educational leadership
T. Stevenson Hansell, reading, language arts
Etta R. Hollins, teacher education
Jan La Forge, rehabilitation counseling
Tyrone L. Payne (Emeritus), teacher education
Charles W. Ryan, educational leadership, counselor education
James K. Uphoff (Emeritus), social studies education, curriculum, supervision

Associate Professors
Larry L. Chance, reading, language arts
Judith A. Cochran, teacher education
Donna S. Courtney, business education, vocational education
Stephen D. Frederick, health and physical education
G. William Gayle, health and physical education
Samuel T. Harris, early childhood education
Ron Helms, teacher education
Phyllis A. Henderson, counselor education
Mary Ann Jones, counselor education
Patricia A. Klein, educational leadership
Bonnie K. Mathies, educational technology
June A. Ovington, educational leadership
Luisa Lang Owen, art education
Vincent Presno, educational leadership
D. Drew Pringle, health and physical education
Ruth B. Schumacher, counselor education
Patrick Taricone, rehabilitation counseling
Eugene Wade (Emeritus), teacher education
Richard Wantz, counselor education
Michael A. Williams, special education

Assistant Professors
Richard Clemens, educational technology
Colleen Finegan, early childhood education
Stephen Fortson, counselor education
Myrna Gifford, teacher education
Susann Mathews, mathematics education
Richelle O'Connor, teacher education
Timothy Rafferty, educational leadership
Linda Ramey, science education
Patricia Renick, special education
Eileen F. Self, counselor education
William Slattery, teacher education
Mark Stevens, educational leadership
James Tomlin, science education
Carol Wagner Williams, rehabilitation counseling

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 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 2.7 minimum GPA, letters of reference, a personal interview, and a writing sample. Candidates for admission to certain programs in the Departments of Educational Leadership and Teacher Education must meet additional requirements, which include letters of reference, a personal interview, a writing sample, and a self-assessment instrument.

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.

Certification Candidate

Students who wish to complete certification/licensure requirements at the graduate level but do not wish to pursue a graduate degree may be admitted as certification/licensure candidates with the permission of the department in which the programs are housed.

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 (M.A.) degree 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 a maximum of 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.

Master of Education

The Master of Education (M.Ed.) degree is awarded only to those individuals qualified for at least a provisional teaching certificate or license. Individuals who have degrees in disciplines other than education, and who are not qualified for a provisional certificate/licensure, can obtain Ohio certification.

A program of concurrent degree and certification/licensure 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/licensure 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 45 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.

An exit requirement must be successfully completed 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 five specialties: mental health counseling, community counseling, business and industrial management counseling, counseling, marriage and family counseling, and counseling exceptional children. An M.Ed. in school counseling is also offered.

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 60–72 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 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 persons with severe disabilities or the rehabilitation of the chemically dependent. M.R.C. students must successfully complete a 600-hour internship.

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 degree program.

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, higher education, administration, and adult continuing education. Successful thesis defense constitutes the comprehensive examination for this degree.

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., and M.A. programs must successfully complete a departmental comprehensive requirement. Should the student fail to pass the final comprehensive requirement, the student and advisor will plan a remedial 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 the comprehensive examination a maximum of three times.

Thesis and/or Project Procedures (for M.A. Candidates)

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

1. Complete EDL 751.
2. Prepare a preliminary thesis or project proposal following the college or departmental outline for 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 three bound copies of the final project or thesis to the School of Graduate Studies. The outline for thesis and project proposals may be obtained from the college's Office of Student Services. The Graduate Thesis/Dissertation Handbook may be obtained from the School of Graduate Studies.

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 can lead to new licensure except the teacher leader program.

The principalship licensure program leads to licensure as a school principal in the same level (early childhood, middle childhood, adolescence to young adult, and multi-age) as the individual's teaching. Initial licensure requires a valid professional teachers license and successful completion of the Entry Year Program for principals.

Through the educational administrative specialist program, four licensure areas are available. This program is primarily for persons who desire positions in school district administrative offices. Initial licensure requires a valid professional teacher license or professional pupil services license.
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 students in renewal of the professional teacher license. The program may be used as a basis for further work in educational leadership. Successful completion of a professional portfolio is required at the end of the program of study.

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.

Special Program Note:
As a result of recently passed legislation, endorsement/licensure programs for teachers are in the process of being changed. All admissions (effective fall quarter 1998) will be for the new licensure programs. For more information, contact the Department of Educational Leadership, 372 or 373 Millett Hall, (937) 775-2518.

Educational Specialist Program
The growing complexity of the educational enterprise has created a need for persons with additional training for public and private schools, federally and state-funded programs, 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 Ed.S. Superintendency Administrative 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 defense of the thesis constitutes the comprehensive examination for this program.

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 752</td>
<td>Statistical Analysis and Research Design</td>
<td>4</td>
</tr>
<tr>
<td>EDL 871</td>
<td>Management of the School</td>
<td>3</td>
</tr>
<tr>
<td>EDL 872</td>
<td>Staff Personnel Administration</td>
<td>3</td>
</tr>
<tr>
<td>EDL 873</td>
<td>Pupil Personnel Administration</td>
<td>3</td>
</tr>
<tr>
<td>EDL 874</td>
<td>School Business Management and Facilities</td>
<td>3</td>
</tr>
<tr>
<td>EDL 890</td>
<td>Practicum: School Administration</td>
<td>3</td>
</tr>
<tr>
<td>EDL 941</td>
<td>Planning Educational Futures</td>
<td>3</td>
</tr>
<tr>
<td>EDL 971</td>
<td>Superintendent/Staff/Board Relationships</td>
<td>3</td>
</tr>
<tr>
<td>EDL 986</td>
<td>Organizational Behavior in Education and Human Services</td>
<td>4</td>
</tr>
<tr>
<td>EDL 987</td>
<td>Administrative Leadership Skills</td>
<td>3</td>
</tr>
<tr>
<td>EDL 988</td>
<td>Research and the Educational Leader</td>
<td>3</td>
</tr>
<tr>
<td>EDL 999</td>
<td>Thesis</td>
<td>6</td>
</tr>
<tr>
<td>EDT 839</td>
<td>Instructional Design and Development</td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 45

Sample Ed.S. Curriculum and Instruction Program
The Ed.S. curriculum and instruction concentration is designed for students who are preparing for leadership positions requiring curriculum and instruction expertise.

Major

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 752</td>
<td>Statistical Analysis and Research Design</td>
<td>4</td>
</tr>
<tr>
<td>EDL 791</td>
<td>Curriculum Design and Evaluation</td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 26
EDL 792 Models of Supervision and Staff Development 4
EDL 941 Planning Educational Futures 3
EDL 986 Organizational Behavior in Education and Human Services 4
EDL 987 Administrative Leadership in Communication 3
EDT 839 Instructional Design and Development 4

**Research**

EDL 988 Research and the Educational Leader 3
EDL 999 Thesis 6

**Cognates/Electives**

Total 45

**Sample Ed.S. Higher Education/Adult Continuing Education Program**

The Ed.S. higher education concentration is designed for students who are preparing for leadership positions in post secondary settings.

**Major**

EDL 920 History and Philosophy of Higher Education in the United States 4
EDL 921 Curriculum in Higher Education 4
EDL 922 Law of Higher Education 4
EDL 923 Instruction in Higher Education 4
EDL 924 Administration in Higher Education 4
EDL 926 The Community College 4
EDL 928 Internship in Higher Education 4
EDL 929 Role of Intercollegiate Athletics in Higher Education 4
EDL 996 Organizational Behavior in Education and Human Services 4

**Research**

EDL 988 Research and the Educational Leader 3
EDL 999 Thesis 6

**Cognates/Electives**

Total 45

* Students must complete Educational Statistics prior to enrolling in EDL 999-Thesis.

**Educational Leadership Master's Programs**

**Educational Leadership Program:**

**Teacher Leader Course Work**

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 721 Design of Curriculum 4
EDL 722 Instructional Management and Evaluation 4
EDL 793 Computer Applications for Educational Leadership 4
EDL 733 Seminar 4
EDL 786 Advanced Computer Applications 4

**Total (minimum)** 48

After satisfactorily completing the above requirements, students will be awarded a master's degree in Educational Leadership.

**Educational Leadership Program:**

**Curriculum and Supervision**

**Introductory Course Work**

EDL 712 Philosophical and Curricular Foundations 4
EDL 713 Applied Psychological Learning Theory 4
EDL 751 Statistics and Assessment for Education 5

**Common Educational Leadership Courses**

EDL 771 Educational Leadership Behavior 3
EDL 773 Curriculum Theory and Practice 3
EDL 774 Curriculum Organization 3
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3
EDL 780 Public Relations and Politics in Education 3
EDL 782 School Law 3

**Curriculum and Supervision Courses**

EDL 792 Models of Supervision and Staff Development 4
EDL 985 Interpersonal Dynamics: Individual and Organization 3
EDT 795 Administration and Supervision of Educational Technology 4
EDT 839 Instructional Design and Development 4

**Total** 49

After satisfactorily completing the above requirements, students will be awarded a master's degree in Educational Leadership.
Educational Leadership Program:
Student Affairs in Higher Education—Administration

Foundation Course Work 31
EDL 760 Introduction to Student Affairs in Higher Education 4
EDL 761 Theories of Student Development and Assessment 4
EDL 763 Campus Ecology 4
EDL 751 Statistics and Assessment for Education 5
EDL 765 Practicum in Student Affairs in Higher Education 4
EDL 767 Internship in Student Affairs in Higher Education 10

Professional Requirements 25–30
EDL 762 Student Affairs Administration in Higher Education 4
EDL 764 Process Consultation in Student Affairs in Higher Education 4
EDL 766 Advanced Seminar in Student Affairs in Higher Education 4
EDL 920 History and Philosophy of Higher Education in the U.S. 4
EDL 922 Law of Higher Education 4
EDL 986 Organizational Behavior in Education and Human Services 4
EDL 999 Thesis (Credit Variable) 1–6

Electives 13

Total 69–74

After satisfactorily completing the above requirements, students will be awarded a master's degree in Educational Leadership.

Educational Leadership Program (General)

The following is the Educational Leadership Master's Degree core program for the subsequent licensure areas: principalship, superintendency, educational research, and pupil services administration.

Educational Leadership Core
Introductory Course Work 13
EDL 712 Philosophical and Curricular Foundations 4
EDL 713 Applied Psychological Learning Theory 4
EDL 751 Statistics and Assessment for Education 5

Common Educational Leadership Courses 18
EDL 771 Educational Leadership Behavior 3
EDL 772 Educational Administrative Behavior 3
EDL 773 Curriculum Theory and Practice 3

EDL 774 Curriculum Organization 3
EDL 775 Leadership for Instructional Improvement 3
EDL 776 Supervision of Instruction and Personnel 3

Administrative Courses 16
EDL 780 Public Relations and Politics in Education 3
EDL 781 School Finance and Economics 3
EDL 790 Practicum in Instructional Leadership 3
EDL 782 School Law 3
EDT 895 Administration and Supervision of Educational Technology 4

Total 47

After satisfactorily completing the above requirements, students will be awarded a master's degree in Educational Leadership.

Post-Master's Licensure Options

Post-Master's Requirements (Principalship License)

Note: Before license is awarded, 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
Electives 6

Total Principalship License 68

Post-Master's Requirements (Superintendent License)

Note: The Superintendent License shall be added to a valid professional teacher license of an individual who holds a Principal or Administrative Specialist License and who has completed three years of successful experience in a position requiring a Principal or Administrative Specialist License.

Concentration Courses 44
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
EDL 891 Planning Educational Futures 3
URS 650 Ethics in Public Services 4
EDL 941 Planning Educational Futures 3
CNL 765 Pupil Personnel Services in the School and Community Resources 4
EDL 971 Superintendent/Staff/Board Relations 3
EDL 986 Organizational Behavior in Education and Human Services 4
EDL 987 Administrative Leadership Skills 3
EDT 839 Instructional Design and Development 4
Electives 4

Total Superintendent License (minimum) 91

### Post-Master's Requirements
(Educational Administrative Specialist with Educational Research)

<table>
<thead>
<tr>
<th>Concentration Courses</th>
<th>17-26</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 752 Statistical Analysis and Research Design</td>
<td>4</td>
</tr>
<tr>
<td>EDL 753 Advanced Educational Statistics</td>
<td>4</td>
</tr>
<tr>
<td>EDL 757 Student Appraisal Methods</td>
<td>4</td>
</tr>
<tr>
<td>EDL 755 Research Projects or EDL 999 Thesis</td>
<td>5-9</td>
</tr>
</tbody>
</table>

Electives* 0-5

Total 64-73

*A minimum of 70 hours is needed to complete this program. Elective hours are based on student's research or thesis hours.

### Post-Master's Requirements
(Educational Administrative Specialist with Pupil Services Administration)

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

Total 67

### Educational Technology and Vocational Education Programs

#### Special Note:
As a result of recently passed legislation, endorsement/licensure programs for teachers are in the process of being changed.

All admissions (effective fall quarter 1998) will be for the new licensure programs. For more information, contact the Department of Educational Leadership, 372 or 373 Millett Hall, (937) 775-2518.

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.

Students must plan their programs in consultation with their faculty advisor. A departmental exit requirements must be successfully completed at the end of the program.

#### Classroom Teacher: Library/Media

**Introductory Course Work** 14

To be taken in any sequence during the first 24 credit hours of graduate education course work:
(select one from each category)

**Foundations (select one)**
- ED 701 Advanced Educational Psychology 4
- EDL 713 Applied Psychological Learning Theory 4

**Statistics and Research (select one)**
- EDL 751 Educational Statistics and Research 4
- EDL 731 Statistics and Appraisal in Education 4

**Curriculum (select one)**
- EDL 721 Curriculum Designing for the Teacher 4
- EDL 791 Curriculum Design and Evaluation 4

To be taken as a prerequisite to other EDT course work:
- EDT 700 Entry Seminar in Educational Technology 2

**Program Concentration—Library/Media** 32

*additional hours needed for Multiage licensure
- EDT 711 Collection Development 4
- EDT 721 Cataloging and Classification 4
- EDT 746 Information and Research Skills 4
- EDT 751 Utilization of Video-Based Technology 4
- EDT 786 Educational Applications of Computers 4
- EDT 791 Organization and Administration of School Library Media Centers 4
- EDT 890 Internship 4
- EDT Electives 4

**Required Exit Course** 2

To be taken at the end of the program of study.
- EDT 799 Exit Seminar in Educational Technology 2

A Department comprehensive portfolio will be required during the final quarter of course work on the program of study.
Total 48

*Multiage Library/Media licensure requires 57 hours of course work. Library/Media concentration course work can be applied toward these hours.

Classroom Teacher: Computer/Technology Education

Introductory Course Work 14
To be taken in any sequence during the first 24 credit hours of graduate education course work:
(select one from each category)

Foundations (select one) 4
ED 701 Advanced Educational Psychology
EDL 713 Applied Psychological Learning Theory

Statistics and Research (select one) 4
EDL 751 Educational Statistics and Research
EDL 731 Statistics and Appraisal in Education

Curriculum (select one) 4
EDL 721 Curriculum Designing for the Teacher
EDL 791 Curriculum Design and Evaluation

To be taken as a prerequisite to other EDT course work:
EDT 700 Entry Seminar in Educational Technology 2

Program Concentration—Computer Technology Education* 30

EDT 786 Applications of Computers in Education 4
EDT 782 Developing Multimedia Presentations 4
EDT 751 Utilization of Video-Based Technology 4
EDT 756 Advanced Television Production 4
EDT 890 Internship 4
EDT Electives** 10

Required Exit Course 2
To be taken at the end of the program of study.
EDT 799 Exit Seminar in Educational Technology 2

A Department comprehensive portfolio will be required during the final quarter of course work on the program of study.

Total 48

*All candidates seeking endorsement in computer/technology must provide evidence that the following foundations have been attained: Basic technology operations and concepts (use computer operating systems and user interfaces to run programs, access, generate and manipulate data, and to report results; evaluate performance of hardware and software components of computer systems and apply basic troubleshooting strategies as needed); personal and professional use of technology (apply tools for enhancing productivity and professional growth, use technology in communicating, collaborating, conducting research, and solving problems; includes equitable, ethical, and legal use of computer/technology resources); and application of technology in instruction (teach computer/technology applications and to use technology to support content areas).

**EDT Electives
EDT 714 Online Communication (1)
EDT 715 Information Retrieval Through Technology (4)
EDT 716 Building Online Communications (2)
EDT 817 Issues and Trends in Telecommunications (3)
EDT 839 Instructional Design and Development (4)
EDT 695 Administration and Supervision of Educational Technology (4)
EDT 670 Workshops—special topics (limit 4 hours)

Vocational Programs

Special Note:
As a result of recently passed legislation, endorsement/licensure programs for teachers are in the process of being changed. All admissions (effective fall quarter 1998) will be for the new licensure programs. For more information, contact the Department of Educational Leadership 372 or 373 Millett Hall, (937) 775-2518.

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 core, and a vocational core. In addition, school law, computer applications for educational leaders, and a clinical field experience are integral program components.

Introductory Course Work 13
*May be taken in any sequence
EDL 711 Leadership for School Improvement 4
EDL 712 Philosophical and Curricular Foundations 4
EDL 751 Educational Statistics and Research 5

Vocational Core 18
VOE 706 Survey of Workforce Education 3
VOE 725 Administration and Supervision in Workforce Education 3
VOE 824 Curriculum for Workforce Education 3
VOE 825 Facilities and Management of Workforce Education 3
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>VOE 826 Program Development Techniques for Workforce Education</td>
<td>3</td>
</tr>
<tr>
<td>EDL 790 Practicum in Instructional Leadership</td>
<td>3</td>
</tr>
<tr>
<td>Supervision Core</td>
<td>6–7</td>
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<tr>
<td>EDL 776 Supervision of Instruction and Personnel</td>
<td>3</td>
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<tr>
<td>or EDL 792 Models of Supervision and Staff Development</td>
<td></td>
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<tr>
<td>EDL 782 School Law</td>
<td>3</td>
</tr>
<tr>
<td>Curriculum and Instruction Core</td>
<td>6</td>
</tr>
<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>EDL 793 Computer Applications for Educational Leaders</td>
<td>3</td>
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<tr>
<td>Electives</td>
<td>4–5</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>47–49</strong></td>
</tr>
</tbody>
</table>

**Vocational Director**

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 712 Philosophical and Curricular Foundations</td>
<td>4</td>
</tr>
<tr>
<td>EDL 713 Applied Psychological Learning Theory</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td><strong>Common Educational Leadership Courses</strong></td>
<td><strong>21–22</strong></td>
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<tr>
<td>EDL 711 Leadership for School Improvement or</td>
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<tr>
<td>EDL 771 Educational Leadership Behavior 3–4</td>
<td></td>
</tr>
<tr>
<td>VOE 725 Administration and Supervision in Workforce Education*</td>
<td>3</td>
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<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
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<tr>
<td>VOE 824 Curriculum for Workforce Education*</td>
<td>3</td>
</tr>
<tr>
<td>EDL 776 Supervision of Instruction and Personnel</td>
<td>3</td>
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<tr>
<td>VOE 826 Program Development Techniques for Workforce Education*</td>
<td>3</td>
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<tr>
<td>VOE 706 Survey of Workforce Education*</td>
<td>3</td>
</tr>
<tr>
<td><strong>Administrative Courses</strong></td>
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<tr>
<td>EDL 780 Public Relations and Politics in Education</td>
<td>3</td>
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<tr>
<td>EDL 781 School Finance and Economics</td>
<td>3</td>
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<tr>
<td>EDL 782 School Law</td>
<td>3</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>
<td>3</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td><strong>0–1</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48–49</strong></td>
</tr>
</tbody>
</table>

*Certificate Specialty Requirements*

**Classroom Teacher: Business**

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDL 712 Philosophical and Curricular Foundations</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td><strong>Professional Requirements</strong></td>
<td><strong>12</strong></td>
</tr>
<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>ED 820 Seminar in Secondary Education: Business Education*</td>
<td>4</td>
</tr>
<tr>
<td><strong>Program Concentration</strong></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td><strong>Business Education Core:</strong></td>
<td></td>
</tr>
<tr>
<td>EDT 724 Foundations of Business Education</td>
<td>3</td>
</tr>
<tr>
<td>VOE 706 Survey of Workforce Education</td>
<td>3</td>
</tr>
<tr>
<td>VOE 824 Curriculum for Workforce Education</td>
<td>3</td>
</tr>
<tr>
<td><strong>Business Education Program Electives</strong></td>
<td><strong>14–15</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48–49</strong></td>
</tr>
</tbody>
</table>

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

**Workforce Education Endorsement**

The endorsement programs reflect the philosophy of continuous quality education in a changing world in its response to current and emerging strategies in education reform as applied in workforce education. The program adopts the mission statement prepared by the Ohio Department of Education, Division of Vocational and Adult Education, and is crafted to provide quality programs and services to meet the lifelong career and training needs of a diverse range of citizens and the ever-changing needs of the present and future workplace.
The endorsement of a teacher license, valid for teaching the subject or learners named, shall be issued to an individual who holds a baccalaureate degree; who is deemed to be of good moral character; who has successfully completed and examination prescribed by the State Board of Education; and who has been recommended by the dean or head of teacher education at an approved institution. The endorsement shall be limited to the age and grade levels listed on the license.

**Workforce Education Endorsement: Adult Education—Full-Time**

The adult education—full-time endorsement program will offer instruction on workforce education programs for adults, including curriculum, special methods, and the development of curriculum materials suitable to such programs. Additional focus will be placed on information about adult learners in terms of development, learning capabilities, learning needs, and planning and implementing a marketing effort for adult programs. Various methods of determining individual training needs and planning instruction for adults will be discussed, along with instructional techniques effective with adults to help the student manage the adult instructional process while evaluating the adults learners' progress in meeting specified objectives.

**Required Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOE 726</td>
<td>Adult Workforce Education</td>
<td>4</td>
</tr>
<tr>
<td>VOE 727</td>
<td>Preparing to Work with Adult Learners and Marketing Adult Education Programs</td>
<td>4</td>
</tr>
<tr>
<td>VOE 728</td>
<td>Determining Individual Training Needs and Planning Instruction for Adults</td>
<td>4</td>
</tr>
<tr>
<td>VOE 729</td>
<td>Managing the Instructional Process and Evaluating the Performance of Adults</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

**Workforce Education Endorsement: OWE/OWA**

The OWE/OWA endorsement program will offer instruction on workforce education for at-risk students, including curriculum, special methods, and the development of curriculum materials suitable to such programs. Additional focus will be placed on information about at-risk learners in terms of development, learning capabilities, learning needs, and planning and implementing a marketing effort for at-risk programs. Various methods of determining individual training needs and planning instruction for at-risk students will be discussed, along with instructional techniques effective with at-risk students to help the instructor manage the instructional process while evaluating the at-risk students' progress in meeting specified coordinating cooperative education.

**Required Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOE 613</td>
<td>Organization and Operation of a Cooperative Education Program for At-Risk Students</td>
<td>3</td>
</tr>
<tr>
<td>VOE 614</td>
<td>Teaching in a Cooperative Education Program I</td>
<td>3</td>
</tr>
<tr>
<td>VOE 615</td>
<td>Teaching in a Cooperative Education Program II</td>
<td>3</td>
</tr>
<tr>
<td>VOE 616</td>
<td>Teaching in a Cooperative Education Program III</td>
<td>3</td>
</tr>
<tr>
<td>VOE 642</td>
<td>Science Content in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 643</td>
<td>English/Language Arts Content in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 644</td>
<td>Mathematics Content in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 645</td>
<td>Social Studies Content in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 646</td>
<td>English/Literature Arts Methods in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 647</td>
<td>Mathematics Methods in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 648</td>
<td>Social Studies Methods in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 649</td>
<td>Science Methods in the OWE/OWA Classroom</td>
<td>3</td>
</tr>
<tr>
<td>VOE 664</td>
<td>Methods and Strategies for At-Risk Students</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>39</strong></td>
</tr>
</tbody>
</table>

**Workforce Education Licensure Program: Workforce Education—Teachers Recruited from Business and Industry (Professional Education License)**

This teacher licensure, valid for teaching the subjects or learners named, shall be issued to an individual who holds a baccalaureate degree; who is deemed to be of good moral character; who has successfully completed an examination prescribed by the School Board of Education; and who has been recommended by the dean or head of teacher education at an approved institution.

**Required Course Work**

Choose a minimum of 36 hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOE 611</td>
<td>Workforce Classroom Laboratory Management</td>
<td>3</td>
</tr>
<tr>
<td>VOE 621</td>
<td>Student Behavior Management in Workforce Education</td>
<td>3</td>
</tr>
<tr>
<td>VOE 631</td>
<td>Student Performance Assessment in Workforce Education</td>
<td>3</td>
</tr>
<tr>
<td>VOE 651</td>
<td>Strategies and Techniques in Workforce Education Teaching</td>
<td>3</td>
</tr>
<tr>
<td>VOE 652</td>
<td>Assessment of Workforce Teacher Performance (PRAXIS Preparation)</td>
<td>3</td>
</tr>
<tr>
<td>VOE 669</td>
<td>Coordination Techniques in Workforce Education</td>
<td>3</td>
</tr>
<tr>
<td>VOE 671</td>
<td>Instructional Design of Workforce Education</td>
<td>8</td>
</tr>
</tbody>
</table>
Health, Physical Education, and Recreation (HPR) Programs

Special Note:
HPR Master of Education (M.Ed.) and Master of Arts (M.A.) programs are currently being redesigned.

Classroom Teacher: Physical Education (HPR)

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>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 713 Applied Psychological Learning Theory</td>
<td>4</td>
</tr>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>EDL 771 Educational Leadership Behavior</td>
<td>3</td>
</tr>
<tr>
<td>EDT 786 Applications of Computers in Education</td>
<td>4</td>
</tr>
</tbody>
</table>

Total 16

Program Concentration

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>HPR 710 Physical Education for Children</td>
<td>4</td>
</tr>
<tr>
<td>with Special Needs</td>
<td></td>
</tr>
<tr>
<td>HPR 720 Motor Development and Acquisition of Motor Skills</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 740 Administration of Interscholastic Athletics or</td>
<td>4</td>
</tr>
<tr>
<td>HPR 760 Advanced Athletic Training Techniques</td>
<td>4</td>
</tr>
</tbody>
</table>

Total 20

Master of Arts (M.A.)
The Master of Arts in education degree may be obtained in the physical education area also. This program allows an individual without a teaching certificate to earn a master’s degree in a specialized area of interest. 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.

Introductory Course Work

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>5</td>
</tr>
<tr>
<td>EDL 988 Research and the Educational Leader in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDT 786 Applications of Computers in Education</td>
<td>4</td>
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</table>

Professional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eleven hours of electives or</td>
<td>4</td>
</tr>
<tr>
<td>EDL 720 Analysis of Teaching</td>
<td></td>
</tr>
<tr>
<td>EDL 791 Curriculum Design and Evaluation</td>
<td>4</td>
</tr>
<tr>
<td>EDL 782 School Law</td>
<td>3</td>
</tr>
</tbody>
</table>

Total 11

Program Concentration

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPR 710 Physical Education for Children</td>
<td>4</td>
</tr>
<tr>
<td>with Special Needs</td>
<td></td>
</tr>
<tr>
<td>HPR 720 Motor Development and Acquisition of Motor Skills</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 740 Administration of Interscholastic Athletics or</td>
<td>4</td>
</tr>
<tr>
<td>HPR 760 Advanced Athletic Training Techniques</td>
<td>4</td>
</tr>
</tbody>
</table>

Total 20
## School Nurse Licensure Program

The purpose of Wright State University's Professional Pupil Services School Nurse Licensure Program is to prepare highly qualified school nurses. These future school nurses must first complete a baccalaureate degree with course work in growth and development, psychology, sociology, and/or anthropology. Each candidate must also have course work in community health and a current license to practice as a registered nurse issued by the Ohio Board of Nursing.

This post baccalaureate School Nurse Licensure Program is designed to build upon an undergraduate education and to prepare the school nurse to be a collaborative team member within the school and community system. A 22-credit, graduate-level program, with courses taught by both the College of Nursing and Health and the College of Education and Human Services requires course work in school nurse related topics. In addition, students must successfully complete an all-day, 10-week, Monday through Friday practicum in the school under the supervision of a university supervisor and a licensed school nurse.

### Prerequisites:
1. Baccalaureate degree with course work in growth, and development, psychology, sociology, and/or anthropology.
2. License to practice professional nursing in the State of Ohio.
3. Course work in community health.

### Professional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPR 640 The Role of the Nurse in Schools</td>
<td>5</td>
</tr>
<tr>
<td>NUR 640 School Nursing</td>
<td>2</td>
</tr>
<tr>
<td>NUR 641 Children with Special Needs</td>
<td>1</td>
</tr>
<tr>
<td>NUR 642 Health Assessment of Children and Adolescents in Schools</td>
<td>2</td>
</tr>
<tr>
<td>NUR 644 Health Promotion in School Nursing</td>
<td>2</td>
</tr>
<tr>
<td>HPR 643 Practicum in School Nursing*</td>
<td>5</td>
</tr>
<tr>
<td>NUR 643 Practicum in School Nursing*</td>
<td>5</td>
</tr>
</tbody>
</table>

### Total: 22

### Note:
The HPR 643/NUR 643 Practicum in School Nursing courses are reserved for students who have been officially admitted to the School Nurse Licensure program and have successfully completed the prerequisite course work (HPR 640, NUR 640, 641, 642). Written permission of the instructor is required to register.

## Teacher Education Programs

### Professional Educator Program

Persons with a bachelor's degree from any approved college or university who wish to work for teaching certificate/licensure in an intensive, professional program and who are able to make a full-time commitment may be eligible for participation. Upon successful completion of the prescribed program, the student may apply for the initial certification/license. A Master of Education degree in classroom teaching may be earned after successfully completing an Inquiry Project. The M.Ed. in Classroom Teaching will be in either Elementary Certification or Secondary Certification; the course offerings follow this description. These programs will be replaced with new licensure programs in Early, Middle Childhood, Adolescent, and Multi-Age licensure, see the Special Note preceding those Classroom Teacher programs which contain a certification/licensure component.

Candidates will take many courses as a cohort group regardless of teaching field. University classes will be held Monday through Friday. The program has an intensive field component in public school classrooms. State of Ohio standards mandate that students have field experiences in culturally diverse settings.

The professional sequence consists of five steps. **Step 1** is an introductory phase that acquaints the candidate with the profession of teaching, the personal qualification required, the interrelationship of school and society, learning theories, and classroom management. **Steps II and III** emphasize teaching skills and focus on the curriculum and materials required in the candidate's teaching field. **Step IV** combines full-time teaching internship with a professional seminar. **Step V** consists of additional work taken during Summer A term after the internship following by completion of an Inquiry Project.

To be eligible for this program, you must have completed appropriate course work in your teaching field prior to admission to the program. Additional requirements include a 2.7 undergraduate GPA, a combined score of 800 on the verbal and quantitative portions of the GRE, or 30 on the MAT.

The State of Ohio requires all students to successfully complete the National Teacher's Exam (NTE) Core Battery and Specialty Area Tests before being recommended for certification/licensure.

Prior to beginning the program, participants must complete an additional application through the Office of Student Services, College of Education and Human Services, as additional entry and exit requirements apply. The College of Education's Student Services should also be contacted for updated information about the program.
Classroom Teacher Programs

The classroom teacher program leads to a Master of Education degree for individuals who are qualified for a provisional teacher certificate/initial license, 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/licensure areas.

Classroom Teacher: Secondary Certification

ED 664 Evaluation 3
ED 602 Education in a Pluralistic Society 4
ED 622 Instructional Design and Technology 3
ED 621 Human Development Research 3
ED 624 Addressing Learning Difficulty 4
CNL 662 Problem Student Personality and Development 4
ED 631 Extending Literature Skills 3
ED 600 Classroom Management Learning Theory 3
ED 635 Secondary Issues and Trends 3
ED 641 Intern Teaching 15
ED 645 Internship Assessment 3
ED 646 Induction Year Project 3
ED 771 Project Completion 1
ED 612 Field Experience 1 1-3
ED 614 Field Experience 2 1-3
ED 616 Field Experience 3 1-3

Choose one of the following:
ED 639 Social Studies Methods 3
ED 623 English Methods 3
ED 638 Math Methods 3
AED 638 Art Methods 3
ED 625 Foreign Language Methods 3
ED 731 Science Methods 3
ED 713 Physical Education Methods 3

Total 58–64

Classroom Teacher: Elementary Certification

ED 600 Classroom Management Learning Theory 3
ED 602 Education in a Pluralistic Society 4
ED 606 Language Arts I 4
ED 607 Literary Instruction 4
ED 608 Social Studies Education 3
ED 770 Art/Physical Education 3
CNL 662 Problem Student Personality and Development 4
EDS 624 Addressing Learning Difficulty 4
ED 610 Early and Middle Science and Math 6
EDL 670 Seminar in Educational Leadership 3
ED 641 Intern Teaching 15
ED 645 Internship Assessment 3
ED 646 Induction Year Project 3
ED 771 Project Completion 1
ED 612 Field Experience 1 1-3
ED 614 Field Experience 2 1-3
ED 616 Field Experience 3 1-3
ED 622 Media Design 3
ED 621 Human Development Research 3

Total 69–75

Classroom Teacher: Art Education

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 4
EDL 784 Legal and Professional Issues 4
EDT 749 Developing Materials for Instruction 4

AED Program Specific Courses 19

Total 48

Classroom Teacher: Early Childhood

Special Note:

This master's degree program is in transition. Other courses may be substituted or added on an individual basis. Please see your Early Childhood advisor before registering for classes.

All Special Education programs will be replaced with Intervention Specialists programs, which should be available in the fall quarter 1998. The Classroom Teacher: Elementary Certification program will be replaced with a new licensure program in either Early or Middle Childhood. The Classroom Teacher Secondary Certification program will be replaced with Adolescent licensure. The new licensure programs should also be available in the fall quarter 1998.

The Early Childhood Education program offers a master's degree and certification/license for prekindergarten to third grade. Prekindergarten validation must be appended to an existing certificate, or home economics/child development certificate. Course work focuses on curriculum and

ED 641 Intern Teaching 15
ED 645 Internship Assessment 3
ED 646 Induction Year Project 3
ED 771 Project Completion 1
ED 612 Field Experience 1 1-3
ED 614 Field Experience 2 1-3
ED 616 Field Experience 3 1-3
ED 622 Media Design 3
ED 621 Human Development Research 3

Total 69–75

Classroom Teacher: Art Education

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 4
EDL 784 Legal and Professional Issues 4
EDT 749 Developing Materials for Instruction 4

AED Program Specific Courses 19

Total 48

Classroom Teacher: Early Childhood

Special Note:

This master's degree program is in transition. Other courses may be substituted or added on an individual basis. Please see your Early Childhood advisor before registering for classes.

All Special Education programs will be replaced with Intervention Specialists programs, which should be available in the fall quarter 1998. The Classroom Teacher: Elementary Certification program will be replaced with a new licensure program in either Early or Middle Childhood. The Classroom Teacher Secondary Certification program will be replaced with Adolescent licensure. The new licensure programs should also be available in the fall quarter 1998.

The Early Childhood Education program offers a master's degree and certification/license for prekindergarten to third grade. Prekindergarten validation must be appended to an existing certificate, or home economics/child development certificate. Course work focuses on curriculum and
and materials relevant to working with children ages three to eight years and toward in-depth understanding of the developmental processes and their application in programs for young children.

**Professional Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDL 751 Educational Statistics and Research</td>
<td>4</td>
</tr>
<tr>
<td>EDE 712 Advanced Study of Child Growth and</td>
<td>5</td>
</tr>
<tr>
<td>Development: Typical and Atypical</td>
<td></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:</td>
<td>4</td>
</tr>
<tr>
<td>Integrating Literacy and the Expressive Arts</td>
<td></td>
</tr>
<tr>
<td>EDE 721 Advanced Planning II: Fundamental</td>
<td>4</td>
</tr>
<tr>
<td>Concepts in Mathematics and Science</td>
<td></td>
</tr>
<tr>
<td>EDE 730 Developmentally Appropriate</td>
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<tr>
<td>Assessment in ECE</td>
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</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 Designing and Administering</td>
<td>4</td>
</tr>
<tr>
<td>Family-Centered Early Childhood Programs</td>
<td></td>
</tr>
<tr>
<td>Electives (with advisor approval)</td>
<td>8</td>
</tr>
</tbody>
</table>

**Total** 48

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**Pre-Kindergarten Endorsement Course Requirements**

*(valid for teaching learners ages three through five)*

May only be added to Ohio certification in:
- kindergarten–primary (K-3)
- elementary (K-8 or 1-8)
- family and consumer sciences (home economics)
- special certificate for education of the handicapped (K-12)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDE 715 Young Children With Special Needs</td>
<td>3</td>
</tr>
<tr>
<td>Practicum Experience II</td>
<td></td>
</tr>
<tr>
<td>EDE 745 Foundations in Early Childhood</td>
<td>4</td>
</tr>
<tr>
<td>EDE 731 Developmentally Appropriate</td>
<td>4</td>
</tr>
<tr>
<td>Programming in EC: Infants and Toddlers</td>
<td>3</td>
</tr>
<tr>
<td>EDE 750 Family and Community in ECE</td>
<td>4</td>
</tr>
<tr>
<td>Practicum Experience III</td>
<td></td>
</tr>
<tr>
<td>(concurrent with EDE 231 and 401)</td>
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</tr>
<tr>
<td>EDS 659 Collaboration and Consultation Skills for Special Educators</td>
<td>4</td>
</tr>
<tr>
<td>EDE 730 or EDS 454 Evaluation and</td>
<td>4</td>
</tr>
<tr>
<td>Assessment in ECE</td>
<td></td>
</tr>
<tr>
<td>Practicum Experience IV</td>
<td></td>
</tr>
<tr>
<td>(concurrent with EDE 464)</td>
<td></td>
</tr>
<tr>
<td>EDE 703 Language Development, Social</td>
<td>3</td>
</tr>
<tr>
<td>Development and Play in ECE</td>
<td></td>
</tr>
<tr>
<td>EDE 717 Meeting the Individual Needs of</td>
<td>3</td>
</tr>
<tr>
<td>Young Children</td>
<td></td>
</tr>
</tbody>
</table>

**Total** 48

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**Practicum Experience VI**

*(concurrent with EDE 317)*

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDE 760 Practicum in Early Childhood</td>
<td>2-6</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>(ECE Practicum in pre-K setting)</td>
<td></td>
</tr>
<tr>
<td>[number of hours based on documentation</td>
<td></td>
</tr>
<tr>
<td>of prior K or Pre-K experience; reduction</td>
<td></td>
</tr>
<tr>
<td>in hours must be supported by ECE advisor</td>
<td></td>
</tr>
<tr>
<td>and approved by undergrad petition committee]</td>
<td></td>
</tr>
</tbody>
</table>

**Total** 30-34

**Note:**

Graduate equivalents and transfer courses will be considered on an individual basis, including the practicum.

---

**Early Education of the Handicapped**

Early Education of the Handicapped (EEH) is a validation program which builds on a prekindergarten (preschool through 3-5 year olds) certificate or a special education certificate. EEH validation enables a teacher to work with children 3-5 years old with special needs. This program is in transition to eventually become the Early Childhood Intervention Specialist license, therefore specific course requirements may be modified and substitute courses may be allowed. Please see certification advisors before pursuing program.

---

**Early Education of the Handicapped Validation**

*(This is not a Master's degree program)*

The State of Ohio requires that this validation be built on an existing certification in Special Education, Prekindergarten, or Home Economics.

**Early Childhood/Special Education Foundations**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDE 712 Advanced Study of Child Development: Typical and Atypical</td>
<td>4</td>
</tr>
<tr>
<td>EDE 745 Foundations in Early Childhood Education</td>
<td>4</td>
</tr>
<tr>
<td>EDS 655 Nature and Needs of the Mildly Handicapped or EDS 651</td>
<td>4</td>
</tr>
<tr>
<td>Nature and Needs of the Multiply Handicapped</td>
<td></td>
</tr>
<tr>
<td>Working with Families and Agencies</td>
<td></td>
</tr>
<tr>
<td>EDE 750 Designing and Administering Family Centered Early Childhood Programs or EDS 659 Communication and Consultation Skills for Special Educators</td>
<td>4</td>
</tr>
<tr>
<td>EDE 735 Individuality in the Early Classroom Classroom</td>
<td>4</td>
</tr>
<tr>
<td>EDE 730 Developmentally Appropriate</td>
<td></td>
</tr>
<tr>
<td>Assessment in Early Childhood Programs</td>
<td></td>
</tr>
<tr>
<td>EDS 654 Administration and Interpretation of Educational Data</td>
<td>4</td>
</tr>
</tbody>
</table>

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**Practicum Experience VI**

*(concurrent with EDE 317)*

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDE 760 Practicum in Early Childhood</td>
<td>2-6</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>(ECE Practicum in pre-K setting)</td>
<td></td>
</tr>
<tr>
<td>[number of hours based on documentation</td>
<td></td>
</tr>
<tr>
<td>of prior K or Pre-K experience; reduction</td>
<td></td>
</tr>
<tr>
<td>in hours must be supported by ECE advisor</td>
<td></td>
</tr>
<tr>
<td>and approved by undergrad petition committee]</td>
<td></td>
</tr>
</tbody>
</table>

**Total** 30-34

**Note:**

Graduate equivalents and transfer courses will be considered on an individual basis, including the practicum.

---

**Early Education of the Handicapped Validation**

*(This is not a Master's degree program)*

The State of Ohio requires that this validation be built on an existing certification in Special Education, Prekindergarten, or Home Economics.
Methods and Materials

EDE 720 Advanced Curriculum Planning I  Introducing Literacy and the Expressive Arts  4
EDE 721 Advanced Program Planning II  Integrating Math and Science  4

Practical Experience

EDE 760 Practicum in Prekindergarten/ Kindergarten  1-6
(Hours to be determined by experience in Early Childhood Special Education)

Acceptance of previously completed courses is subject to departmental approval.

Classroom Teacher: General

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/licensure. 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  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  23
EDL 720 Analysis of Teaching  4
EDL 791 Curriculum Design and Evaluation  4
ED 710 Teaching Strategies for Culturally Diverse Settings  4
EDL 740 Legal and Professional Issues  4
EDT 749 Introduction to Instructional Media  4
ED 820 Seminar in Secondary Education or ED 810 Seminar in Elementary Education*  3

Program Electives  12
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, mathematics, religion, science, social studies, student learning and behavior, or other special-interest fields.

Total  48

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

Classroom Teacher: Mathematics

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

Introductory Course Work  13
To be taken in any sequence within first 24 credit hours of graduate education course work
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
Twenty-four hours of graduate courses (approved by advisor) in mathematics and related disciplines. These must be taken outside the College of Education and Human Services.

Total  48

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

Classroom Teacher: Reading

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.

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**

**Special Note:**
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

**Classroom Teacher: Special Education Developmentally Handicapped (DH)**

**Special Note:**
All Special Education programs will be replaced with Intervention Specialists programs, which should be available in the fall quarter 1998. The Classroom Teacher: Elementary Certification program will be replaced with a new licensure program in Early or Middle Childhood. The Classroom Teacher Secondary Certification program will be replaced with Adolescent licensure. The new licensure programs should also be available in the fall quarter 1998.

This program leads to certification in developmentally handicapped education for the holder of an elementary education teaching certificate. Persons who do not hold a initial teaching certificate/license should check with the teacher certification advisor in the Office of Student Services for the necessary prerequisites before beginning this program, including acceptance into the Teacher Education Program in their major teaching field. Applications and admissions information is available in the College's Office of Student Services.

**Introductory Course Work** 13
ED 704 Introduction to Foundations of Education 4
EDL 771 or 711 Leadership for School Improvement 4
EDL 751 Educational Statistics and Research 5

**Professional Requirements** 8
EDT 786 Applications of Computers in Education 4
EDS 700 Special Education Entrance Seminar 2
EDS 799 Special Education Exit Seminar 2

**Program Concentration** 32-33
EDS 651 Nature and Needs of the Multiply Handicapped (offered fall only) 3
EDS 655 Nature and Needs of the Mildly Handicapped 4
EDS 654 Administration and Interpretation of Educational Data 3
EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped 4
EDS 644 Instructional and Behavioral Management of Exceptional Individuals 3
EDS 645 Career Education and Occupational Training for Exceptional Individuals 3
EDS 656 Clinical Practice in Remediation 4
EDS 658 Practicum in Education: Developmentally Handicapped 5-6
EDS 659 Communication and Consultation Skills for Special Educators 3

Total 53-54

**Classroom Teacher: K-12 Special Education/Gifted**

**Special Note:**
All Special Education programs will be replaced with Intervention Specialists programs, which should be available in the fall quarter 1998. The Classroom Teacher: Elementary Certification program will be replaced with a new licensure program in Early or Middle Childhood. The Classroom Teacher Secondary Certification program will be replaced with Adolescent licensure. The new licensure programs should also be available in the fall quarter 1998.
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 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 Concentration</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 (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>
<tr>
<td>ED 658 Practicum in Education</td>
<td>3-6</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>

**Content Concentration**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courses developing a concentration in advanced instruction/curriculum, educational technology, counseling, education of gifted/handicapped or research selected by student and advisor</td>
<td>9-12</td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-51</td>
</tr>
</tbody>
</table>

**Classroom Teacher: Special Education Multiple Handicapped (MH)**

**Special Note:**

All Special Education programs will be replaced with Intervention Specialists programs, which should be available in the fall quarter 1998. The Classroom Teacher: Elementary Certification program will be replaced with a new licensure program in Early or Middle Childhood. The Classroom Teacher Secondary Certification program will be replaced with Adolescent licensure. The new licensure programs should also be available in the fall quarter 1998.

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 who do not hold a initial teaching certificate/license should check with the teacher certification advisor in the Office of Student Services for the necessary prerequisites before beginning this program, including acceptance into the Teacher Education Department. Applications and admissions information is available in the College's 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 Foundations of Education</td>
<td>4</td>
</tr>
<tr>
<td>EDL 771 or 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>

**Total**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
</tr>
</tbody>
</table>

**Program Concentration**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped</td>
<td>4</td>
</tr>
<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>
<tr>
<td>EDS 651 Nature and Needs of the Multiply Handicapped (offered fall only)</td>
<td>3</td>
</tr>
<tr>
<td>EDS 652 Education of Individuals with Physical, Sensory, and Motor Disorders (offered winter only)</td>
<td>3</td>
</tr>
<tr>
<td>EDS 653 Curriculum, Methods, Materials, and Adaptive Equipment for Multiply Handicapped (offered spring only)</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 643 Introduction to Augmentative Communication</td>
<td>3</td>
</tr>
<tr>
<td>HPR 710 Physical Education for Children with Special Needs</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 Education</td>
<td>3</td>
</tr>
<tr>
<td>ED 658 Practicum in Education: Multiply Handicapped (Students without prior student teaching must do 6 hours of student teaching and 6 hours of practicum)</td>
<td>5-6</td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-31</td>
</tr>
</tbody>
</table>

**Classroom Teacher: Special Education Orthopedically Handicapped (OH)**

**Special Note:**

All Special Education programs will be replaced with Intervention Specialists programs, which should be available in the fall quarter 1998. The Classroom Teacher: Elementary Certification program will be replaced with a new licensure program in Early or Middle Childhood. The Classroom Teacher Secondary Certification program will be replaced with Adolescent
licensure. The new licensure programs should also be available in the fall quarter 1998.

This program leads to certification in orthopedically handicapped for the holder of an elementary education teaching certificate. Persons who do not hold a initial teaching certificate/license should check with the teacher certification advisor in the Office of Student Services for the necessary prerequisites before beginning this program, including acceptance into the Teacher Education Department. Applications and admissions information is available in the College's 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 771 or 711 Leadership for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDS 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>EDS 642 Curriculum, Methods, and Materials for the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDT 766 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>
<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 652 Education of Individuals with Physical, Sensory, and Motor Disorders (offered winter only)</td>
<td>3</td>
</tr>
<tr>
<td>EDS 653 Curriculum, Methods, Materials, and Adaptive Equipment for Multiply Handicapped (offered spring only)</td>
<td>3</td>
</tr>
<tr>
<td>HPR 710 Physical Education for Children with Special Needs</td>
<td>4</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 643 Introduction to Augmentative Communication</td>
<td>3</td>
</tr>
<tr>
<td>EDS 655 Nature and Needs of the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDS 644 Instructional and Behavioral Management of Exceptional Individuals</td>
<td>3</td>
</tr>
<tr>
<td>ED 658 Practicum in Education: Orthopedically Handicapped</td>
<td>5-6</td>
</tr>
</tbody>
</table>

**Classroom Teacher: Special Education Severe Behavior Handicapped (SBH)**

**Special Note:**

All Special Education programs will be replaced with Intervention Specialists programs, which should be available in the fall quarter 1998. The Classroom Teacher: Elementary Certification program will be replaced with a new licensure program in Early or Middle Childhood. The Classroom Teacher Secondary Certification program will be replaced with Adolescent licensure. The new licensure programs should also be available in the fall quarter 1998.

This program leads to certification in severe behavior handicapped education for the holder of an elementary education teaching certificate. Persons who do not hold a initial teaching certificate/license should check with the teacher certification advisor in the Office of Student Services for the necessary prerequisites before beginning this program, including acceptance into the Teacher Education Department. Applications and admissions information is available in the College's 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 771 or 711 Leadership Skills for School Improvement</td>
<td>4</td>
</tr>
<tr>
<td>EDS 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>
<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>3</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>CNL 751 Counseling Skills for Educators (offered alternating spring quarters)</td>
<td>3</td>
</tr>
<tr>
<td>EDS 740 Clinical Practice with Severe Behavior Handicapped Individuals (offered alternating winter quarters)</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ED 658</td>
<td>Practicum in Education: Severe Behavior Handicapped</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

**Human Services (Counseling) Programs**

The Department of Human Services programs share a common curriculum of courses associated with five different counseling concentrations. Students may choose to obtain a M.A. or M.S. degree in counseling with a specialization in mental health counseling; business and industrial management counseling; community counseling; marriage and family counseling; exceptional children; or students may choose to obtain either a M.R.C. degree with a specialization in severe disabilities or chemical dependency or a M.Ed. in school counseling.

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. Students may or may not be endorsed in their program concentrations by the Department of Human Services for showing competence in academic ability, professional ability, and ethical commitment to the field of counseling.

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. The degree program in rehabilitation counseling with a concentration in severe disabilities has accreditation by the Council on Rehabilitation Education (CORE).

**Modifications to a number of counseling programs are anticipated to meet Professional Counselor (PC) and Professional Clinical Counselor (PCC) requirements. Such changes may include additional course work and/or field experiences. Students entering under this catalog can expect such changes to their programs.**

**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, complete a minimum of 90 credit hours in counseling, and complete supervision and examination requirements. In addition, a supervised field experience and meet specific competencies during counsel or preparation.
Clinical Training Series for Professional Clinical Counselor (PCC)

The department offers a series of courses—CNL 950, 951, 952, 953, 954, 960 plus a clinical elective—for students who have met all other requirements and wish to obtain the Ohio Counselor and Social Worker Board PCC endorsement. This is a 30 credit hour sequence of courses. Please contact the Human Services Department for information.

Business and Industrial Management Counseling

Introductory Course Work 13
RHB 701 Counseling Theory and Practice 4
CNL 863 Techniques of Counseling* 4
EDL 751 Educational Statistics and Research 5

Professional Requirements

CNL 667 Group Background and Theory 4
CNL 762 Career Development and Information Services 4
CNL 864 Practicum I: Individual 4
CNL 971 Counseling for Life-Span Development 4
CNL 972 Legal, Professional, and Ethical Issues in the Human Services 4
CNL 973 Social and Cultural Foundations in Counseling 4
MBA 541 Survey of Law 2
MBA 551 Survey of Management 2
MBA 751 Managing People in Organizations 3
MGT 703 Seminar in Personnel Administration 3
MGT 705 Seminar in Industrial Relations 3
RHB 705 Behavioral Assessment 4

Electives 6

Total 60

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

Counseling Exceptional Children

Introductory Course Work 13
RHB 701 Counseling Theory and Practice 4
CNL 863 Techniques of Counseling* 4
EDL 751 Educational Statistics and Research 5

Professional Requirements† 31–32

CNL 662 Problems in Student Personality and Development OR
CNL 663 Mental Health I 4
CNL 667 Group Background and Theory OR
CNL 767 Group Processes in Counseling and Guidance 3–4
CNL 769 Techniques of Child Counseling OR
CNL 778 Techniques of Play Therapy 4
CNL 865 Individual and Group Practicum with Exceptional Children 4

CNL 960 Advanced Institute for Human Services 3
CNL 972 Legal, Professional, and Ethical Issues in Human Services 4
EDS 652 Education of Individuals with Physical, Sensory, and Motor Disabilities 3
EDS 655 Nature and Needs of the Mildly Handicapped 3
ED 659 Communication and Consultation Skills for Special Educators AND/OR ED 722 Gifted Children and Youth 3

Recommended Electives 16–19

Total 60–64

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

Community Counseling

Courses recommended in the first phase of the program 13
RHB 701 Counseling Theory and Practice 4
CNL 863 Techniques of Counseling* 4
EDL 751 Educational Statistics and Research 5
*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863

Courses recommended in the second phase of the program 59–60

CNL 663 Mental Health I 4
CNL 664 Crisis Intervention Counseling 4
CNL 667 Group Background and Theory OR
CNL 767 Group Process in Counseling and Guidance (plus 1 hour elective if needed) 3
CNL 762 Career Development and Information Services 4
CNL 773 Mental Health II 4
CNL 779 Marriage and Family Counseling 4
CNL 860 Advanced Seminar in Counseling: Counseling and Appraisal 4
CNL 865 Individual and Group Practicum 4
(Can be spent as a group.) (Minimum 200 hours with 80 direct client contact hours per each 4-hour unit. This has a minimum total of 600 hours with 240 direct client contact hours. A minimum total of 41 direct client contact hours will be spent leading a group.)
CNL 971 Counseling for Life Span Development 4
CNL 972 Legal, Professional, and Ethical Issues in Human Services 4
CNL 973 Social and Cultural Foundations in Counseling 4
RHB 705 Behavioral Assessment 4
Advised Electives  4–5

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNL 866 Advanced Individual and Group Practicum</td>
<td>4</td>
</tr>
<tr>
<td>(Prerequisites: CNL 865 and CNL 667 OR CNL 767)</td>
<td></td>
</tr>
<tr>
<td>CNL 670 Counseling Workshop: Human Sexuality I &amp; II</td>
<td>1–3</td>
</tr>
<tr>
<td>CNL 670 Counseling Workshop: Counseling Older Adults</td>
<td>1–3</td>
</tr>
<tr>
<td>CNL 770 Independent Study</td>
<td>1–3</td>
</tr>
<tr>
<td>CNL 778 Play Therapy</td>
<td>4</td>
</tr>
<tr>
<td>CNL 780 Systems Theory and Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 781 Advanced Techniques of Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 782 Advanced Techniques of Marital Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 960 Advanced Institute for Human Services Personnel</td>
<td>4</td>
</tr>
<tr>
<td>CNL 961 Counseling the Gifted</td>
<td>4</td>
</tr>
<tr>
<td>RHB 730 Epidemiology of Chemical Dependency</td>
<td>4</td>
</tr>
<tr>
<td>RHB 731 Treatment Approaches in Chemical Dependency</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total** 76–78

*Exit Requirements: A written comprehensive exam. Thesis: Students may also choose to complete a thesis. This involves nine hours of thesis credit and also ED 752.

Marriage and Family Counseling

Introductory Course Work  13

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</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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Professional Requirements  59

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
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<tbody>
<tr>
<td>CNL 762 Career Development and Information Services</td>
<td>4</td>
</tr>
<tr>
<td>CNL 779 Marriage and Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 780 Systems Theory and Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 781 Advanced Techniques of Family Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 782 Techniques of Marital Counseling</td>
<td>4</td>
</tr>
<tr>
<td>CNL 670 Counseling Workshop: Human Sexuality and Counseling</td>
<td>3</td>
</tr>
<tr>
<td>CNL 663 Mental Health I</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>CNL 867 Internship: Marriage and Family Counseling</td>
<td>12</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
<tr>
<td>SOC 560 Sociology of the Family</td>
<td>4</td>
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</table>

**Total** 92–94

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

Electives†  4

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</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>

**Total** 76

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

†CNL 667 is recommended for this major's elective in order to meet Ohio LPC requirements.

Mental Health Counseling

Introductory Course Work  13

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</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>
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</table>

Professional Requirements  75–76

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
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</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>
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<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 860 Advanced Seminar in Counseling: Counseling and Appraisal</td>
<td>4</td>
</tr>
<tr>
<td>CNL 865 Individual and Group Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 967 Internship: Mental Health Counseling</td>
<td>12</td>
</tr>
<tr>
<td>CNL 950 Personelity Theory and Psychopathology</td>
<td>4</td>
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<tr>
<td>CNL 951 Clinical Assessment in Counseling Practice</td>
<td>4</td>
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<tr>
<td>CNL 952 Diagnosis and Clinical Counseling Practice</td>
<td>4</td>
</tr>
<tr>
<td>CNL 953 Formulation and Clinical Intervention</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 705 Behavioral Assessment</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total** 92–94

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

Rehabilitation Counseling:

Chemical Dependency

Introductory Course Work  13

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</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

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>CNL 663 Mental Health I</td>
<td>4</td>
</tr>
<tr>
<td>CNL 779 Marriage and Family Counseling</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 973 Social and Cultural Foundations in Counseling</td>
<td>4</td>
</tr>
<tr>
<td>RHB 700 Foundations of Vocational Rehabilitation</td>
<td>4</td>
</tr>
<tr>
<td>RHB 704 Psychological Adjustment to Disabilities</td>
<td>4</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
<tr>
<td>RHB 707 Medical Assessment: Chemical Dependency</td>
<td>3</td>
</tr>
<tr>
<td>RHB 711 Vocational Evaluation and Job Placement</td>
<td>4</td>
</tr>
<tr>
<td>RHB 720 Case Management in Vocational Rehabilitation</td>
<td>4</td>
</tr>
<tr>
<td>RHB 730 Epidemiology of Chemical Dependency</td>
<td>4</td>
</tr>
<tr>
<td>RHB 731 Treatment Approaches in Chemical Dependency</td>
<td>4</td>
</tr>
<tr>
<td>RHB 865 Practicum†</td>
<td>4</td>
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<tr>
<td>RHB 801 Internship: Chemical Dependency†</td>
<td>10</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>73-74</strong></td>
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### LPC Requirements

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<th>Course</th>
<th>Credit</th>
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<tbody>
<tr>
<td>CNL 762 Career Development and Information Services</td>
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</tr>
<tr>
<td>CNL 971 Counseling for Lifespan 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><strong>Total</strong></td>
<td><strong>85-86</strong></td>
</tr>
</tbody>
</table>

* Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.
† The students are required to complete a 100-hour practicum in a rehabilitation agency or a human services agency that works with people with disabilities. Students enrolled in the Chemical Dependence Concentration will complete their practicum in a vocational rehabilitation setting and a 600-hour internship in a chemical dependency treatment program.
‡ LPC—Chemical dependency majors wishing to pursue licensure in Ohio as a counselor must take CNL 762, 971, and 972.

**Exit Requirements:** Students must pass a written comprehensive examination.

**Thesis:** Completion of the thesis is optional, and is intended for students wishing to research a specific topic related to chemical dependency. In addition to their regular course work, students must complete 9 hours of thesis credit and EDL 752. All these proposals must be approved by the program advisor and the thesis committee prior to continuing with the project. The thesis committee will consist of a faculty member who will serve as the major advisor, and two additional faculty members.

### Rehabilitation Counseling: Severe Disabilities

#### Introductory Course Work

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</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>
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#### Professional Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<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 971 Counseling for Lifespan 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 700 Counseling: Severe Disability Foundations of Vocational Rehabilitation</td>
<td>4</td>
</tr>
<tr>
<td>RHB 702 Medical Assessment</td>
<td>4</td>
</tr>
<tr>
<td>RHB 704 Psychological Adjustment: Severe Disability</td>
<td>4</td>
</tr>
<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
<tr>
<td>RHB 711 Vocational Evaluation and Job Placement Techniques</td>
<td>4</td>
</tr>
<tr>
<td>RHB 720 Case Management in Vocational Rehabilitation</td>
<td>4</td>
</tr>
<tr>
<td>RHB 801 Internship: Severe Disability</td>
<td>10</td>
</tr>
<tr>
<td>RHB 865 Practicum†</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students' choice</td>
<td>3</td>
</tr>
</tbody>
</table>

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

### Student Personnel Services Program

The student personnel services program, leading to the Master of Arts or Master of Education degree, offers a concentration in school counseling. 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 for 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; and complete the application for a counseling practicum during the first week of the term preceding the quarter in which the practicum is offered, except for fall quarter for which application is made during the first two weeks of spring quarter.

### School Counseling

**Introductory Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</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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</table>

**Professional Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<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 971 Counseling for Life Span Development</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>EDS 655 Nature and Needs of the Mildly Handicapped</td>
<td>4</td>
</tr>
<tr>
<td>EDL 773 Curriculum Theory and Practice</td>
<td>3</td>
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<tr>
<td>RHB 705 Behavioral Assessment</td>
<td>4</td>
</tr>
<tr>
<td>CNL 865 Individual and Group Practicum</td>
<td>4</td>
</tr>
<tr>
<td>CNL 867 Internship: School Counseling</td>
<td>10</td>
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</tbody>
</table>

**Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Unless permission is granted, you must take RHB 701 prior to or concurrent with CNL 863.</td>
<td></td>
</tr>
</tbody>
</table>

**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.
Electrical Engineering

The Department of Electrical Engineering offers a program of graduate study leading to a Master of Science in Engineering (M.S.E.) degree with a major in electrical engineering. The M.S.E. program is broad in scope and emphasizes complex physical systems using modeling, synthesis, and optimization techniques, and bridges interdisciplinary engineering areas such as controls, robotics, electronics, and communications. A Ph.D. in engineering with a major in electrical engineering is also available. For details see Engineering Ph.D. Program.

The Graduate Faculty

Professors
James E. Brandeberry (Dean), circuit and interface design, microprocessors, digital control, robotics and computer-aided design
Marian K. Kazimierczuk, electronic circuit analysis, high-frequency tuned power amplifiers, power electronics
William S. McCormick, communication theory, bioengineering, electromagnetics, electro-optics
L. Rai Pujara, multivariable control systems, systems analysis, robust control theory
Kuldip S. Rattan, computer-aided design, digital signal processing and control, bioengineering, robotics
Belle A. Shenoi, network theory, active and digital filters, communication circuits, digital signal processing
Raymond E. Siferd (Chair), integrated circuits, signal processing, microelectromechanical systems

Associate Professors
Chien-In Chen, VLSI design, design testability, computer-aided design automation
Fred Garber, decision theory and pattern recognition with applications to automatic target recognition, communication theory with emphasis on modulation techniques for multipath fading channel communications
Russell A. Hannen (Emeritus), electronic systems, control theory, stochastic processes
Lang Hong, stochastic control systems, computer vision, image processing and pattern recognition, robotics, multiple sensor integration and target tracking
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 microwave, 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
George R. Spalding, systems identification, robotics, dynamics and control
Kefu Xue, image processing and computer vision, stochastic processes and filtering, computer and communication systems, control and estimation theory

Admission

Students must satisfy the requirements of the School of Graduate Studies. International students must have a TOEFL score of at least 550. In addition, the basic requirement for admission to the Master of Science in Engineering program is a bachelor's degree in engineering or a related area with an overall undergraduate grade point average of at least 2.7 (on a 4.0 scale) or an overall undergraduate grade point average of at least 2.5 with a 3.0 or better for the last 90 quarter hours (60 semester hours) earned toward the undergraduate degree.

Facilities

Graduate students have access to a wide range of computer systems interconnected by local and wide-area networks. Access is available to three DEC Alpha AXP 4000/610's; numerous Sun, DEC, and Silicon Graphics fileservers 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

Research in electrical engineering includes the following areas: robotics and control systems, signal and image processing, power electronics, very large scale integrated (VLSI) circuits, 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. Related research in system identification, multisensor integration, multidimensional filter design, and computer integrated manufacturing is also being conducted.
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 design of research in radio frequency power conditioning circuits involving hybrid circuit technology and power electronics. VLSI research includes design of integrated circuits for signal processing and computer architecture using CMOS technologies as well as developing methods for built-in self-test of VLSI circuits. There is an associated research program in microelectromechanical systems (MEMS).

The research effort in microwaves and antennas is focused on CAD models for millimeter wave integrated circuits (MMIC); and, analytical and numerical techniques for arbitrarily shaped, high-frequency printed circuits and conformal antennas.

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.

Collaboration

The Dayton Area Graduate Studies Institute provides collaboration opportunities through the graduate engineering courses, faculty, and research resources of the Air Force Institute of Technology, the University of Dayton, The Ohio State University and the University of Cincinnati.

Graduate Assistantships

Assistantships are available to students on a competitive basis. Students awarded assistantship 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 should plan a program of study in consultation with a faculty advisor. The program of study should be finalized by the time the student completes 12 credit hours of graduate study.

The following requirements must be met for the Master of Science in Engineering degree with a major in electrical engineering:

1. Completion of 45 graduate credit hours (in courses numbered 600 or above) in a program of study approved by the Electrical Engineering department chair or the Electrical Engineering Graduate Program Director.
2. At least 23 of the total 45 graduate credit hours must have an EE (electrical engineering) prefix.
3. At least 24 of the 45 graduate credit hours must be courses numbered 700 or above. Of these 24, 700-level credit hours, at least 12 must have an EE prefix.
4. At least 6 of the total 45 graduate credit hours must be from courses in mathematics or statistics.
5. Students may choose either a thesis option or a 45 credit hours graduate course work option. Students employed as teaching or research assistants through the School of Graduate Studies must choose the thesis option. The thesis option consists of a research project satisfying all requirements of the School of Graduate Studies. The final report (thesis) must be completed and successfully defended in an oral examination before a faculty committee. Up to 12 credit hours of 899, Thesis, may count toward degree requirement of 45 graduate credit hours.

Engineering Ph.D. Program

The College of Engineering and Computer Science offers a graduate program leading to the Doctor of Philosophy (Ph.D.) degree in engineering.

The Ph.D. in engineering is an interdisciplinary program that involves the Departments of Electrical, Biomedical/Human Factors, and Mechanical/Materials Engineering. The Ph.D. in engineering is a nontraditional program because it is interdisciplinary and collaborative. The Ph.D. in engineering incorporates (1) an interdisciplinary core curriculum that spans the commonality of the various engineering fields involved; (2) both major and breadth course specialization areas; and (3) significant research in one of six focus areas. In addition, the program provides for substantial collaboration among several graduate engineering programs at five different institutions.
Participating Faculty
The program faculty at Wright State University reside in the College of Engineering and Computer Science. In addition, faculty from the Air Force Institute of Technology, the University of Dayton, The Ohio State University, and the University of Cincinnati also participate in the program.

Admission
Students must satisfy the requirements of the School of Graduate Studies. All applicants for the Ph.D. in engineering must submit scores on the quantitative and analytical parts of the Graduate Record Examinations (GRE). International students must have a TOEFL score of at least 550. The minimum admission requirements for the Ph.D. in engineering program are a B.S. from an ABET-accredited program, with a minimum 3.0 grade point average, or an M.S. from an engineering program, with a minimum 3.5 grade point average.

Facilities
Graduate students have access to a wide range of computer systems interconnected by local and wide-area networks. Access is available to three DEC Alpha AXP 4000/610's; numerous Sun, DEC, and Silicon Graphics fileservers 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
The Ph.D. program supports research in the following six focus areas: sensor signal and image processing; modern control and robotics; electronic and microwave circuits; processing and properties of high-temperature and lightweight materials; computational design and optimization; and human interaction with complex systems.

Collaboration
Wright State's Ph.D. in engineering does not narrowly define research focus areas as would normally be the case in traditional Ph.D. programs. While the program provides for doctoral research efforts in six focus areas, these areas are not intended as disciplinary boundaries; rather, they are intended to focus and help define research efforts across disciplinary boundaries in a way that exploits collaborative opportunities. The Dayton Area Graduate Studies Institute (DAGSI) provides collaboration opportunities through the graduate engineering courses, faculty, and research resources of the Air Force Institute of Technology (AFIT), the University of Dayton (UD), The Ohio State University (OSU) and the University of Cincinnati (UC). Students enrolled in Wright State's Ph.D. in engineering program are effectively considered resident students of both AFIT and UD. Additionally, WSU engineering Ph.D. students have the courses, faculty, and research resources of OSU and UC available to them on a transfer credit basis.

Graduate Assistantships
Assistantships are available to students on a competitive basis. Students awarded assistantship support are eligible for stipends and remission of tuition fees. Interest in financial support should be indicated at the time of application.

Degree Requirements
To obtain the Ph.D. degree in engineering, the student must complete an approved program of study containing at least 135 quarter graduate credit hours beyond the bachelor's degree in engineering, or equivalent degree or 90 quarter graduate credit hours beyond a master's degree in engineering. At least 30 of these credit hours must be for graduate course work beyond a master's degree.

General Requirements
1. Complete at least three courses from the following interdisciplinary core courses.
   EGR 701-4 Linear Systems
   EGR 702-4 Systems Engineering and Analysis
   EGR 703-4 Computational Engineering Analysis
   EGR 704-4 Design Optimization
   EGR 705-4 Design and Analysis of Engineering Experiments
2. Pass a written qualifying exam on three of the five interdisciplinary core courses.
3. Complete a major course specialization area of at least 24 credit hours of 700 level and above courses in electrical, mechanical, materials, biomedical, or human factors engineering, or a focus area.
4. Complete a breadth course specialization area of at least 12 credit hours outside of the major program area.
5. Complete at least 8 hours of graduate credit in mathematics (MTH) or statistics (SIT) courses. A minimum of 4 hours of graduate mathematics or statistics courses is required for students entering the program with a master's degree.
6. Complete 6 credit hours of seminar courses.
7. Complete at least 12 credit hours of course work in the focus area selected for the dissertation research. **Note:** This requirement might not involve additional hours since these hours could be included in the major or breadth requirements.
8. Satisfy the collaboration requirement. At least 10 percent of the courses in a student’s program of study will come from other Dayton Area Graduate Studies Institute (DAGSI) member institutions unless waived by the DAGSI Operating Committee at the request of the student.
9. Satisfactorily complete a candidacy exam and research proposal defense as defined and judged by the student’s dissertation committee. The dissertation research must fall into one of the following areas of focus: Sensor signal and image processing, Modern control and robotics, Electronic and microwave circuits, Processing and properties of high temperature/lightweight materials, Computational design and optimization, Human interactions with complex systems.
10. Complete at least 45 credit hours of dissertation research and submit a doctoral dissertation. A maximum of 60 credit hours of dissertation research may be applied toward fulfilling the degree requirements.
11. Submit at least one substantial, original paper based on the dissertation research to a refereed, archival journal before approval is granted for the final defense of the dissertation.
12. Successfully defend the doctoral dissertation as judged by the student’s dissertation committee.

**Dissertation Committee Composition**

1. The committee will have a minimum of five graduate faculty and be approved by the dean of the Graduate School and the dean of the College of Engineering and Computer Science.
2. The committee will have a least one member from the graduate faculty of one of the four collaborating partner institutions (University of Dayton, Air Force Institute of Technology, University of Cincinnati, Ohio State University).
3. The chair of the dissertation committee must be a doctoral qualified member of the WSU graduate faculty.
4. WSU graduate faculty must constitute a majority of the committee’s membership.

**Elementary Education**

See Education and Human Services

**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 college English teachers, ESL specialists, professional writers, and predoctoral students. The program is structured around work in language, literature, and writing. Courses are regularly available in the standard areas of literature, linguistics, composition/rhetoric, professional writing, and gender studies, as well as in nontraditional and interdisciplinary studies. Elective options allow students to design programs to meet their educational goals. In addition to the course and thesis options, special options allow students to combine courses in literature or language with work in creative writing, professional writing, technical writing, women’s studies, or the teaching of writing and literature. The program in TESOL (Teaching English to Speakers of Other Languages), which includes linguistics and which may be pursued as an option, as a validation for certified public school teachers, or as a concentration in itself, prepares students to teach English to nonnative speakers. Interdisciplinary options allow work in programs like reading, communications, religion studies, or history. Internships within the various options prepare students for professional writing careers, for college teaching, or for positions in special collections, archives, and libraries by offering on-the-job experience at appropriate sites. Full-time or part-time study is possible.

**The Graduate Faculty**

**Professors**

William D. Baker (Emeritus), American literature, creative writing
Peter S. Bracher (Emeritus), Victorian literature, English novel
Eugene B. Cantelupe (Emeritus), Renaissance literature, iconography
Norman R. Cary, world literature in English, non-Western literature
Robert M. Correale, Chaucer, Middle English 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 3.2 or better (on a 4.0 scale), or five appropriate upper-division courses in English with an average of 3.5 or better in those classes. Applicants must also present an academic paper on a subject in English using secondary sources and an overall undergraduate grade point average of 3.0 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 3.0 and 2.7 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 on the Test of Spoken English of 250 or above (old test) or 55 or above (new test); the Test of Spoken English can be taken on the same date as the TOEFL test.

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 (old test) or 60 (new test) on the Test of Spoken English.

Degree Requirements
The master's program in English comprises three concentrations. The concentration 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 concentration in composition and rhetoric provides training in writing theory and pedagogy. The concentration in TESOL provides those who wish to teach ESL with thorough grounding in linguistics, language acquisition theory, and classroom practice. To meet these goals, the program uses 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 concentration in literature are required to take both ENG 701 and 702; all students in the concentration in composition and rhetoric and the concentration in TESOL 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 submit a graduate portfolio.

Program of Study: Concentration in Literature

Core Courses 8
ENG 701 Methods and Materials of Research in Literature 4
ENG 702 History of Literary Criticism 4

Additional Courses 20
Five 700-level courses, at least three of which must be seminars: ENG 720, 730, 740, 750, 760 (prerequisite ENG 701)

Elective Options (see below) 20–22

Total 48–50

Program of Study: Concentration in Composition and Rhetoric

Core Courses 8
ENG 700 Methods and Materials of Research in Writing and Language 4
ENG 711 Rhetoric 4

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

Program of Study: Concentration in TESOL

Core Courses 8
ENG 700 Methods and Materials of Research in Writing and Language 4
ENG 711 Rhetoric 4

Additional Courses 20
ENG 770 Issues in ESL Listening and Speaking 4
ENG 780 Issues in ESL Reading and Writing 4
Three additional 700-level courses in writing and language, at least one of which must be a seminar 12
Option in TESOL (see page 110)  24

Total  52

**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

COM 741 Principles and Application of Communication Theory
COM 643 Interviewing
COM 647 Organizational Communication
COM 651 Communication Consulting and Training

**Elective(s)**  4–6

One or two 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**  16

COM 741 Principles and Application of Communication Theory
COM 654 Feature Story Writing
COM 658 Editing for the Media
COM 662 Mass Media Law and Regulation

**Elective(s)**  4–6

One or two 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**  4

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:  4–6

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 692 or 693 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
MBA 551 Survey of Management
OR MKT 720 Service and Nonprofit Organization Marketing  2–3
One of the following: LCS 621 Cataloging; LCS 635 or 649 Instructional Materials; LCS 740 History of Books and Printing; MBA 511 or MBA 531 Graduate Survey of Accounting 4

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: 2
MBA 541 Graduate Survey of Law and the Legal Environment
MBA 551 Graduate Survey in Management
MBA 571, 572, 573 Introduction to Management Information Systems
MBA 561 Graduate Survey in Marketing
ENG 795 Internship and Apprenticeship 4

Women's Studies Option
ENG 720 Women's Studies through Literature 4
Four or five more graduate-level courses in English or other disciplines chosen from the list of approved graduate-level courses for WMS available from the director of Women's Studies. Four to eight credit hours of ENG 799 Thesis may substitute for two to three of these courses provided the thesis is focused on topics relevant to Women's Studies. 16

TESOL (Teaching English as a Second Language) Option*
ENG 681 Theory of ESL 4
ENG 682 Grammatical Structures of English 4
ENG 683 Sociolinguistics 4
ENG 684 Studies in English Education: TESOL Methods and Materials 4
ENG 660 Practicum 2–4
(Students taking the TESOL Option as part of the concentration in TESOL must take the Practicum for 4 hours)
One of the following courses: 4
ENG 685 ESL in the K–12 Classroom
ENG 679 History of the English Language
ENG 670 Studies in World Literature

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

Graduate Portfolio
During the last quarter in the program, a candidate for a degree must submit a portfolio that includes a cover essay, an original paper from each of four courses taken during the candidate's graduate study, and an independent paper.

Details concerning the portfolio are available from the Department of English.

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.

Environmental Sciences
Reflecting its commitment to the environment, the university in 1994 established the Institute for Environmental Quality. The mission of the Institute is to oversee the environmental courses, research, and outreach activities that serve the diverse interests of Wright State graduate students, as well as undergraduate students and the community at large. Institute staff work closely with faculty in the Departments of Biological Sciences, Chemistry, and Geological Sciences, to ensure that WSU environmental programs are current, stimulating, interdisciplinary, and career directed. A graduate student in the Departments of Biological Sciences, Chemistry, or Geological Sciences can elect to pursue an environmental sciences concentration within the home department. See individual departmental listings for specifics.

Finance, Insurance, and Real Estate
See Business and Administration
Geological Sciences

The Department of Geological Sciences offers two master's degree programs—the Master of Science and Master of Science in Teaching (earth science). The Master of Science program prepares students for careers as professional geoscientists in industry, government, or education, or for continued graduate study. Current program concentrations in geological sciences, geophysics, environmental geology, environmental sciences, hydrogeology, and petroleum geology are available. The department maintains a strong emphasis on practical field applications, a distinction nationally recognized. The Master of Science in Teaching (earth science) program is designed for teachers seeking to add earth science to an existing certification, individuals wishing to teach junior college, or individuals leading workshops in earth and environmental sciences. A nonthesis option is available for individuals seeking to gain expertise in another field who already have a M.S. or Ph.D. degree in science or engineering from an accredited university, and who have completed a research thesis or dissertation.

The Graduate Faculty

Professors

C. Bryan Gregor, geochemical cycles, massage distribution of sediments
Byron F. Kulander (chair), structural geology, geophysics
Paul Pushkar, isotope geochemistry, igneous and metamorphic petrology, field geology
Benjamin H. Richard, field geology, exploration geophysics
Raphael Unrug, basin analysis, tectonics
Paul J. Wolfe, exploration geophysics

Associate Professor

Cindy Carney, carbonate petrology, carbonate sedimentology, diagenesis
Songlin Cheng, hydrogeochemistry, isotope hydrology, geographic information systems
David Dominic, clastic sedimentology, stratigraphy
Robert W. Ritzi Jr., hydrogeology, hydrogeological modeling

Assistant Professors

Abinash Agrawal, contaminant hydrogeology, site remediation
Ernest C. Hauser, near surface geophysics, subsurface imaging
William Slattery, teacher education, sequence stratigraphy

Admissions

A candidate for the Master of Science degree (geological sciences) must possess a Bachelor of Science degree from a recognized institution and is expected to have completed an appropriate geology field course. A candidate for the Master of Science in Teaching degree (earth science) must possess a Bachelor of Arts or Bachelor of Science degree from a recognized institution.

Facilities and Research

The Department of Geological Sciences is housed in the Brehm Laboratory. Department facilities include 12 teaching and research laboratories and a wide variety of specialized facilities. The department's research facilities and equipment are outstanding and lend critical support to its applied programs.

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 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, Zeiss universal microscopes, and several student model microscopes. A Logitech thin-sectioning machine and facilities for mineral separations are available. The geochemistry laboratory has complete facilities for analysis of geological materials using chromatographic and atomic absorption 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 sedimentology and sedimentary petrology laboratory is equipped with an ISI scanning electron microscope (shared with the Department of Mechanical Engineering), a Wild stereo microscope with drawing attachment, Nuclide Cathodoluminescence Luminoscope, Zeiss Universal R Pol petrographic microscopes, Nikon 35mm macrophotography equipment, an interactive video-computer microscope system, UV luminescence equipment, complete darkroom facilities, an air abrasive unit, and the petrologic equipment listed previously. Both PC- and Macintosh-based software are 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 the study of Blue Ridge turbidites in Tennessee, Mississippian oolitic limestones in the central Appalachian Basin, Pleistocene and Holocene carbonate rocks and sediments in...
the Bahamas, facies analysis of Paleozoic fluvial sandstones as well as Pleistocene glacial sediments, and the quantitative modeling of sedimentary structures, textures, and facies distributions.

Several laboratories serve the needs of hydrogeology and environmental geology. The field laboratory supports equipment for sampling or in situ determination of both the physical and the chemical properties of hydrogeologic systems, including drilling rigs with numerous support vehicles, sample extraction apparatus, in situ sampling probes with automated digital data acquisition systems, and downhole geophysical logging tools. Two field sites with dedicated hydrogeological monitoring equipment are maintained. Through the hydrogeochemistry laboratories, access is possible to a complete line of analytical instrumentation for the analysis of aqueous chemical parameters, including ion chromatography, VIS/UV spectrophotometry, AA spectrophotometry, gas chromatography, and facilities and vacuum extraction lines for stable isotope sample processing. An organic geochemistry lab is equipped with the latest Hewlett-Packard 6890 series gas chromatograph, a Hewlett-Packard 6890 series automatic sampler, managed by a HP VI.3 pentium computer system and HP GC Chemstation software.

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, organic contaminant fate and transport, insular water resource planning and management, ground-water buffering of acid precipitation, acid-mine drainage, hydrogeology and diagenesis of carbonates, non-point source pollution (Sycamore Farms Experimental Watershed), wetland hydrogeology and hydrogeochemistry, hydraulic 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 facilities and equipment supporting the geophysics concentration include a 120-channel truck-mounted seismic reflection system, a Geophysical work station for seismic modeling, a Sun SPARCstation for seismic data processing and interpretation, three gravity meters (LaCoste-Romberg and Worden), a magnetic gradiometer system, a ground-penetrating radar system, a resistivity meter, a 36-channel engineering seismograph, an elastic wave generator, and a precision GPS survey system and ProMAX seismic processing software.

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 other computers, linked to the IBM and VAX mainframes on campus, are available for running applications programs and data storage.

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
Graduate teaching assistantships, graduate assistantships, and several industry-funded research fellowships, all carrying fee remissions, are awarded. Additional research assistantships connected with supported research projects and research contracts are also available. Tutoring positions in the nonresidential IRIS 5 program are another funding opportunity for graduate studies.

Degree Requirements
Master of Science in Geological Sciences
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 45 or more graduate credit hours apportioned in the following way: at least 9 hours of thesis credit and at least 36 additional hours of graduate credit in an instructional program approved by the candidate's graduate committee, including colloquia or seminars as required by the department.

2. Submission of an approved thesis based on original research.

3. Satisfactory performance in a final thesis defense near the end of the degree program.

Individual programs of study tailor course work, seminars, and research guided by faculty to the professional and educational goals of each student. Each graduate student is advised by a committee of three faculty members. Ultimate responsibility for fulfilling all requirements rests with the student.
Environmental Sciences

The Environmental Sciences concentration was developed by the College of Science and Mathematics to promote interdisciplinary research. Students working toward an M.S. degree in the Department of Geological Sciences under this concentration are required to complete 45 graduate quarter hours, including environmental sciences core courses and additional geology and supporting science courses. A student in the Department of Geological Sciences can elect to pursue an environmental sciences concentration that combines courses and research in geology, biology, and chemistry. When selecting this option, a student's advisory committee includes a member from outside the department, e.g., a member of the biology or chemistry faculty. And, in addition to meeting the general requirements for the Master of Science degree in geological sciences, course requirements for the environmental core include:

- Environmental chemistry
- Geologic and environmental applications of geographic information systems
- Environmental statistics
- Risk assessment
- Environmental sciences seminar
- Two environmental sciences electives outside the geological sciences department

Master of Science in Teaching (Earth Science)

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, 9 hours of geology field-based courses, and additional graduate courses approved by the student's graduate committee to fulfill the credit hour requirement

2. Submission 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 geological sciences faculty members and one education faculty member who are responsible for advice concerning the academic program including the research project, and the number of education courses, and the selection of other courses to fulfill candidacy requirements. For instance, students may elect to pursue an environmental sciences concentration by taking a suite of environmental sciences courses. Ultimate responsibility for fulfilling all requirements rests with the student.

Graduate School Achievement Program for Older Adults

For information, contact the School of Graduate Studies, 106 Gelman Hall, (937) 775-2976. wsugrad@wright.edu

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 (Emeritus), Ohio, Civil War
Jacob H. Dorn, United States: twentieth century, intellectual and religious
Edward F. Haas, United States: South, urban and public history, Civil War, twentieth century
Allan Spetter, United States: diplomatic
Associate Professors
Martin Arbarg, Roman, Medieval, and Byzantine
Susan B. Carrafiello, modern Europe, Italy
Barbara Green, United States: African American, South, and Reconstruction
Paul D. Lockhart, early modern Europe, Scandinavia
Edgar Melton, Russia
Robert Sumser, modern Europe, intellectual, Germany
Roy L. Vice, Reformation, Germany
Tsing Yuan, East Asia
Assistant Professors
Donna Amoroso, Southeast Asia, European imperialism
Nancy Garner, United States: women’s, West
John Sherman, Latin America, Mexico
Harvey M. Wechtell (chair), United States: colonial, revolutionary, and Ohio history

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 3.0 overall). Each candidate shall also include a statement of goals, three letters of recommendation, and the results of the Graduate Record Examination. 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. The Thesis Plan 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. The Examination Plan is intended primarily, but not exclusively, for students not expecting to pursue doctoral studies. The Public History Plan 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.

Thesis Plan Program of Study
Students must meet all requirements of the School of Graduate Studies, show a reading knowledge of a foreign language when deemed necessary for thesis research, and successfully complete HST 799.

Two fields of concentration must be selected, totaling 36 hours, 20 hours of which must be 700-level course work. In addition, each student will take 16 hours of HST 799 (thesis). Each field of concentration consists of a minimum of four courses, and students must take a minimum of two 700-level and two 600-level courses in each of their fields of concentration. The possible fields 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. Third World
History Courses Numbered 700 to 709 20

History Courses Numbered 600 16

Students must seek the advice and consent of the departmental graduate advisor or chair before taking course work outside of the department.

History 799 Thesis 16

Students will be required to demonstrate a reading knowledge of a foreign language if, in the opinion of the thesis advisor, such knowledge will be necessary for thesis research. Students will also be required to defend their thesis in an oral examination.

*Students entering the Thesis Plan Program who have not had a research methods course or its equivalent at the undergraduate level will be required to take HST 700 (Historical Methods) in lieu of 4.0 hours of HST 799.

Total 52

Examination Plan Program of Study

Students must meet all requirements of the School of Graduate Studies.

Two fields of concentration must be selected, totaling 52 hours, 24 hours of which must be 700-level course work. Each field of concentration should consist of a minimum of three 700-level and two 600-level courses. The possible fields of concentration are as follows:

1. United States to 1865
2. United States since 1865
3. Ancient, Medieval, and Early Modern European
4. Modern European
5. Third World

Total 52

History Courses Numbered 700 to 709 24

History Courses Numbered 600 28

Students must seek the advice and consent of the departmental graduate advisor or chair before taking course work outside their fields of concentration.

Written Comprehensive Examination

The student will be examined on the two fields of concentration. The examination will be given during the seventh week of a quarter designated by student and graduate advisor.

Total 52

Public History Plan Program of Study

Students must fulfill the requirements of the School of Graduate Studies and successfully complete the following curriculum.

Professional Core 26

HST 710, 714 Archival Administration 6
HST 712, 713 Historical Administration 8
HST 715 Internship and Report 5
HST 720 Project 1
HST 727 Introduction to Public History 4
HST 730 Archival Preservation 1
HST 740 Archival Automation 1

History Core 24

Seminars in U.S. history 12
600-level U.S. history courses* 12

*Students entering the Public History Plan Program who have not had a research methods course or its equivalent at the undergraduate level will be required to take HST 700 (Historical Methods) in lieu of 4.0 hours of 600-level U.S. history courses.

Electives 6–8

Students may select from the courses listed below and from any additional courses with the consent of the Public History Advisor.

HST 711 State and Local History
HST 716 American Architectural History
HST 717 Practicum
MBA 511, 531 Graduate Survey of Accounting
ART 610 Studies in American Art
ART 697 Museology and Gallery Management

Total 56–58

Human Factors and Industrial/Organizational Psychology

See Psychology

Human Factors Engineering

The Department of Biomedical and Human Factors Engineering offers a program of graduate study leading to a Master of Science in Engineering (M.S.E.) degree with a major in human factors engineering. The M.S.E. program is broad in scope and emphasizes portable concepts in the design and analysis of complex physical systems using modeling, synthesis, and optimization techniques, and bridges interdisciplinary engineering areas such as controls, robotics, electronics, and communica-
tions. A Ph.D. in engineering with a major in human factors engineering is also available. For details see Engineering Ph.D. program.

The Graduate Faculty

Professors
Rick Koubek (chair), product usability, human-computer interaction, training, human aspects of manufacturing
Chandler Phillips, mathematical modeling of biomechanics, fuzzy decision making in rehabilitation, functional electrical stimulation
Malcolm L. Ritchie (Emeritus), human factors engineering, engineering psychology

Associate Professors
Jennie Gallimore, visualization, virtual environments, spatial orientation, adaptive displays

Assistant Professors
S. Narayanan, modeling and simulation of complex technological systems, cognition, computational representation, interactive systems
Xudong Zhang, occupational biomechanics, computer-aided ergonomics, ergonomics

Admission
Students must satisfy the requirements of the School of Graduate Studies. International students must have a TOEFL score of at least 550. In addition, the basic requirement for admission to the Master of Science in Engineering program is a bachelor's degree in engineering or a related area with an overall undergraduate grade point average of at least 2.7 (on a 4.0 scale) or an overall undergraduate grade point average of least 2.5 with an average of 3.0 or better for the last 90 quarter hours (60 semester hours) earned toward the undergraduate degree.

Research
Faculty research interests focus on three primary areas. Typical activities within these areas include:

Ergonomics and Occupational Biomechanics
- Biomechanical modeling in the context of human-machine system design
- Analysis and modeling of human movement, including kinematics and underlying strategy
- Computer-aided ergonomics and biomechanical analysis

Human-Computer Interaction, Systems Modeling, and Usability
- Integration of interactive optimization and object-based simulation for logistics systems analysis
- Design of information retrieval systems using cognitive modeling techniques
- Modeling enterprise information consumption
- Aiding information synthesis using integrated learning techniques
- Development of a model for implementing usability early in the design process
- Study of engineering design process when collaborating over distances
- Creating a model for predicting skill requirements of advanced manufacturing personnel

Interactive Visualization
- Visual information presentation
- Three-dimensional displays
- Spatial orientation and optokinetic collic reflex
- Virtual environments
- Adaptive displays
- Display measurement

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.

Collaboration
The Dayton Area Graduate Studies Institute provides collaboration opportunities through the graduate engineering courses, faculty, and research resources of the Air Force Institute of Technology, the University of Dayton, The Ohio State University and the University of Cincinnati.
Graduate Assistantships

Assistantships are available to students on a competitive basis. Students awarded assistantship 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 should plan a program of study in consultation with a faculty advisor. The program of study should be finalized by the time the student completes 12 credit hours of graduate study.

The following requirements must be met for the Master of Science in Engineering degree:

1. Completion of 45 graduate credit hours in courses that have prior approval by an 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. 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.

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 science.

Course Option: Students must complete 12 credit hours of courses numbered 700 or above in addition to the 12 hours specified in requirement 3.

Humanities

The Master of Humanities program in the College of Liberal Arts provides opportunities for interdisciplinary study for students who wish to pursue individually designed curricula in the humanities. Study leads to a Master of Humanities (M.Hum.) degree.

The program's primary goal is scholarly, intellectual development, and thus serves diverse personal and professional needs. High school teachers who want a content-emphasis graduate degree, persons who seek a career change or a post-retirement graduate degree, and persons who seek a second master's degree in a complementary or even a contrasting field are among the many people who may find this program uniquely suited to their needs. Graduates of specialized undergraduate programs may welcome the breadth provided by this master's degree. Part-time study is the norm; full-time study is also possible.

At the core of the program are three seminars that introduce students to the scope and methodologies of and scholarly research in the humanities. In cooperation with the program director, students design a personal program of study to meet their individual academic goals. The program thus has both a specific focus on the humanities and wide flexibility within the broad curriculum of the College of Liberal Arts. While anchored in the humanities, the program encourages selection of courses from supplemental areas of study.

The range of possible programs of study is intentionally wide. A student might choose to study the role of music in African American culture, or the status of women in American religion. Another student might study the history of international politics or the interrelation of art and philosophy in modern German (or French) culture. One might study the politics and rhetoric of Cicero. Students are encouraged to take advantage of specialized programs in the university. Students interested in topics in women's studies, for example, may take advantage of the resources of the Women's Studies program.

A program handbook detailing policies and requirements is available upon request in the Humanities Office. The program handbook and additional information about the program are available electronically at: http://philos.wright.edu/hum/hum.html.

The Graduate Faculty

Participating faculty are drawn from departments throughout the College of Liberal Arts. A list of affiliated faculty and their respective areas of expertise is available upon request in the Humanities Office, and from the internet address listed in the paragraph above.

Director

Charles S. Taylor, professor of philosophy
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 who have deficiencies in their undergraduate work may be asked to take additional courses.

Additionally, all prospective students are asked to submit an essay containing the following: 1) a description of their academic background both within the humanities and beyond, 2) a description of their professional background, 3) an explanation of their reasons for pursuing a graduate degree, and 4) an explanation of why they wish to pursue graduate study in the humanities.

Students who do not meet requirements for regular admission may be admitted to the program on conditional status.

A maximum of three courses, normally not to exceed 12 quarter hours of credit, may 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, all students should consult at least once each term with the director. In consultation with the director, students will select courses consistent with their programs of study, develop preliminary ideas for their capstone projects, and choose faculty to direct those projects.

Financial Assistance

The university 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 is designed primarily 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 students who must balance graduate education with the demands of a full-time job.

International Business

See Business and Administration

Logistics Management

See Business and Administration

Management

See Business and Administration

Management Information Systems

See Business and Administration

Marketing

See Business and Administration
Materials Science and Engineering

The Department of Mechanical and Materials Engineering offers a program of graduate study leading to a Master of Science in Engineering (M.S.E.) degree with a major in materials engineering. The M.S.E. program is broad in scope and emphasizes portable concepts in the design and analysis of complex physical systems using modeling, synthesis, and optimization techniques, and bridges interdisciplinary engineering areas such as controls, robotics, electronics, and communications. A Ph.D. in engineering with a major in materials engineering is also available. For details see Engineering Ph.D. Program.

The Graduate Faculty

Professors
Joseph F. Thomas Jr., materials engineering, mechanical behavior
Isaac Weiss, materials engineering, thermomechanical processing, powder metallurgy

Associate Professors
Richard J. Bethke (chair), signal and systems modeling, analysis and control, stochastic processes
Raghuveer Srinivasan, materials engineering, high-temperature deformation, materials behavior modeling

Assistant Professors
Maher S. Amer, Raman spectroscopy, polymers, composites, micromechanics of multi-phase materials
Sharmila Mukhopadhyay, composites, surface engineering, high temperature electronic devices

Admission
Students must satisfy the requirements of the School of Graduate Studies. International students must have a TOEFL score of at least 550. In addition, the basic requirement for admission to the Master of Science in Engineering program is a bachelor's degree in engineering or a related area with an overall undergraduate grade point average of at least 2.7 (on a 4.0 scale) or an overall undergraduate grade point average of least 2.5 with an average of 3.0 or better for the last 90 quarter hours (60 semester hours) earned toward the undergraduate degree.

Facilities
Graduate students have access to a wide range of computer systems interconnected by local and wide-area networks. Access is available to three DEC Alpha AXP 4000/610's; numerous Sun, DEC, and Silicon Graphics 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
Research in materials engineering emphasizes processing, development, and utilization of metals, ceramics, polymers, and composites. Current programs include studies of ceramics and ceramic composites, intermetallics, nickel- and titanium-based alloys, carbon-carbon and carbon-epoxy composites and polymers. There are several high-temperature mechanical testing facilities, a thermogravimetric apparatus, an ultra-high temperature furnace for studying equilibrium and chemical reactions of ceramics, and scanning and transmission electron microscopes. Related facilities for metallography, microscopy, heat treatments, mechanical testing, and data acquisition are excellent.

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.

Collaboration
The Dayton Area Graduate Studies Institute provides collaboration opportunities through the graduate engineering courses, faculty, and research resources of the Air Force Institute of Technology, the University of Dayton, The Ohio State University, and the University of Cincinnati.

Graduate Assistantships
Assistantships are available to students on a competitive basis. Students awarded assistantship 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 should plan a program of study in consultation with a faculty advisor. The program of study should be finalized by the time the student completes 12 credit hours of graduate study.
The following requirements must be met for the Master of Science in Engineering degree:

1. Completion of 45 graduate credit hours in courses that have prior approval by an 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. 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.

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 science.

Course Option: Students must complete 12 credit hours of courses numbered 700 or above in addition to the 12 hours specified in requirement 3.

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 concentrations are available: mathematics and applied mathematics. The mathematics concentration is designed for students with an undergraduate degree in mathematics or the equivalent. The applied mathematics concentration is designed not only for persons with undergraduate training in mathematics but also for those with degrees in related disciplines, such as engineering and science, 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
K. T. Arasu, combinatorics
Joanne M. Dombrowski, functional analysis
Anthony B. Evans, finite geometry, graph theory
Gerd H. Fricke, complex analysis
Tapas Mazumdar, partial differential equations (abstract methods)
Terry A. McKee, graph theory, logic
Steen Pedersen, operator theory
Manley Perkel, algebra, combinatorics
Edgar A. Rutter (chair), algebra

Associate Professors
Robert Craighead, complex analysis
Ann M. Farrell, mathematics education
Lop-Fat Ho, optimal control, duality theory
Xiang-Dong Hou, algebra, coding theory
Alexander J. Kaplan, functional analysis
Phan Loi, operator theory
Guozhen Lu, Fourier analysis
Richard Mercer, operator algebras, mathematical physics
David F. Miller, optimization
Thomas P. Svobodny, applied mathematics
Larry Turyn, differential equations, applied analysis
James T. Vance Jr., Fourier analysis

Assistant Professors
Chaocheng Huang, partial differential equations
Alex Iosevich, harmonic analysis
Renée Koplon, systems and control theory
Susann Mathews, mathematics education
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 program of study. The specific undergraduate requirements, appropriate for the intended they prepare, 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 six 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.

Applicants should inquire about the availability of tuition fellowships. (See fellowships and financial aid).

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 a career 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 Concentration

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 quarter hours (14 semester 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 Concentration

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 for those who have completed a bachelor's degree in engineering, science, mathematics, or statistics, and 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 16

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

Group I


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


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

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. Students should contact the Department of Mathematics and Statistics for possible alternative programs for the applied mathematics concentration.

Mechanical Engineering

The Department of Mechanical and Materials Engineering offers a program of graduate study leading to a Master of Science in Engineering (M.S.E.) degree with a major in mechanical engineering. The M.S.E. program is broad in scope and emphasizes portable concepts in the design and analysis of complex physical systems using modeling, synthesis, and optimization techniques, and bridges interdisciplinary engineering areas such as controls, robotics, electronics, and communications. A Ph.D. in engineering with a major in mechanical engineering is also available. For details see Engineering Ph.D. program.
The Graduate Faculty

Professors
Parviz Dadras, solid mechanics, manufacturing processes, carbon-carbon composites
Ramana Grandhi, structural optimization, finite element methods, mechanical vibrations
Wilbur L. Hankey (Emeritus), computational fluid dynamics, aerodynamics, aerothermodynamics

Associate Professors
Richard J. Bethke (chair), signal and systems modeling, analysis and control, stochastic processes
Kenneth C. Cornelius, fluid mechanics, turbulent flow
Junghsen Lieh, dynamics and controls of mechanical systems

Assistant Professors
Billy W. Friar (Emeritus), thermodynamics, heat transfer, fluid mechanics
James A. Menart, thermal sciences, heat transfer
Joseph C. Slater, structure dynamics and control
Scott K. Thomas, heat and mass transfer, fluid mechanics and analysis
J. Mitch Wolff, fluid mechanics, computational fluid dynamics, unsteady aerodynamics

Research
Research in mechanical engineering spans several exciting areas. There is a large program in design optimization addressing large structures, die shapes, flight trajectories, and other applications. Work is also being done in structural dynamics areas including vehicle suspensions and turbine blades. Mechanical design studies include the characterization of carbon-carbon composites. Fluid dynamics research is being conducted both experimentally and via computer computation (CFD). Projects include study of flows in turbine engines and reciprocating compressors. There is also a large thermal science program in the analysis and application of heat pipes and related devices.

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.

Collaboration
The Dayton Area Graduate Studies Institute provides collaboration opportunities through the graduate engineering courses, faculty, and research resources of the Air Force Institute of Technology, the University of Dayton, The Ohio State University and the University of Cincinnati.

Graduate Assistantships
Assistantships are available to students on a competitive basis. Students awarded assistantship 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 should plan a program of study in consultation with a faculty advisor. The program of study should be finalized by the time the student completes 12 credit hours of graduate study.

The following requirements must be met for the Master of Science in Engineering degree:

1. Completion of 45 graduate credit hours in courses that have prior approval by an 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.

Admission
Students must satisfy the requirements of the School of Graduate Studies. International students must have a TOEFL score of at least 550. In addition, the basic requirement for admission to the Master of Science in Engineering program is a bachelor’s degree in engineering or a related area with an overall undergraduate grade point average of at least 2.7 (on a 4.0 scale) or an overall undergraduate grade point average of at least 2.5 with an average of 3.0 or better for the last 90 quarter hours (60 semester hours) earned toward the undergraduate degree.

Facilities
Graduate students have access to a wide range of computer systems interconnected by local and wide-area networks. Access is available to three DEC Alpha AXP 4000/610's; numerous Sun, DEC, and Silicon Graphics workstations; X-windowing terminals; and personal computers. Access is also available to the Ohio Supercomputer via the Ohio Academic and Research Network (OARNET).
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. 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.

**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 science.

**Course Option:** Students must complete 12 credit hours of courses numbered 700 or above in addition to the 12 hours specified in requirement 3.

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**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 specialization 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 either a research-based or literature-based thesis. Candidates are required to obtain a major advisor and an advisory committee. For the research-based thesis, 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). For the literature-based thesis, the advisory committee will select the additional courses required to fulfill the 45 credit hour limit. 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.

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**The Graduate Faculty**

**Microbiology and Immunology**

**Professors**

- Larry G. Arlian, immunoparasitology, medical entomology
- Nancy J. Bigley, immunology
- David J. Giron, virology
- Neal S. Rote (chair), immunology
- Harold F. Stills, laboratory animal medicine, bacterial pathogenesis

**Assistant Professors**

- Mark S. Chandler, bacterial genetics and molecular biology
- Pamela S. Fink, bacterial genetics and molecular biology
- Dawn P. Wooley, retroviral replication

**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, flow cytometry, electroporator, PCR thermocoupler, Laminar flow safety cabinets, 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 6 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

Professor

Leland D. Bland, music theory, music history and literature

Associate Professors

Henry N. Dahiman, music education, music history and literature
Charles S. Larkowski, musicology, music history and literature
Jackson Leung, musicology, music history and literature, applied piano
Sharon H. Nelson (interim chair), music education
Karl Sievers, applied trumpet
James W. Tipps, music education

Assistant Professors

David M. Booth, instrumental conducting, music education
Brenda Ellis, music education
Randall S. Paul, music education, applied clarinet/saxophone
Kimberly J. Warrick, applied voice

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.

Students not holding a standard teaching license may also be required to earn Ohio licensure.

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 the *Wright State University Graduate Studies in Music*, a student handbook which 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.

**Nursing**

The College of Nursing and Health offers a graduate program leading to a Master of Science degree with a major in nursing and a dual degree program leading to a Master of Science and a Master of Business Administration in administration of nursing and health care systems. A third program enables the registered nurse student with a bachelor's degree in a traditional discipline outside of nursing to enroll in a bridge program.
leading to one of the master’s degrees listed above. The program prepares nurses for advanced leadership roles in practice, and administration, as well as for doctoral study in nursing. The curriculum offers students the opportunity to individualize the nursing major by selecting from concentrations in client systems, areas of clinical specialization, and roles (clinical specialist, family nurse practitioner, or nurse administrator). Please note: Applications for the nursing education concentration will be accepted only through fall quarter 1998. Nurses already possessing a master’s degree with a major in nursing may earn a second M.S. degree in nursing with a concentration in Family Nurse Practitioner. The programs accommodate 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 or two calendar years, depending on the major. Part-time students must complete all requirements for the degree within five years.

The Graduate Faculty

Professors
Jane C. Swart (dean), administration, research, nursing education, vulnerable populations, gerontology
Susan G.-traeger, school nursing, adolescent health, nursing education, maternal-child nursing

Associate Professors
Donna Miles Curry, pediatric nursing, family nursing, infant development
Barbara Fowler, community health, adolescent health, nursing education, health policy, cultural diversity, vulnerable populations
Margaret Clark Graham, family nurse practitioner, community health
Beth Lipp, pediatrics, adolescent health, heart disease prevention
Patricia Martin, maternal-child, community health, organizational behavior, research environments, evaluation
Virginia Nehring, theory construction, research methodologies, community health, nursing education

Assistant Professors
Janice Belcher, psychiatric nursing, nursing informatics, nursing administration
Janet Fulton, adult health, oncology, IV therapy, home care, research, theory, health policy
Barbara O’Brien, child psychiatric nursing, family nursing, theory, research, health policy

Kristine Scordo, intensive care, cardiac intensive care, cardiac rehabilitation, research, theory
Patricia Vermeersch, gerontology, nursing research and instrument development

Admission

The College of Nursing and Health 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 traditional discipline 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 course work in the major.
- Taken the Graduate Record Examination (GRE). Applicants for the M.S./M.B.A. dual degree program need only the GMAT as required by the College of Business and Administration.
- Submission of a goal statement with application to the program.
- Complete a statistics course, required on admission or prior to enrollment in NUR 707.
- Completed or documented expertise in physical/health assessment, required on admission.
- Computer literacy.
- Evidence of registered nurse licensure in Ohio is required on admission to the program.
- Evidence of liability insurance, health insurance, CPR certification, and other necessary health information as required by clinical agencies, prior to clinical courses and practica.

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

The college has a rolling admission policy to provide flexibility for students wishing to start in any quarter. Family Nurse Practitioner concentration has a deadline of February 1.

Facilities

The College of Nursing and Health is currently housed on the fourth floor of Allyn Hall. The college will be moving to a new academic facility around January 1999. 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 College of Nursing and Health also owns a Mobile Health Unit which serves as a health assessment and education center.

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

Degree Requirements

The 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 administration of nursing and health care systems would select organizational systems. Students who select clinical systems choose a client focus with individuals or community. Current available clinical specialties include adult health and illness, child/adolescent health, community health nursing, and the family nurse practitioner program. (Call the College of Nursing and Health 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 a minimum 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

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*Students in the Family Nurse Practitioner Program must complete 63 credit hours.

School Nurse Preparation

The College of Nursing and Health collaborates with the College of Education and Human Services to provide a postbaccalaureate program of study leading to preparation for licensure through the Ohio Department of Education to practice as a school nurse. Nurses interested in this preparation will find specific information under the College of Education and Human Services listing in this catalog.

Operations Management

See Business and Administration

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 private or government laboratories or for further graduate work. This program includes a medical physics concentration, which deals with both diagnostic (radiology, magnetic resonance, and positron emission) and therapeutic (radiation oncology) aspects. 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.

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
Thomas N. Hangartner, medical physics
Paul J. Wolfe, geophysics

Research Professors
Jane L. Fox, atmospheric physics
David C. Look, semiconductor and device physics
Facilities and Research

The Department of Physics is involved in four major areas of research: solid state physics and materials, optical and laser spectroscopy, exploration geophysics, and medical physics.

Research interests in the solid state physics/materials science area center around the properties of metals, metal alloys, superconductors, semiconductors, and thin films. Typical physical properties of interest are Young’s modulus, creep, effects of radiation damage on mechanical and electrical properties, and superconductor growth and critical currents. 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), and transmission electron microscopy (TEM).

The research in superconductors is focused on the processing and preparation of high-temperature superconducting materials. It involves the enhancement of the critical current density and the study of pinning mechanisms and relaxation effects and their dependence on the microstructure of the material. This work is done in collaboration with researchers at Wright-Patterson Air Force Base. Facilities available include a sputtering rig, a SQUID magnetometer, a vibrating-sample magnetometer, an electrical transport measurement station, a rotating stage x-ray spectrometer, and a scanning electron microscope.

Other 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, cryostats, an automatic internal friction data acquisition system, and electronics for monitoring and controlling the electrical and thermal parameters of the samples. Metallographic and tensile testing equipment is also available. Theoretical studies are directed toward understanding metal-hydrogen systems and defects in solids.

Research in the Optical and Laser Spectroscopy Laboratory focuses on temporal- and wavelength-resolved spectroscopy. The laboratory is equipped with a high-resolution spectrometer and detection systems that include photographic, intensified CCD, and photon counting systems. Several laser sources are available, including a six-watt argon ion laser, a nitrogen laser, a pulsed dye laser, and diode lasers. Specific research areas include absorption and stimulated fluorescence from solid state materials, time-resolved absorption and laser-induced fluorescence in gas discharge plasmas, high-resolution spectroscopy of solid state laser emissions, and, in collaboration with researchers at Wright-Patterson Air Force Base, low-energy electron transport in low-density plasmas.

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.

The program in medical physics includes radiological, magnetic resonance, and positron emission diagnostics and radiation therapy. The facilities include a Bruker 2.4T MR imager/spectrometer, a Bruker 8.5T MR spectrometer, computed tomography x-ray scanner, dual-energy absorptiometry x-ray scanner, and two Philips 2.5 MeV linacs.

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 Norco 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, include hours from PHY 680, 681, 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).
4. Complete an orientation exam administered by the physics department for use in determining the program of study.

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 a 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 240, 242, 244, and 260 sequence at Wright State.
3. Have received certification or licensure 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
Robert W. Putnam, regulation of intracellular pH, cell volume regulation, neuroscience

Associate Professors
Jay B. Dean, neurobiology of CNS respiratory and cardiovascular control neurons
Melvyn D. Goldfinger, neuroscience and biophysics of somatosensory afferents and relay nuclei
Luo Lu, molecular biology and expression of ionic channels
Noel S. Nussbaum, skeletal tissue cell dynamics, endocrinology of osteogenesis
Richard E. White, molecular physiology of ion channel regulation by neurochemicals and drugs

Assistant Professors
Julian Gomez-Cambronero, physiology/biochemistry of signal transduction in normal neutrophils and leukemic cells
Dan R. Halm, epithelial physiology

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.

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.

Professional Psychology
Program information may be obtained from the School of Professional Psychology.

Project Management
See Business and Administration

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 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, applied psychology, home design for aged
Allen L. Nagy, color displays, visual science

Associate Professors
Kevin B. Bennett, human-computer interaction, training, graphic display design
Herbert A. Colle, mental workload, keyboard interfaces, working memory
John Flach, perceptual-motor skill, ecological psychology, human-machine systems
Robert H. Gilkey, binaural displays, masking, psychoacoustics, virtual environments
Pamela S. Tsang, time sharing performance, aviation, aging
Daniel L. Weber, psychoacoustics, auditory warnings

Assistant Professors
Valerie Shalin, workplace expertise and learning, aiding and training technology
Scott Watamaniuk, visual motion, eye movements

Industrial/Organizational Psychology

Associate Professors
Jean M. Edwards, personality assessment, stress
Joan R. Rentsch, organizational cognitions and teams

Assistant Professors
Debra Steele Johnson, training systems and feedback, intelligent tutoring
Robert Tett, assessment centers, personality and job performance meta-analysis

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. Ideally, students should also have completed a year of physical or biological science, courses in mathematics, 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. Students enter a program with a critical mass of faculty and students and a wide variety of research opportunities.

The Department of Psychology has recently moved to newly renovated space, which includes modern, state-of-the-art research laboratories, well-equipped teaching laboratories, and office space for faculty and graduate assistants. Specialized equipment in dedicated research laboratories supports research on sensory processes, motor control, spatial orientation, human computer interaction and display design, flight simulation, memory, aging, expertise, teamwork, assessment, training, and stress in the workplace. Computer facilities include numerous UNIX workstations, PCs, and Macintoshes. The department is particularly proud of its facilities for virtual environment generation, including 3-D visual displays, 3-D auditory displays, and tactile/haptic displays. The Virtual Environment Research, Interactive Technology, And Simulation (VERITAS) facility, which is owned and operated by Wright State University but housed at Wright-Patterson Air Force Base, is unique in the world. The facility includes a room-sized display that surrounds the user with interactive 3-D auditory and visual images. The department of Psychology has a memorandum of agreement with the U.S. Air Force Research Laboratory, which facilitates utilization of its sophisticated behavioral laboratories such as flight simulators and the Auditory Localization Facility.

The department also maintains a Psychology Computer Services facility to support research and teaching. Several general purpose laboratories also exist including two PC labs, a 17-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 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.

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. 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.

The Graduate Faculty

Statistics

Professors
Harry J. Khamis, contingency table analysis, goodness of fit tests
Makarand V. Ratnaparkhi, mathematical statistics, biostatistics

Associate Professors
Barbara L. Mann, nonparametric statistics, biostatistics, medical applications
Munsup Seoh, mathematical statistics
Daniel T. Voss, design and analysis of experiments

Assistant Professors
Kimberly Kinateder, stochastic processes and exit times
Thaddeus Tarpey, multivariate statistics, mathematical statistics
Weizhen Wang, testing hypotheses

Management Science and Information Systems

Professors
Michael J. Cleary (Emeritus), quantitative methods, computer applications, quality management
W. Steven Demmy, management information systems, logistics, production and inventory management
Nada Sanders, forecasting, decision theory, materials management, expert systems
Li D. Xu, systems theory, integrated information systems, artificial intelligence

Associate Professors
Joseph W. Coleman, statistical analysis, simulation, management information systems
Gordon K. Constable (Emeritus), logistics management, production operations, quality statistics
Jon R. Hobbs, logistics modeling, simulation, reliability, management information systems
Andrew W. Lai (Emeritus), quantitative methods for business, logistics systems, computer simulation, decision support systems
George G. Polak, network optimization, queuing theory, simulation
Vincent C. Yen, operations research, statistics, management information systems, systems development, decision support systems
Selected Graduate Studies

Under a carefully administered program, students may develop a proposal for a master's degree that is not available in any one existing program, but combines elements of two or more existing master's degree programs. One-of-a-kind programs are possible in certain circumstances, and may be pursued in one of the following ways:

- A new student may develop a proposal for a master's degree that is not available in any one existing program. The proposal must be approved by an Advisory Committee comprised of three or more members of the graduate faculty from two or more programs. The proposal must be presented to the dean of the School of Graduate Studies, who will forward it to the Policies Committee of the Graduate Council for review and approval. The proposal must be signed by the student and the faculty member who is to serve as chair of the student's Advisory Committee; it must also be countersigned by the other faculty members of the Advisory Committee. The members of the Advisory Committee must be graduate faculty from programs that currently offer master's degrees.

- A student in an existing Wright State University master's program may, before having completed 24 credit hours of work, develop a proposal and follow the procedure as indicated above.

To guarantee the integrity of one-of-a-kind programs, the School of Graduate Studies will require that proposals follow these general guidelines:

1. All School of Graduate Studies requirements for degrees must be observed, such as the minimum number of credits to be earned, time limits and deadlines, the necessity of graduate faculty status for all Advisory Committee members, etc. The proposal must indicate whether the degree will be a Master of Arts or a Master of Science degree.

2. The written proposal must include three essential elements: a definition of the program, its rationale, and a list of required courses and additional suggested courses.

3. The proposed program may not be a patent device for escaping either the rigor or the specific requirements of already existing programs. The proposed program must have its own integrity and focus; it is not to be merely a survey of general knowledge in several fields of learning.

4. 500-level courses for graduate credit will be permitted in one-of-a-kind programs only in exceptional cases. If a substantial amount of lower-level work is required, it must be taken without graduate credit.

Rehabilitation Counseling

See Education and Human Services

Assistant Professors
Barbara B. Denison (chair), small business applications, systems analysis and design
Rebecca B. Koop, management information systems
Frederick R. Watson, linear and integer programming, network modeling and optimization
Larry B. Weinstein, integration of production and maintenance planning, TQM in manufacturing and education environments, issues concerning ISO/9000 registration

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, and have introductory management courses or background equivalent to MGT 302.

Certificate Requirements

The following requirements must be completed with a cumulative grade point average of at least 3.0 to earn a certificate.

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>STT 646-647</td>
<td>Statistical Methods for Engineers I and II OR</td>
</tr>
<tr>
<td>STT 666-667</td>
<td>Statistical Methods I and II</td>
</tr>
<tr>
<td>STT 669</td>
<td>Experimental Design</td>
</tr>
<tr>
<td>MBA 762</td>
<td>Managing Operations</td>
</tr>
<tr>
<td>MBA 763</td>
<td>Quality Management and Continuous Improvement</td>
</tr>
</tbody>
</table>

**Elective Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>STT 624</td>
<td>Quality Control</td>
</tr>
<tr>
<td>STT 626</td>
<td>Reliability and Life Data</td>
</tr>
</tbody>
</table>

**Total**

22

Students with sufficient background may substitute STT 764 for STT 669 or any of MS 753, 757, and 759 for MBA 782.
5. The program of study will contain a reasonable number of formal courses other than independent readings or independent studies from one or several departments. All required independent study courses must be outlined in the proposal.

6. A one-of-a-kind program will be approved only when the same objective cannot be accomplished by adding 12 or fewer credit hours to an existing degree program.

7. A proposal for a one-of-a-kind program that has been approved by the School of Graduate Studies will constitute the student's graduate program from which departures will be permitted only with the approval of the chair of the student's Advisory Committee. Those courses designated by the student's Advisory Committee as required in the program can be altered only with the approval of the Policies Committee of the Graduate Council. Upon application for admission to candidacy for the degree, the School of Graduate Studies will monitor the courses completed against those in the approved program. Departures from the required program of courses that have not had prior approval in writing cannot be credited toward the degree.

8. All one-of-a-kind master's degree programs must have a thesis or exit examination requirement. A School of Graduate Studies representative shall be appointed on all one-of-a-kind master's degree thesis defenses or exit examinations. This person shall be a member of the Policies Committee of the Graduate Council. The Policies Committee serves as the graduate program committee for one-of-a-kind degree programs.

9. The student's Advisory Committee shall meet no less than once each quarter.

10. Students pursuing these degrees will have "Selected Graduate Studies" listed on their transcripts as their major. Upon completion of the degree, the student may add a subtitle following "Selected Graduate Studies" which specifies the exact nature or title of the program undertaken.

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

Software Engineering
See Computer Science and Engineering Certificate Programs

Software Management
See Computer Science and Engineering Certificate Programs

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. 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
Harry J. Khamis, contingency table analysis, goodness of fit tests
Makarand V. Ratnaparkhi (program director), mathematical statistics, biostatistics

Associate Professors
Barbara L. Mann (graduate advisor), nonparametric statistics, biostatistics, medical applications
Munsup Seoh, mathematical statistics
Daniel T. Voss, design and analysis of experiments
Assistant Professors
Kimberly Kinaterde, stochastic processes and exit times
Thaddeus Tarpey, multivariate statistics, mathematical statistics
Wei zhen Wang, testing hypotheses, 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 multivariable calculus and a course in linear or matrix algebra. Some experience in computer programming and enough background in probability and statistics to begin basic graduate courses in statistics 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. Because of course sequencing, it is best to enter the program at the beginning of fall quarter.

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. Other assistantships are sometimes available through research grants and contracts.

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.

TESOL/Teaching of English to Speakers of Other Languages
See English Language and Literatures

Urban Administration
The Department of Urban Affairs and Geography offers a Master of Urban Administration degree. The program of study provides instruction to individuals planning careers in the administration of metropolitan public and nonprofit organizations. The
credentials, research, and public service of the faculty support students interested in concentrating their urban administration studies in sub-fields of management, planning, and development.

The Master of Urban Administration degree meets the needs of practitioners seeking career advancement and students pursuing an advanced degree. To serve our students, we emphasize (1) basic and innovative concepts and practices required of local public and nonprofit administrators; (2) a curriculum structured to develop decision-making and analytical skills; and (3) flexible course scheduling to accommodate working students.

The Graduate Faculty

Professors
Mary Ellen Mazey (chair), strategic planning, regional cooperation, and urban leadership
Perry D. Moore, (dean, College of Liberal Arts), public personnel and management
Kenji Oshiro, economic geography, transportation, and urban geography

Associate Professors
Robert W. Adams, public opinion, legislation processes, and government
Dan DeStephen, communications and labor-management cooperation
Jack Dustin (director, Center for Urban and Public Affairs), urban development, ethics, and technology policy
Willard Hutzel (Emeritus), urban governance and administration

Assistant Professors
Drew Dolan, public budgeting, fiscal management, and nonprofit administration

Admission
Master of Urban Administration applicants must present a baccalaureate degree, preferably in the social or behavioral sciences, with an overall undergraduate grade point average of 2.7 or better on a 4.0 scale. Students who cannot meet this grade point average requirement should review the policies of the School of Graduate Studies for admission under conditional or nondegree status.

Urban Administration applicants must submit three letters of recommendation from individuals familiar with their work or academic achievements. In addition, the department requires applicants to write a 400-word essay outlining their personal and professional goals and how a Master of Urban Administration degree will help them achieve their goals.

Students begin their studies in the fall quarter with URS 710 (see core courses listed below). Students may receive a waiver from this requirement after meeting and preparing a program of studies with the chair of the department.

Advising
Upon entering the urban administration program, every student must meet with the department's chair and attend a fall orientation. Each student will be assigned an advisor whose expertise matches the student's interests.

Financial Assistance
The Department of Urban Affairs annually awards a limited number of graduate research assistantships to qualified students. We encourage all regular and conditional degree students who wish to carry at least eight credit hours and are not employed full time to apply for a graduate research assistantship position. Application forms are available in the department office.

If awarded the position, the department grants a tuition waiver and pays a biweekly stipend. Graduate research assistants are required to work 20 hours per week during the academic year. The department chair assigns graduate research assistants to projects that will develop their skills and knowledge of urban administration.

Degree Requirements
The program curriculum for the Master of Urban Administration degree consists of 52 credit hours of approved course work. The program requires core courses totaling 28 hours; a research project of four hours or a thesis of four to eight hours; an internship, which can be repeated once, totaling four or eight hours; and elective courses in planning, management, development, or a special concentration equaling the remainder of the credit hours.

The thesis requirement (URS 799, four to eight credit hours) conforms to the needs of students pursuing a Doctor of Philosophy or a Doctor of Public Administration. The research project (URS 724, four credit hours) gives students who do not plan to continue their education beyond the master's level an opportunity to apply their writing, research, and analytical skills.

The internship requirement (URS 723, four to eight credit hours) provides students who are not working in the public services with practical
administration experience. Internships require 200 hours of supervised work in a public institution or nonprofit agency. The department waives the internship requirement for students already employed in the field, or for students pursuing a Ph.D. In these cases, elective course work replaces internship credit hours. Both the internship and thesis/research project should deal with urban management, planning, development, or the student’s special program concentration.

Program of Study

Core Courses 28

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 710</td>
<td>Legal and Political Environment</td>
<td>4</td>
</tr>
<tr>
<td>URS 711</td>
<td>Organization Theory and Management</td>
<td>4</td>
</tr>
<tr>
<td>URS 712</td>
<td>Empirical Urban Analysis</td>
<td>4</td>
</tr>
<tr>
<td>URS 713</td>
<td>Urban Planning</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 720</td>
<td>Urban Decision Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>

Additional Requirements 4–12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 723</td>
<td>Internship</td>
<td>4–8</td>
</tr>
<tr>
<td>URS 724</td>
<td>Research Project or URS 799 Thesis</td>
<td>4–8</td>
</tr>
</tbody>
</table>

Elective Concentrations 12–20

The Department offers elective concentrations in planning, management, and development. With their advisors, however, students may select elective courses that better serve their career and intellectual goals.

Planning Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 612</td>
<td>Cities and Technology</td>
<td>4</td>
</tr>
<tr>
<td>URS 624</td>
<td>Issues in Urban Planning</td>
<td>4</td>
</tr>
<tr>
<td>GEO 647</td>
<td>GIS Principles</td>
<td>5</td>
</tr>
<tr>
<td>GEO 648</td>
<td>GIS Applications</td>
<td>5</td>
</tr>
<tr>
<td>URS 650</td>
<td>Ethics in Public Service</td>
<td>4</td>
</tr>
<tr>
<td>GEO 655</td>
<td>Geography of Transportation</td>
<td>4</td>
</tr>
<tr>
<td>GEO 665</td>
<td>Cartography</td>
<td>5</td>
</tr>
<tr>
<td>URS 670</td>
<td>Urban Leadership</td>
<td>4</td>
</tr>
<tr>
<td>URS 618</td>
<td>Urban Public Works Administration</td>
<td>4</td>
</tr>
<tr>
<td>URS 722</td>
<td>Directed Studies</td>
<td>4</td>
</tr>
</tbody>
</table>

Public and Nonprofit Management Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 620</td>
<td>Public Safety Administration</td>
<td>4</td>
</tr>
<tr>
<td>URS 623</td>
<td>Issues in Urban Administration</td>
<td>4</td>
</tr>
<tr>
<td>URS 627</td>
<td>Urban Policy Analysis</td>
<td>4</td>
</tr>
<tr>
<td>URS 650</td>
<td>Ethics in Public Service</td>
<td>4</td>
</tr>
<tr>
<td>URS 670</td>
<td>Urban Leadership</td>
<td>4</td>
</tr>
</tbody>
</table>

Development Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>URS 612</td>
<td>Cities and Technology</td>
<td>4</td>
</tr>
<tr>
<td>URS 615</td>
<td>Community Development I</td>
<td>4</td>
</tr>
<tr>
<td>URS 616</td>
<td>Community Development II</td>
<td>4</td>
</tr>
<tr>
<td>URS 625</td>
<td>Issues in Urban Development</td>
<td>4</td>
</tr>
<tr>
<td>URS 650</td>
<td>Ethics in Public Service</td>
<td>4</td>
</tr>
<tr>
<td>URS 670</td>
<td>Urban Leadership</td>
<td>4</td>
</tr>
<tr>
<td>URS 675</td>
<td>Management of Urban Nonprofits</td>
<td>4</td>
</tr>
<tr>
<td>URS 722</td>
<td>Directed Studies</td>
<td>4</td>
</tr>
</tbody>
</table>

EC 730 Regional and Urban Economics 3

Total 52

Urban Planning

Contact the Department of Urban Affairs and Geography for information about this certification program.

Women’s Studies

The Women’s Studies Program offers several ways for students to pursue women’s studies emphases through or as a complement to various graduate programs. As an interdisciplinary program made up of women’s studies–designated undergraduate and graduate courses across much of the curriculum, Women’s Studies enables students to develop a speciality or subspecialty in gender analysis and feminist perspectives as they relate to various fields of inquiry and occupations. For more information on pursuing women’s studies graduate course work through the Master of Humanities Program, the M.A. in English Program, the Selected Graduate Studies Program, or the Women’s Studies Graduate Certificate Program, contact the director of Women’s Studies or visit the Women’s Studies website: http://hypatia.wright.edu/wms/wmsprgms.htm. See also Humanities, English Language and Literatures, and Selected Graduate Studies.
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
BMB Biochemistry and Molecular Biology
BIO Biological Sciences
BME Biomedical Engineering
BMS Biomedical Sciences
CHM Chemistry
CLS Classics
COM Communication
CMH Community Health
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
EP Engineering Physics
ENG English
FIN Finance
FR French
GEO Geography
GL Geological Sciences
GER German
HLT Health
HPR Health, Physical Education, and Recreation
HST History
HFE Human Factors Engineering
HUM Humanities
LAT Latin
LAW Law
MGT Management
MIS Management Information Systems
MS Management Science
MKT Marketing
MBA Master of Business Administration
MTH Mathematics
ME Mechanical and Materials 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
RUS Russian
SW Social Work
SOC Sociology
SPN Spanish
STT Statistics
TH Theatre
URS Urban Administration
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.

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 take "dual listed" (e.g., PHY 420/620) courses for graduate credit (PHY 620-level) are required to perform alternate work that reflects both quantitative and qualitative advances over the undergraduate requirements (PHY 420-level), such as additional scholarly readings, more rigorous research, and/or more comprehensive examinations. The alternate work required for graduate credit will be stated in the syllabi for all "dual listed" courses.

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 College of Nursing and Health; 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, E 148 Student Union.

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.

711-3 Financial Accounting Concepts I
Study of financial accounting concepts and theory relating to the nature, measurement, and reporting of income and financial condition. Emphasis on controversial areas of asset definition, recognition, and measurement. Prerequisite: MBA 531.

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: MBA 531.

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.

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: MBA 531.

781-1 to 6 Independent Studies
Titles vary.

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
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.

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.

701-1 to 5 Selected Topics in Anatomy
Selected topics in anatomy. Topics vary.

702-3 Anatomical Techniques
Preparation of anatomical specimens for training and research. Techniques include preparation of prosected materials, preparation of tissues for microscopy, processing of photographic materials, or other techniques. May be repeated once for credit. Graded pass/unsatisfactory. Prerequisite: ANT 711, 721.

711-9 Human Gross Anatomy
Lectures and dissection of human cadaver; includes introductory embryology. 3.5 hours lecture, 9 hours lab.

715-4 Advanced Human Embryology
Classical and contemporary issues in human developmental biology. Emphasis is on the clinical relevance of developmental processes, and on modern methods used to study the mechanisms of development. Prerequisite: ANT 711.
721-8 Human Microanatomy
Detailed microanatomy of human cells, tissues, and organ systems. 3 hours lecture, 6 hours lab.

731-7 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&F 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 to 2 Graduate Seminar
Topics vary. Graded pass/unsatisfactory.

811-5 Comprehensive Anatomy
Integrates general principles and concepts of the following systems: cardiovascular, gastrointestinal, lymphatic, nervous, respiratory, endocrine, integumentary, muscular, reproductive, and urinary. Knowledge is assessed by an oral examination before a faculty review committee. Graded pass/unsatisfactory.

850-3 Special Topics in Archaeology
Advanced study of various specialized aspects of archaeology. Twelve credit hours of anthropology required.

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.

600-3 Special Topics in Archaeology
Advanced study of various specialized aspects of archaeology. Twelve credit hours of anthropology required.

610-3 Special Topics in Cultural Anthropology
Examines selected topics concerning the method and theory of anthropological thought and their relationship to the allied disciplines of economics, linguistics, art, politics, and history. Emphasis on current trends influencing research in cultural anthropology. Topics vary. Twelve credit hours of anthropology or undergraduate degree in other social science, graduate standing or permission of instructor required.

646-4 Peoples and Cultures of South Asia
Survey and analysis of cultural diversity and unity in Southern Asia, particularly India, Pakistan, Bangladesh, and Sri Lanka.

648-4 Development of Ethnological Thought
Surveys historical development of ethnological thought; emphasizes theories of social and cultural change.

650-4 Political Anthropology
(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.

675-4 Historical Archaeology
Focuses on the post-European discovery period of America; archaeological interpretations of colonial, plantation, industrial, frontier, and urban sites and materials are explored in seminar discussions, and through lab analysis of southwest Ohio site collections. Prerequisite: ATH 242.

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.

701-4 Research Methods
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.

702-5 Statistical Analysis for the Social Sciences
Analysis and interpretation of data in social research, with emphasis on multivariate statistical techniques. Prerequisite: Pass departmental placement test.

703-4 Issues in Applied Research
Addresses issues pertaining to the collection and analysis of data in various settings, for the purpose of program evaluation, policy analysis, and other applied objectives. Prerequisite: ABS 701, 702. ABS 723.

705-2 Computer Scholarship
Emphasis is on computer software and technologies available to assist in the assembling and communication of information relevant to social research, such as E-mail, the Internet, and bibliographic databases.

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.

761-4 Seminar in Social Deviance
(Also listed as SCC 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.

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.

773-2 Professional Experience: Portfolio
Students with considerable job experience in their major field may develop a portfolio. Following departmental guidelines, students will assess experiences and present an evaluation detailing the skills utilized, characteristics of the setting, and processes involved in the performance of the work role.

774-2 Applied Problem Solving
Students currently employed in their major field may define and carry out an applied project involving their work role. The project should address a specific problem or issue. Students must obtain approval of their superior to develop a solution that can be implemented by the employer. Prerequisite: ABS 701, 702.

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. May be repeated once for credit. Prerequisite: ABS 703.

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.

798-1 to 10 ABS Graduate Project
Practical application of knowledge gained through student courses is applied to a capstone experience. Graded pass/unsatisfactory. Prerequisite: ABS required courses and 24 hours of graduate credit.

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 Independent Study in Art
Special studies for qualified students. Intensive individually directed work in art with faculty consultation and supervision.

604-1 to 4 Studies in Art History
Titles vary.

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.

658-4 Photography
Exploration of personal concepts and aesthetic expression in photography. Intensive individual work with faculty supervision.

666-4 Printmaking: Relief
Development of personalized concepts and individual aesthetic expression in printmaking with an emphasis in the area of relief. Titles vary. May be taken for letter grade or pass/unsatisfactory. Prerequisite: 12 hours of 400 level printmaking or permission of instructor.

667-4 Printmaking: Intaglio
Development of personalized concepts and individual aesthetic expression in printmaking with an emphasis in the area of intaglio. Prerequisite: 12 hours of 400 level printmaking or permission of instructor.

668-4 Printmaking: Lithography
Development of personalized concepts and individual aesthetic expression in printmaking with an emphasis in the area of lithography. Prerequisite: 12 hours of 400 level printmaking or permission of instructor.
669-4 Printmaking: Screenprinting
Development of personalized concepts and individual aesthetic expression in printmaking with an emphasis in the area of screenprinting.

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 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.

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.

630-3 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.

638-6 Multi-age Visual Arts Methods
Theoretical/practical methods of teaching multi-age visual arts. Integration of artistic and educational ideas into creative programs as continuum of issues and skills for the developing art education with mentorship by master teachers. Prerequisite: Must be accepted into Professional Educators Program.

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.

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.

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

Biochemistry and Molecular Biology/BMB

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
Designed to acquaint new graduate students with the research being carried out by the faculty in the biochemistry program.

703-1 Research Ethics
(Also listed as BMS 703.) Research ethics emphasizes the evaluation of hypothetical ethical scenarios. Class discussion are based on integrating ethical policy and practices as they relate to research at Wright State. Pass/unsatisfactory.

727-4 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: BMB 421, 423.

740-4 Physical Biochemistry
(Also listed as BMS 770.) Structure-function analysis of biological macromolecules (particularly proteins and polynucleotides) based on chemical and physical properties. Prerequisite: BMB 750 or equivalent.

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: BMB 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: BMB/BMS 750, 752.

755-3 Cancer: Molecular Aspects
A profile of the general properties of transformed cells and an in-depth examination of the mechanisms of oncogenesis at the level of molecular genetics. Prerequisite: BMB 750.

760-4 Molecular Biology of the Nucleus
(Also listed as BMS 760.) A literature based course covering molecular events in the nucleus including DNA replication, repair and recombination and transcription. Prerequisite: BMB 750, BMB 752.

762-3 to 6 Fundamental Principles of Fourier Transform Nuclear Magnetic Resonance
(Also listed as BMS 762/PHY 760.) 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: BMB/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: BMB/BMS 762 or permission of instructor.

800-1 Biochemistry Seminar
Topics vary. Graded pass/unsatisfactory.

899-1 to 15 Biochemistry Research
Topics vary. Graded pass/unsatisfactory.

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.

603-5 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 212, 302, or permission of instructor.

607-5 Wetlands Biology
Ecological investigation of wetlands of the U.S. with emphasis on midwest. Primarily field oriented with some lecture. Covers soils, vegetation, hydrology, conservation, and restoration. Requires two weekend trips and written report. Prerequisite: junior or senior standing; CHM 121, one of the following: Ecology, Vascular plants, Hydrogeology or Soil Biology, Aquatic Biology or relevant field experiences.

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.

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.

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.

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.

631-3 Risk Assessment
Studies the determination of quantitative risk to humans and the environment. Approaches currently used in regulatory activities are described, showing method of hazard identification, sampling, data evaluation, exposure assessment, toxicity assessment, and risk characterization. Prerequisite: Minimum of two BIO courses and completion of one year of organic chemistry.

632-3 Risk Assessment II
Follow-up course to BIO 631. Includes key components of risk assessments, such as pharmacokinetic modeling, environmental fate and transport modeling, low dose extrapolation, and risk communication. Prerequisite: BIO 631.
642-3 Advanced Molecular Biology
Emphasizes gene organization and genome organization focusing on the molecular anatomy, expression, and regulation of eukaryotic genes. Includes a thorough discussion of recombinant DNA technology. Prerequisite: BIO 212, 410, CHM 213.

651-3 Environmental Management and Risk Communication
Enlarges students’ environmental perspective by focusing on management issues as they relate to air, water, and land resources including ethics, policy, and economics, as well as questions relating to specific resources. Titles vary.

652-3 Environmental Protection: Law, Regulation, and Enforcement
Reviews the American legal system emphasizing regulatory agencies and the courts; environmental and toxic tort case law; and the complex way that the myriad environmental laws and regulations are structured and enforced. Titles vary.

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.

667-3 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.

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.

684-3 Introduction to Biogeography
Introduction to the factors affecting the distribution of plants and animals. Prerequisite: BIO 306.

692-1 Environmental Sciences Seminar
Guest experts expose students to a variety of current issues in environmental science and environmental management.

699-1 to 12 Special Problems in Biology
Topics vary.

700-1 Principles of Instruction in Biology
Survey of available instructional materials and discussion of educational theory and techniques leading to more effective instruction. For biology majors only.

701-1 to 5 Selected Topics in Biology
Topics vary.

702-2 Introduction to Research
Different research problems under investigation by the faculty are described with respect to objectives, methodology, and progress as examples of scientific methods applied to biology.

703-4 Advanced Developmental Biology
(Also listed as BMS 937.) Molecular mechanism of development including topics such as cell signaling, pattern formation, terminal differentiation. Prerequisite: BIO 212 or equivalent, or instructor approval.
720-4 Mammalian Cell Biology
(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.

734-3 Molecular Genetics
(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.

737-6 Recombinant DNA Methods
(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 BMS 734/BMS 779 or permission of instructor.

740-6 Electron Microscopy for Life Sciences
(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.

799-1 to 6 Literature Critique
Independent project to write a critical review of literature on a specific topic. Graded pass/unsatisfactory.

800-1 Graduate Seminar
Topics vary.

899-2 to 18 Graduate Research
Supervised thesis research.

Biomedical Engineering/BME
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

619-3 Biomedical Engineering Systems I
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: MTH 233, ME 212, 515/315, or permission of the instructor.

620-3 Biomedical Engineering Systems II
Introduces transport phenomena in biomedical engineering and physiological systems. Energy and mass balances together with constitutive and empirical relationships are used in quantifying such topics as body heat loss by various modes, diffusion mass transport and heat/mass transport in applicable technological systems. Prerequisite: BME 619/419 and permission of instructor.

622-3 Engineering Biophysics
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 521/321 or permission of instructor.

628-3 Biomechanics and Biothermodynamics
Application of solid mechanics and thermodynamics toward describing physiological systems. Topics include mechanisms of the skeletal, cardiac, and pulmonary systems and analysis of the biothermal regulation system. Prerequisite: ME 212, 515/315, or permission of instructor.

649-4 Biotransport and Artificial Organs
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 620/420 and permission of instructor.

640-4 Biomaterials
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: ME 213, EE 521/321 or permission of instructor.

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 601/401, 602/402, 613/413, 614/414.
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 661/461.

663-2 Biomedical Computers I
Digital computer applications in biomedical related fields. Use of software to solve biomedical problems and display results. Prerequisite: CS 220, EE 501/301.

664-2 Biomedical Computers II
Examines principles, hardware structure, and programming techniques of microprocessors, applications of microprocessor-based systems in hospitals, rehabilitation engineering and medical research. Prerequisite: BME 663/463.

699-1 to 5 Special Problems in Engineering
Special problems in advanced engineering topics. Titles vary.

670-3 Photon Radiation
Introduces generation, effects, and detection of ionizing radiation and its application to medicine. Completion of this course fulfills the educational requirement to be a user of radioactive materials and radiation-producing devices. Prerequisite: PHY 244.

711-3 Advanced Biomechanics
Covers a variety of mathematical models that have been developed to describe muscle performance in health and disease. Prerequisite: BME 628/428 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 639/439, 640/440.

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 640/440, 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: PHY 244, EE 521/321.

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 671/471.

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 671/471.

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 671/471, EE 710, or corequisite: EE 711.

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 671/471.

736-3 Biomedical Signals and Processing
Characteristics of measurement of various biomedical signals; time-domain and frequency-domain, continuous and discrete signal representations; application of digital and random signal processing methods to analysis of biomedical signals. Prerequisite: EE 710, STT 666/466 or equivalent.
740-1 Rehabilitation Engineering Design I
Presented as a three-quarter sequence to provide knowledge and experience in the rehabilitation engineering design process, research and development process, and funding issues. Limited to students enrolled in the graduate rehabilitation engineering training program.

741-3 Neuromuscular Engineering
(Also listed as BMS 961.) Teaches the design and application of neuromuscular assistive devices. Emphasizes biomathematics modeling and control theory. Prerequisite: BME 622/422 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.

743-3 Introduction to Rehabilitation Engineering
Introduces the complex structure of the rehabilitation engineering service delivery systems practiced in the United States. Covers basic disability areas, current laws, resources, and rehabilitation technology.

745-3 Rehabilitation Engineering Service Delivery
Introduces rehabilitation engineering design principles. Includes practical design experiences in worksite modification, ergonomics, and accessibility evaluations. Provides experience in technical report writing and presentation. Prerequisite: BME 743.

746-3 Rehabilitation Engineering Computers I
Introduces object oriented programming structured around the HyperCard, HyperText Macintosh, and ToolBook PC environments. Covers basic principles of programming using objects, cards, windows, projects, and graphics with application to rehabilitation engineering. Introduces PC hardware in detail. Concurrent enrollment in lecture and lab is required.

747-3 Rehabilitation Engineering Design II
Continuation of BME 745 and BME 746. Focuses on development of computer application programs and devices to aid the disabled. Prerequisite: BME 745 and 746.

748-4 Rehabilitation Engineering Introduction to Clinical Practice
Introduces clinical practices and services provided to disabled patients in a rehabilitation center involving various services, testing, and evaluation. Focus is on spinal cord injury and traumatic brain injury.

750-1 to 5 Rehabilitation Engineering
Engineering analysis and design are applied on rehabilitation tasks within a clinical setting. Provides training in rehabilitation engineering management of various disabilities. Enrollment in multiple sections is required. Prerequisite: BME 742, 747, 748 and HFE 743.

880-1 to 5 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 biomedical engineering topics. Topics vary.

898-1 to 5 Ph.D. Dissertation Research

899-1 to 5 Thesis
Pass/unsatisfactory.

Biomedical Sciences/Courses
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.

686-4 Biomedical Computer Science
Introduces programs such as SYMVU, CSMP, and ORTEP, which create plotted output. FORTRAN is also introduced. Problems and data used are from the life sciences. Graded pass/unsatisfactory. Enrollment in Biomedical Sciences Ph.D. program required. Prerequisite: BMS 664.
703-1 Research Ethics
(Also listed as BMB 703.) Research ethics emphasizes the evaluation of hypothetical ethical scenarios. Class discussion is based on integrating ethical policy and practices as they relate to research at Wright State. Graded pass/unsatisfactory.

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 electromagnetical 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: CHM 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 BMB 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 BMB 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 BMB 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.

760-4 Molecular Biology of the Nucleus
(Also listed as BMB 760.) A literature based course covering molecular events in the nucleus including DNA replication, repair, recombination and transcription. Prerequisite: BMS 750, BMB 752.

762-3 to 6 Fundamental Principles of Fourier Transform Nuclear Magnetic Resonance
(Also listed as BMB 762/PHY 760.) 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 BMB 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 BMB 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.

767-4 Enzymes
(Also listed as BMB 727.) Mechanism of enzyme catalysis, including such topics as structure, kinetics, energetics, allosterism, co-enzymes, and control of enzymes and multi-enzyme 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 BMB 731.) Examines the biochemistry of membranes and provides basic information on membrane composition and processes. Prerequisite: BMS 752, 835; or equivalent.

770-4 Physical Biochemistry
(Also listed as BMB 740.) Structure-function analysis of biological macromolecules (particularly proteins and polynucleotides) based on chemical and physical properties. Prerequisite: BMS 750 or equivalent.

771-2 Safe Use of Radionuclides
Principles of a, b, and g radiation and methodology of counting with application to physical and biological problems.

775-5 Pathogenic Mechanisms
(Also listed as M&L 775.) Expands knowledge of basic microbiology by focusing on human-microbial pathogen interactions. The molecular basis of the pathogenic mechanisms will be emphasized. In addition, the student will gain a better appreciation and understanding of the complexities of interactions between microbes and their human hosts. Prerequisite: BIO 210 or equivalent molecular biology course and BIO 252 or equivalent introductory microbiology course.

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.

805-4 Intercellular Communication  
(Also listed as M&I 770 and P&B 776.) Introduces concepts of intercellular communication through an interdisciplinary presentation of immune and neuroendocrine system functions. Emphasizes the similarities between the systems and the multidisciplinary approaches used to study each.

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.

816-3 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.

838-3 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, 635.

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.

853-4 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.

856-3 Glial Cell Physiology
(Also listed as P&B 650.) Concepts of glial cell physiology based on the analysis of current primary literature. Topics include interaction between glia and other cell types and the role of glia in pathophysiology. Prerequisite: P&B 642.

859-3 Gastrointestinal Physiology and Biophysics
(Also listed as P&B 761.) Principles of gastrointestinal physiology and biophysics emphasizing cellular mechanisms of secretions, 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.

862-5 Human Physiology
(Also listed as P&B 610.) An overview of human/mammalian organ system physiology. Fundamental mechanisms and the experimental basis for current understanding are emphasized.

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.

865-4 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. 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 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.

870-3 Physiology and Pharmacology of Vascular Cells
(Also listed as PHA 870 and P&B 870.) Physiological steady states and pharmacological properties of vascular cells—circulating erythrocytes, endothelial cells, and smooth muscle cells in particular—as a basis of pathologic aberrations and clinical disorders.

876-2 to 3 Principles of Pharmacology I
(Also listed as PHA 876.) Abbreviated course describing passage of drugs across membranes, their mechanisms of action, distribution, biotransformation, and elimination. Discusses dose-response relationships, receptor-binding kinetics, and topics of interest and importance to enrolled students.

879-2 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.

887-4 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 toxicity including central nervous system, splanchic organs, cardiovascular, hematopoietic, respiratory, reproductive, and skeletal systems. Prerequisite: BMS 879, 890.

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 Principles of Pharmacology II: 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.

903-7 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.

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.
Courses/Biomedical Sciences

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 also 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.

502-4 Environmental Chemistry
Students study water, air, and soil chemistry, including pollutants added to these environments and how they interact to create environmental problems. 3 hours lecture, 3 hours lab. Prerequisite: CHM 123 or 193.

514-4.5 Quantitative Analysis Laboratory

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.

525-3 Advanced Inorganic Synthesis and Characterization
Advanced synthesis and characterization of representative inorganic compounds. 1 hour lecture, 4 hour lab. Prerequisite: CHM 417, 420, or permission of instructor.

535-3 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, 312. Corequisite: CHM 536.

536-4.5 Instrumental Analysis Laboratory
Introduction to experimental instrumental analysis. Practical experience in the operation of chemical instrumentation; emphasizes applications of the material presented in CHM 535. Prerequisite: CHM 452, 312. Corequisite: CHM 535.

545-3 Advanced Organic Synthesis and Characterization
Advanced synthesis and identification of organic compounds. 1 hour lecture, 4 hours lab. Prerequisite: CHM 213, 217, 417.

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.

557-3 Physical Chemistry Laboratory I
Experimental methods of physical chemistry. Corequisite: CHM 552.

558-3 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

602-4 Advanced Environmental Chemistry and Analysis
Environmental sampling and analysis using instrumental techniques. Chemical fate prediction by measurement and examination of physical and chemical properties. 3 hours lecture, 3 hours lab. Prerequisite: CHM 312/314 and 213, or instructor permission.
617-3 Applied Chemical Spectroscopy
Practical applications of various spectrophotometrical 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, 452 or permission of instructor.

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 and 451; or CHM 361; or permission of instructor.

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 and 451; or 361; or permission of instructor. 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 flash 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.
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.

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.
632-4 Gender and Communication
Theoretical and pragmatic consideration of how and why men's and women's communication behaviors are similar to one another in some instances, yet different in others, and how men and women can communicate more effectively. Prerequisite: COM 102.

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
Application of organizational communication theories and major theoretical perspectives to problems in public and private-sector organizations. Includes a simulation which focuses on conflict management, leadership, and decision making in a business context.

648-4 Case Studies in Organizational Communication
A critical analysis of communication issues and problems in organizations through an examination of various cases. Prerequisite: COM 446, 447/647.

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 interpersonal, intergroup, 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/Courses
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.

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: CMH 601.

621-3 Epidemiology I
Nature of epidemiological studies; descriptive epidemiology; experimental and observational investigations; cross-sections; prospective and retrospective studies; mortality and morbidity measurements and factors affecting comparison; life tables; and introduction to demographic measurements.

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: CMH 621.

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.

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.

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.

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.

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: CMH 651.

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.

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.
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.

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.

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.

700-4 Aeromedical Aspects of Aerospace Accidents
Overview of aerospace accident investigation procedures, concerned regulations, and interdisciplinary management from an aeromedical perspective. Selected advance topics include the analyses of relevant aerospace accident reports, post-crash survivability, and future directions. MD or equivalent degree is required.

701-3 Special Topics in Community Medicine (Aerospace)
Provides the philosophy underlying each major aerospace medicine standard. It also explores the aeromedical factors that convert safe flight into hazardous flight. M.D. degree and departmental approval required. May be taken for letter grade or pass/unsatisfactory.

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.

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.

731-3 to 5 Health Services Administration
(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.

899-3 Aerospace Medical Research
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.

Computer Engineering/CEG
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.

505-4 Introduction to Expert Systems
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.

520-4 Computer Organization and Assembly Language Programming
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.

530-4 Object-Oriented Programming in C++
Introduces object-oriented programming and the C++ language. Topics include functions, pointers, structures, classes, function/operator overloading, inheritance and virtual functions, template, exceptions, and file input and output. Prerequisite: CEG 220 or CS 240 or equivalent.
560-4 Digital System Design
(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.

602-4 Introduction to Computer Communication Design
Survey of modern digital communications techniques. Specific focus is on serial transmission over public communication channels. Topics include information content and coding, asynchronous and synchronous formats, concentrating and multiplexing, channel properties, modulation techniques, common carrier services, error sources and control, regulatory policies, networks, and their analyses. Students 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.

611-4 Microprocessor-Based System Design
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.

616-4 Matrix Computations
(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.

619-4 Introduction to Fuzzy Logic Control
(Also listed as EE 619.) Foundations and philosophy of fuzzy logic and applications to control theory. Relationship between classical PID control and fuzzy rule-based control. Techniques for rule construction and adaptive fuzzy logic controllers. Case studies of applications. Prerequisite: EE 613, 614.

621-4 Microcomputer Design Projects
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.

625-4 VHISC Hardware Description Language (VHDL)
Rapidly being embraced as the universal communication medium of design, VHDL is an industry standard language used to describe hardware from the abstract to the concrete level. Prerequisite: CEG 360 and CS 400.

628-4 Linear Optical Systems for Computer Engineers
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 622.

633-4 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 520, CS 600. Knowledge of C language useful.

634-4 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 CMOS devices and circuit design techniques, basic building blocks for CMOS 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, EE 632 and EE 651.

656-4 Introduction to Robotics
(Also listed as EE 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.

658-4 Digital Integrated Circuit Design with PLDs and FPGAs
(Also listed as EE 658.) Design and application of digital integrated circuits using programmable logic devices (PLDs) and field programmable gate arrays (FPGAs). A commercial set of CAD tools (Mentor Graphics and Xilinx) will be used in the lab portion of the course. Prerequisite: CEG 560/EE 651.

659-4 Integrated Circuit Design Synthesis with VHDL
(Also listed as EE 659.) Application of VHDL hardware description language (VHDL) to the design, analysis, multi-level simulation, and synthesis of digital integrated circuits. A commercial set of CAD tools (Mentor Graphics) will be used in the lab portion of the course. Prerequisite: CS 220, C programming or equivalent, CEG 260.

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).

661-4 Object-Oriented Programming & Design
Topics emphasize the core concepts of encapsulation, inheritance, polymorphism, and dynamic binding. Additional topics include class organization, software maintenance, and design of reusable components. Prerequisite: CEG 660.

663-4 Personal Software Development Process
Discusses software development as it relates to the individual, software project measurement, design and code reviews, software quality measurement, design and design verification. Each student will participate in the development of a software project. 3 hours lecture, 2 hours lab. Prerequisite: CEG 660 or equivalent.

665-4 Interactive Systems Modeling, Analysis, and Design
(Also listed as HFE 665) Provides experience in interactive real-time simulation and design, implementation and evaluation of interfaces to simulations. The relevant topics are explored through application in supervisory control of complex, dynamic systems. Prerequisite: CEG 220 or any one of the following: CEG 221, 241, 242 or instructor permission.

668-4 Managing the Software Development Process
Discusses software development processes, models, and techniques necessary to successfully develop large-scale software and presents the Capability Maturity Model (CMM). Students will participate in the development of a software project. 3 hours lecture, 2 hours lab. Prerequisite: CEG 660.

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 or 255.

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.

678-3 Coding Theory
(Also listed as MTH 656/EE 678) Introduction to the essentials of error-correcting codes, the study of methods for efficient and accurate transfer of information. Topics include basic concepts, perfect and related codes, cyclic codes, and BCH codes. Prerequisite: MTH 253 or MTH 355 (or equivalent).
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.

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.

729-4 Optical Computer Architectures
Optics provides for new high-performance architectures including hardware and software methodologies. Optical architectures considered include: sequential, dataflow, cellular automatic, and neural networks. Prerequisite: CEG 720 or CEG 728.

730-4 Distributed Computing Principles
Communicating sequential processes, clients and servers, remote procedure calls, stub generation, weak and strong semaphores, split-binary semaphores, and distributed termination. Example languages: [sic srl, [sl Linda V]. 3 hours lecture, 2 hours lab. Prerequisite: CEG 634. (Previously listed as CS 730.)

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 Subsystem Design
CMOS VLSI subsystems including data path operators, counters, multipliers, memory elements, and programmable logic arrays. VLSI circuits for FIR and IIR filters. VLSI circuits for digital data exchange systems. 3 hours lecture, 2 hours lab. Prerequisite: EE 654 or CEG 654.

753-4 VLSI Design Synthesis and Optimization
VLSI architectural-level synthesis and optimization including data-path synthesis, control-units synthesis, scheduling, and resource sharing. Logic-level synthesis and optimization including two-level and multi-level combinational logic optimization, and sequential logic optimization. 3 hours lecture, 2 hours lab. Prerequisite: EE 654 or CEG 654.

754-4 VLSI Testing and Design for Testability
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: EE/CEG 654 or EE/CEG 752.

756-4 Robotics I
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
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 Advanced Software Engineering
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.

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, 260, CS 600.

770-4 Computer Engineering Mathematics
Introduction to computer arithmetic algorithms, systems theory, linear and nonlinear programming, and optimization theory for computer engineering applications. In addition to mathematical theory, appropriate engineering applications are presented. Prerequisite: CEG 616, 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. Graded pass/unsatisfactory.

799-1 to 8 Thesis
Grade pass/unsatisfactory.

820-4 Computer Architecture II
Study of parallel architectures and parallel processing. Topics include multiprocessors, cache coherence, synchronization mechanisms, scalable architectures, and vectorization and parallelization. (Previously listed as CEG 721.)

830-4 Distributed Computing Systems
Example languages and packages: SR and PVM, file servers, semantics of file sharing, caches and replication, log-structured file systems, remote evaluation, process migration, mobile projects, checkpointing and rollback-recovery. Prerequisite: CEG 730. (Previously listed as CS 731.)

860-4 Object-Oriented Programming
Course covers data abstraction, overloading, polymorphism, inheritance binding, delegation and prototypes, and languages such as C++, Ada 95, Eiffel, and Self from a software engineering point of view. Prerequisite: CEG 760. (Previously listed as CEG 761.)

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.

892-1 to 8 Ph.D. Qualifying Exam
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. Graded 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.

897-1 to 12 Residency Research

898-1 to 12 Dissertation Research
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 or CS 241; MTH 231, 253 or 255; for 517, CS 516, MTH 233, 253 or 355.

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 600.

607-3 Optimization Techniques
(Also listed as MTH 607.) Concepts of minima and maxima; linear programming; simplex method; density, and duality; transportation and assignment problems, dynamic programming. Prerequisite: MTH 233 and MTH 253 or 255.

609-4 Principles of Artificial Intelligence
Problem-solving methods in artificial intelligence (AI) with emphasis on heuristic approaches. Topics include methods of representing and searching problem state spaces, and basic techniques for using predicate calculus and rule-based systems. 3 hours lecture, 2 hours lab. Prerequisite: CS 600, (CS 340—LISP or LISP programming experience). (Previously listed as CS 710.)
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.

711-4 Knowledge-Based Systems in Artificial Intelligence
Continuation of CS 710. Topics covered include techniques for handling judgmental knowledge, semantic networks, and frame-based systems. Useful constructs and architectures for AI systems are discussed.
3 hours lecture, 2 hours lab. Prerequisite: CS 609, (CS 340—LISP or LISP programming experience).

712-4 Advanced Topics in Artificial Intelligence
Covers advanced topics in artificial intelligence theory and applications. These are taken from such areas as natural language processing, machine learning, advanced AI programming techniques, and search and planning. Prerequisite: CS 609.

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 609.

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.

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 Computational Complexity and Algorithm Analysis
Time complexity analysis of algorithms; computational complexity, NP completeness. 3 hours lecture, 2 hours lab. Prerequisite: CS 610, 666.

771-4 Natural Language Processing Techniques
Survey of issues that arise in computer understanding of natural languages like English. Topics include significance of language structure in extracting meaning, ambiguities, parsing techniques and case studies. Prerequisite: CS 666, (LISP or CS 680).

772-4 Advanced Natural Language Processing Concepts
Continuation of CS 771. Computational methods for dealing with natural language semantics are introduced. Topics include semantic networks, conceptual dependency graphs, and formal logic as a semantic model. Prerequisite: CS 771.
774-4 Logic Programming
Theory and practice of logic programming. Application of Prolog to artificial intelligence, language analysis, and symbolic programming. Some attention to implementation issues, constraint logic programming, and concurrent logic languages. An acquaintance with Prolog is assumed. Prerequisite: CS 680 or 784.

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
Programming paradigms and concepts for high level programming languages. Techniques for formal specification.

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. Graded pass/unsatisfactory.

799-1 to 8 Thesis
Graded pass/unsatisfactory.

840-4 Advanced Topics in the Theory of Computation
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 or consent of instructor. (Previously listed as CS 741.)

884-4 Advanced Topics in Programming Languages
Continuation of CS 784. Emphasis on formal methods for specifying and defining both the syntax and the semantics of programming languages. Prerequisite: CS 784. (Previously listed as CS 756.)

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.

892-1 to 8 Ph.D. Qualifying Exam
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.

895-1 to 8 Independent Study
Independent study in a chosen area for Ph.D. research. Graded 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.

897-1 to 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: 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 Affairs in Higher Education
(Also listed as EDL 760.) 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
(Also listed as EDL 763.) 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
Previews 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
Surveys 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 occupational 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. May be taken for letter grade or pass/unsatisfactory.

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 students to further develop skills in counseling, appraisal, research, or other related areas under faculty direction. Prerequisite: permission of instructor.

863-4 Techniques of Counseling
Laboratory practice in individual counseling techniques; focuses on the development of basic skills and procedures. Pre- or corequisite: 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 and Group 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, 860 and/or department permission.

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 department permission.

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: CNL 865, 866 or RHB 801, 802 or permission of instructor.

868-1 to 4 The Role and Function of the School Psychologist
Overview of the school psychologist’s role and function. Considers the history and ethical and legal issues of the profession. Emphasizes the consultation, teaming, assessment, in-service, and counseling aspects of the role. Course is taken concurrently with the assessment sequence and internship in the school psychology program.

869-4 Student Affairs Administration in Higher Education
(Also listed as EDL 762.) Surveys student personnel services in colleges and universities. Consideration is given to the organization, administration, and rationale of these services. Prerequisite: CNL 700.

870-4 Practicum in Student Personnel Services in Higher Education
Provides opportunity to work in an area of student personnel services under supervision. Includes weekly seminar. Graded pass/unsatisfactory. Prerequisite: RHB 701, EDL 751, CNL 700.

871-10 Internship: Student Personnel Services in Higher Education
This field-based experience provides human services master’s degree students with advanced training, supervision, and experience in student personnel services in higher education. Prerequisite: RHB 701, EDL 751, 869; CNL 700, 870, 755, 667, 762.

880-4 Process Consultation in Student Affairs in Higher Education
(Also listed as EDL 764.) 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 969.

950-4 Personality Theory and Psychopathology
Focuses on the development of personality throughout the life span 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.

521-3, 522-3 Graduate Survey in Principles of Economics
Basic micro- and macroeconomics theory designed for persons having had no previous work in economics. Economics 521 and 522 are prerequisites for all 600 and 700 level courses. Additional requirements may be indicated for some courses.
523-2 Survey of Microeconomics
An introduction to microeconomics. Provides students with facts, theories, and modes of reasoning regarding individual and business behavior. The course is sharply focused to prepare students to succeed in the MBA program at Wright State.

524-2 Survey of Macroeconomics
An introduction to macroeconomics. Enhances the student's ability to understand the aggregate economy and how it influences business decisions. The course is sharply focused to prepare students to succeed in advanced course work in the MBA program.

602-3 Monetary Economics
Analysis of monetary policy development and the theory of money market behavior. Emphasizes the relationship between money and national economic conditions.

609-3 Applied Econometrics
Application of economic theory, mathematical modeling, and statistics to the measurement and forecasting of economic relationships. Emphasis is on specification, estimation, and hypothesis testing. Prerequisite: MBA 581, 582. (Previously listed as EC 709.)

610-3 Introduction to Mathematical Economics
Application of mathematical tools in the formulation of economic theory. Methods used in model construction.

625-3 Development of Economic Thought
Historical development of economic thought and philosophies. Prerequisite: EC 521 and 522 or instructor permission.

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 institutions of various capitalist and socialist economies including economies in transition. Comparative analysis presents a basis for evaluating government policy options.

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
Policies of economic development in low income countries as it relates to population growth, cultural change, industrialization, and distribution of wealth.

712-3 Forecasting Economic Activities
Techniques and theories used in forecasting. Practical methods and problems are stressed. Prerequisite: EC 521 and 522, EC 709 or instructor permission.

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
History of economic policy and the evolution of contemporary institutions.

722-3 Economics for Managers
Applies economic theory and methods to business and administrative decision making. Prescribes rules for improving managerial decisions. Tells managers how things should be done to achieve organizational objectives efficiently. Also helps managers recognize how macroeconomic forces affect organizations, and describes the economic consequences of managerial behavior. Special attention is paid to the operation of the firm in a global economy. Prerequisite: EC 523, 524, and MBA 581 or equivalent.
723-3 International Business and the Global Economy
Theories, practices, and patterns of international business and the effect of globalization on the business environment in the U.S. Topics may include international markets, international institutions such as the World Trade Organization, multinational corporations, legal and cultural considerations in conducting international business, and global business strategies. Prerequisite: 21 of 27 credit hours from the Business Competency and Functional Area courses.

725-3 Economic and Social Systems
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, intraregional 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, MBA 781, 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 521 or EC 523 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 Seminar
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. Pre- or corequisite: EC 715, 717, or permission of instructor.

781-2 to 4, 782-2 to 4, 783-2 to 4 Research in Economics
Titles vary. Intensive reading or research in selected fields of advanced economics.

785-6 to 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.

Education/ED
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

600-3 Classroom Management-Learning Theory
An application of a variety of discipline models for use in diverse settings and discussion of recent research, practice, and innovation in the field of classroom management. Prerequisite: ED 622, 602, 621, 612.

602-4 Education in a Pluralistic Society
Introduces students to foundational analysis of the relationship between public education in a democracy and the critical social issues and forces impacting renewal efforts. Course focuses upon curricula, materials, strategies, and techniques for instructing learners with cultural, social, economic and intellectual differences. Topics include cultural pluralism, culture, ethnicity, race, sexism, WASP ethnic, U.S. Mosaic.

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 evaluation and implementation.
606-5 Reading and Literacy Instruction I
Assessment of current literacy levels, instructional procedures, and an overview of instructional materials. Students are expected to carry out assessment and instructional procedures within their internship classrooms and to be associate instructors to the teaching in the areas of oral language, children's literature, reading, and writing. Prerequisite: ED 622, 602, 621, 612.

607-5 Reading and Literacy Instruction II
Course extends student knowledge of literacy instruction and addresses more advanced levels of literacy including textbook study and research. Students are expected to carry out instructional procedures within their internship classrooms and to be associate instructors to the teachers in the areas of oral language, children's literature, reading, and writing. Prerequisite: ED 622, 602, 621, 612.

608-6

611-4 Early and Middle Childhood

612-1 to 3 Field Experience I
The first field experience in the PYP provides an opportunity to work in a K-12 school and/or human service agency setting in order to initiate the task of applying theory to practice. Graded pass/unsatisfactory. Prerequisite: ED 622, 602. Corequisite: ED 621.

614-1 to 3 Field Experience II
The second field experience in the PYP provides an opportunity to work in a K-12 school and/or a human service agency setting(s) as a laboratory to implement the objectives of the second quarter of this program. Graded pass/unsatisfactory. Prerequisite: ED 612.

615-3 Improvement of Elementary Reading Instruction
Curriculum, methods, materials, and evaluation in reading designed to improve the teacher's instructional skills.

616-1 to 3 Field Experience III
Consideration of selected scientific principles which have application in the elementary school. Inquiry through a laboratory approach is emphasized. Graded pass/unsatisfactory. Prerequisite: ED 614.

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.

621-3 Human Development: Research Perspective
Apply basic research techniques and methods to the study of human development, learning, growth, and achievement. Engage in observational analysis of children in the classroom setting, putting theory into practice. Prerequisite: ED 602, 622. Corequisite: ED 612.

622-3 Instructional Design and Technology
Course introduces students to a broad spectrum of instructional technologies, techniques, and approaches that are workable in today's complex classroom. Students will utilize and integrate a broad base of educational computing and technology applications to enhance student learning and professional productivity.

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.

631-3 Extending Literacy Skill Through Secondary School
Course provides the content area for secondary teachers with reading and writing strategies to help solve the problems encountered in grades 7–12. Reading comprehension is a key element in solving the many problems of classrooms that stress content. Writing skills and strategies are taught to help students communicate more effectively in all content areas. Prerequisite: ED 600.

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 Secondary Education: Issues and Trends
An examination of major trends and issues facing those who work with adolescents in the education system. Such elements as school organization, curriculum, assessment, funding, and instruction are included. Prerequisite: ED 622, 602, 621, 612.

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 number 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.

641-6 to 15 Internship/Seminar
Students are assigned to a public school full-time for solo teaching under the direct supervision of an experienced classroom teacher. Includes weekly seminar. Graded pass/unsatisfactory. Prerequisite: PYP program of study through Spring.

645-3 Internship Assessment Seminar
Final assessment of the Professional Year Program includes the portfolio, exhibition, and demonstration of teaching proficiency. Prerequisite: ED 641.

646-3 Induction Year Inquiry Project Design
Each student will develop a research topic during the summer term and, after instructor approval, complete the research project across the coming school year. Prerequisite: ED 621, 641.

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.

651-6 to 15 Internship/Seminar: Adolescence
Interns are assigned to a secondary public school full-time for solo teaching under the direct supervision of an experienced classroom teacher. Includes weekly seminar. Graded pass/unsatisfactory. Prerequisite: Must have completed Professional Educators Program courses.

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.
662-1 to 6 Psychological Foundations of Education and Classroom Management
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 Inquiry Into 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.

712-3 to 4 Improving Science Instruction in the Elementary School
Consideration of selected scientific principles that have application in the elementary school. Inquiry through a laboratory approach is emphasized.

716-3 Foundations of Reading Instruction
Development of effective reading instruction based on children’s language acquisition and development.

717-5 Instruction in Word Study: Phonics
In-depth analysis of how people learn printed words related to instructional procedures in schools. Students will apply knowledge in a tutoring situation.

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.

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.

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.

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.

771-1 Inquiry Project Completion
To be taken the term PEP interns complete the inquiry project. Students complete research and write the inquiry project paper. Prerequisite: Completion of Professional Educators Program.

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.

670-1 to 4 Workshop in Early Education
(Also listed as EDT 670.) 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:
Typical and Atypical
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.

720-4 Advanced Curriculum Planning 1: 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 art—
visual art, poetry, music, and creative
movement. Field experience required. Field experience required. Prerequisite: EDE 712, EDE 745 or
equivalent.

721-4 Advanced Program Planning II: Integrating
Math and Science
Continued examination of developmentally
appropriate curriculum for young children.
Integrated planning for cognitive concepts
including number, representation, visual/
spatial skills, classification, logical thinking,
and problem solving. Field experience
required. Prerequisite: EDE 712, 745 or
equivalent.

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. A variety of types
will be discussed including formal and
informal observation, play-based, authentic,
and portfolio. Field experience required.
Prerequisite: EDE 712, EDE 745 or
equivalent.

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.
Prerequisite: EDE 712, EDE 745 or
equivalent.

744-3 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.

745-3 to 6 Foundations in Early Childhood
Education
Study of the history, theory, goals, programs,
approaches and related research underlying
early childhood education, including early
intervention, and early childhood special
education as well as other program models
and philosophies such as Reggio Emilia,
High Scope, Montessori, etc. Prerequisite:
EDE 712 or concurrent enrollment.

750-4 Designing and Administering Family
Centered Early Childhood Programs
Examines roles of the administrator, including
hiring, training, evaluation, accreditation
regulation, program planning, marketing, and
budgeting. Emphasizes sensitivity to the
needs of families and communities.
Prerequisite: EDE 712 and EDE 745 or
equivalent. (Previously listed as EDE 750
and EDE 751.)

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 EDE 809; permission of advisor.

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.

624-4 Addressing Learning Differences
An advanced course in addressing learning differences that stresses the need to integrate issues of educational assessment, instructional adaptations, behavior management, and collaboration. Purpose is to orient and better prepare developing professional educators to function effectively in inclusive instructional settings for adolescents. Prerequisite: ED 622, 602, 621, 612.

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.

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.

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.

645-3 Career Education and Occupational Training for Exceptional Individuals
Role of occupational training in the curriculum; relationships with the world of work; problems of organizing and administering; methods and techniques used in developing occupational interests and abilities at various levels. Direct work with clients required. Prerequisite: EDS 651 or 655 or RHB 301 or 702.

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.

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.

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 habitilation. Participation with clients is required. Prerequisite: EDS 651, 652.

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.
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. Prerequisite: ED 603 or 604 or teaching certificate.

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 EDS 642 and 655.

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. Prerequisite: ED 651 or 655.

661-10 to 12 Internship: Special Education
Graduate student teaching assignment for graduate students seeking licensure to teach students with mild/moderate, moderate to intensive educational needs. Required for students without previous student teaching experience. May be taken for letter grade or pass/unsatisfactory. Prerequisite: All Special Education course requirements.

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 comprehensive examination. Graded pass/unsatisfactory.

720-4 Creative Problem Solving
Introduction to creative problem-solving models and approaches that can be used by classroom teachers to involve students in the solutions of problems.

722-4 Education of the Gifted
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.

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: EDS 722.

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 course work 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.

799-1 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.

Educational Leadership/EDL
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

660-1 to 4 Programming in Residential Life (Variable Topic)
Provides an orientation to the university for new residence services paraprofessionals to prepare them to be effective in their roles. Participants will be exposed to the various student services available on campus as well as aspects of student development, the mission of the university, residence services, and new student orientation. May be taken for letter grade or pass/unsatisfactory.

661-1 to 4 Student Development for Residential Life Programs (Variable Topic)
Provides an overview of various student development concepts and functions within a residential setting. Focuses on knowledge and skills specifically for paraprofessional staff. Topics include community development, multiculturalism, peer counseling, interpersonal communication, conflict mediation and resolution, developmental programming, and developmental discipline. May be taken for letter grade or pass/unsatisfactory.
662-1 to 4 Special Topics in Student Affairs in Higher Education
Special topics in selected areas; in Student Affairs in Higher Education designed to focus on management trends, theoretical frameworks, critical issues, and specific professional areas within Student Affairs. Past topics have included Student Housing/Residential Life and Management Issues in Student Affairs. Prerequisite: EDL 760 or CNL 700.

670-1 to 4 Workshop in Educational Leadership
Intensive study of a selected area of the school curriculum and educational administration to meet the needs of in-service teachers, administrators, and curriculum supervisors. May be taken for a letter grade or pass/unsatisfactory.

711-1 to 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.

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.

721-1 to 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

730-4 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.

733-1 to 4 Seminar: Professional Development for Teachers
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. May be repeated up to four hours. Graded pass/unsatisfactory. Prerequisite: EDL 730, 732.

740-1 to 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 education profession.

741-1 to 4 Instructional Design
Management and leadership skills as related to organizational patterns, staffing, utilization of space, time, and facilities at the building level.

751-4 Statistics and Assessment For Education
Introduction to descriptive and inferential statistics and their application to assessment procedures.

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.

757-1 to 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.
760-4 Introduction to Student Affairs in Higher Education
(Also listed as CNL 700.) An overview of the history, philosophy, organization, and structure of student personnel services. Various student affairs functions and professional competencies are presented. Current and future trends and issues in student affairs are considered.

761-4 Theories of Student Development and Assessment
Studies theories of student development and their use in research and practice in student affairs, focusing specifically on college students. Prerequisite: EDL 760 or instructor permission.

762-4 Student Affairs Administration in Higher Education
(Also listed as CNL 869.) Surveys student personnel services in colleges and universities. Consideration is given to the organization, administration, and rationale of these services. Prerequisite: EDL 760, 761.

763-4 Campus Ecology
(Also listed as CNL 755.) Studies of campus ecology and the changing demographic and developmental issues facing college students. Studies the impact of the college environment on student development and the interaction between students and the environment. A combination of theory and research regarding college students and the environment are studied and applied. Prerequisite: EDL 760, 761, and 762.

764-4 Process Consultation in Student Affairs in Higher Education
(Also listed as CNL 880.) Studies theories, models, and process techniques for collaborative consultation with other university personnel, student organizations, and community agencies. Focus is on a systems approach of consultative interaction and collaborative relationships which foster college students' development. Prerequisite: EDL 760, 761, 762, and 763.

765-4 Practicum in Student Affairs in Higher Education
Provides an opportunity to work under supervision in an area of student affairs. This field work experience is accompanied by weekly on-campus seminars. Prerequisite: EDL 762.

766-4 Advanced Seminar in Student Affairs in Higher Education
Graded pass/unsatisfactory. Prerequisite: EDL 764, 765.

767-1 to 10 Internship in Student Affairs in Higher Education
This field-based experience provides students with advanced practice and supervision in their major specialty area. Graded pass/unsatisfactory. Prerequisite: EDL 764, 765 or instructor permission.

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.

774-1 to 4 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 773.

775-1 to 4 Leadership for Instructional Improvement
Understanding teaching from research and methodological viewpoints. Emphasis on examining various bases of teaching and improving instruction techniques.

776-1 to 4 Supervision of Instruction and Personnel
Emphasis on general supervision practices, personnel management, and staff performance evaluation. Prerequisite: EDL 775.

780-1 to 4 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.
781-1 to 4 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.

791-1-4 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.

792-1 to 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.

793-1 to 4 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.

796-1 to 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.

858-4 Advanced Educational Measurement: Theory and Practice
Test construction, evaluation, standardization, validation, reliability, item analysis, norm setting, criterion referencing, selection, and interpretation of standardized tests. Prerequisite: EDL 751.

671-3 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. May be taken for letter grade or pass/unsatisfactory. Prerequisite: EDL 920.
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.

926-4 The Community College  
Explores the historical roots of the most exciting, important innovation in American higher education since the Second World War, the community college. How and why did they come into being, how do they really work, and how can we make them more effective? 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.

929-4 The Role of Intercollegiate Athletics in Higher Education  
Explores the role and impact of athletic programs at the intercollegiate level. Students study administrative and organizational structure, specialized functions, and professional career opportunities within the field of intercollegiate athletics. Planning, financing, programming, and management are studied, as well as the role of athletics within the educational experience. Prerequisite: EDL 920.

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.

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.
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.

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.

607-4 Coordination Techniques

Procedures in organizing and implementing a vocational program, including recruitment, selection, and evaluation of students and training stations: concurrent classroom instruction; and in-depth study of the duties, problems, and techniques involved in coordination.

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: EDT 633 or equivalent.

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.

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.

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 322; OA 213. Corequisite: ED 327. (Previously listed as ED 635.)

670-1 to 6 Workshop in Educational Technology

(Intensive, practical study in a selected area of educational or applied technology. Titles vary.

700-2 Entry Seminar for Educational Technology

Introductory seminar into educational technology programs. Students should take this class before or concurrently with their educational technology coursework.

711-4 School Media Collection Development

Focuses on the process for developing school library media center collections. Includes policy development, selection, acquisition, weeding, evaluation, development and use of collections, and copyright/intellectual freedom issues.

714-1 Online Communication

Introductory and extended instruction in telecommunications topics including hardware and software requirements, online etiquette, e-mail, copyright issues, file transfers, maintenance and troubleshooting. The class meets only electronically.

715-4 Information Retrieval Through Technology

Search strategies are developed and information retrieval technology is used to access sources. Instructs how to implement skills in an educational setting.

716-2 Building Online Applications

Provides examples and demonstrations of the advantages of using online resources with educators and children who integrate that access into the learning environment. A major project will be required on a subject area of discipline of choice. Prerequisite: EDT 714 or instructor permission.

721-4 Cataloging and Classification

Focuses on the process of developing library media center retrieval systems for print/nonprint resources. Students learn to establish standard bibliographic description, access points, classification, subject description, and MARC format for automated systems.
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.

727-3 Teaching Strategies and Curriculum Trends in Nonskilled Business Education Subjects
Study of recent developments in the teaching of basic business subjects including vocational programs and the development of appropriate teaching strategies.

728-3 Curriculum and Materials in Economic Education
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.

729-3 Teaching Strategies and Curriculum Trends in Accounting and Data Processing

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.

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.

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.

746-4 Teaching Information and Research Skills
Major concepts covered include the application of a nonlinear information skills model across curricula: interdisciplinary and authentic curriculum design; and electronic information searching skills.

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.

751-4 Educational Use of Video-Based Technology
Studies the potential, limitations, and techniques for effectively using ITV, radio, distance learning, telecommunications, and interactive video.

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.

763-4 Young Adult Literature
Students demonstrate applications of young adult literature for ages 12-21 using booktalks, response-centered approach techniques, literary projects, voices in young adult literature discussions, response journals, and media and young adult literature discussions.

770-1 to 4 Independent Study
Individualized course of study under the supervision of the faculty. May include, but not limited to, extensive readings, the performance of a research project, a paper, or a production.

782-4 Developing Multimedia Productions
Students use elements of instructional design and storyboarding techniques to translate instruction into various types of multimedia presentations.

786-4 Applications of Computers in Education
Types of educational software and applications, software evaluation, curriculum development, and lesson planning integrating computer courseware.

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.
Electrical Engineering/Courses

799-2 Exit Seminar in Educational Technology
Individual and group study of problems related to educational technology. Enrollment is limited to department majors. Should be taken near or at the completion of master degree program.

817-3 Issues & Implications of Telecommunications in the Education Environment
Students meet in seminar-fashion both in the traditional as well as virtual classroom. All will participate in an interactive, online discussion group. Topics will focus on creating virtual entities, developing a sense of community using online tools, the developing communication infrastructure, how new technologies affect children in the school, the home, and the future job market.

839-4 Instructional Design and Development
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 739.)

901-4 to 4 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.

895-4 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. (Previously listed as EDT 795.)

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.

975-4 Directed Study
Designed for students enrolled in the Educational Specialist degree program with a focus on technology. Involves library research, analysis, evaluation, problem solving, and critical thinking.

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, Thevenin 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 304.

504-1 Circuit Analysis II Laboratory
Application of AC concepts, computer-aided circuit analysis, two-port networks, and power theory. 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 and 302.

522-4 Linear Systems II
Covers discrete time signals and systems, the z-Transform, input/output theory and discrete Fourier transform, IIR and FIR filter design, relationships, and sampling. Prerequisite: EE 321.

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 501, 502. Corequisite: 532.

532-1 Electronic Devices Laboratory
Applications of diodes and transistors in analog circuits, design of bias circuits transistors. Prerequisite: EE 501 and EE 502. Corequisite: EE 531.
545-4 Electromagnetics
Developments in the basic concepts of vector calculus and their application to electromagnetics, electrostatics, and magnetism; 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. Transmission line equations and application of Smith chart. Wave propagation in rectangular waveguides. Introduces radiating antennas. Rudimentary design of typical systems containing transmission lines, waveguides, and antennas. Prerequisite: EE 345.

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.

615-3 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, and root locus techniques. Prerequisite: EE 613, 614.

616-1 Control Systems II Laboratory
Application and testing of control systems theory with electromechanical systems. Prerequisite: EE 613 and 614. Pre- or corequisite: EE 615.

617-3 Digital Control Systems
Covers sampled spectra and aliasing, analysis and design of digital control systems using root locus and transform techniques; discrete equivalents of continuous controller and quantization effects, introduction to programmable logic controllers. 3 hours lecture, 4 hours lab. Prerequisite: EE 522 and 615.

618-4 Control Systems Design Project
A project-oriented design course, integrating design methodology with the principles of controller design developed in previous courses. Topics include project planning, system specs, documentation, design reviews, written and oral reports, and system test. 2 hours lecture, 2 hours lab. Prerequisite: EE 617, 620.

619-4 Introduction to Fuzzy Logic Control
(Also listed as CEG 619) Foundations and philosophy of fuzzy logic and applications to control theory. Relationship between classical PID control and fuzzy rule-based control. Techniques for rule construction and adaptive fuzzy logic controllers. Case studies of fuzzy logic control applications. (3 hours lecture and 2 hours lab.) Prerequisite: EE 613 and 614.

620-1 Digital Control Systems Laboratory
Sampling, temperature control on a microprocessor-based system, PLC implementation, quantization error computational delay, frequency response. Prerequisite: EE 615, 616, CEG 611. Pre- or corequisite: EE 617.

621-4 Communication Theory
Analysis of communication systems using the Fourier transform and the convolution integral. Discussion of Nyquist's sampling theorem and an introduction to binary pulse code modulation (PCM). Various analog (AM, SSB, WBFM) and digital (BPSK, AK, FSK) modulation techniques are also discussed and analyzed. Prerequisite: EE 321.

624-4 Numerical Methods for Engineers
Root location, polynomial interpolation, numerical methods for linear-systems analysis, matrix methods in circuit analysis, frequency domain circuit-analysis techniques. Prerequisite: EE 321, MTH 253, proficiency in "C", Pascal or FORTRAN. (Previously listed as EE 525.)

630-4 Distributed Systems
Distributed constants and traveling waves in various types of physical systems, A-C steady-state in distributed systems. Phase and group velocities. Reflections, standing wave ratios, and impedance matching techniques. Prerequisite: EE 322, MTH 232.

631-3 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, EE 531 and EE 532. Corequisite: EE 632.
632-1 Electronic Circuits Laboratory
Design of single and multiple stage amplifier circuits, feedback amplifiers, circuits to meet frequency response specifications and output stages. Prerequisite: EE 531 and EE 532. Corequisite: EE 631.

634-2 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.

635-4 Design and Implementation of Analog and Digital Filters

636-4 Digital Signal Processing Theory, Application and Implementation
Introduces principles and applications of digital signal processing (DSP) from the design and implementation perspective. Topics include analog-to-digital/digital-to-analog converters and digital filters, Fourier analysis algorithms, and real-time applications—all implemented on a TMS 320C30 floating Point DSP Chip. Prerequisite: EE 322, CEG 220 or CS 240.

644-4 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, 632.

645-4 Electromagnetic Compatibility
Identification of possible sources of electromagnetic interference (EMI) in an electronic device or system. Fundamental EMC design principles concerning conducted and radiated emissions, reduction of susceptibility to EMI and EMI shielding. Prerequisite: EE 545.

646-4 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.

647-4 Antenna Theory and Design
Computer-aided design and analysis of wire antennas, feed networks, and antenna arrays using antenna CAD software. Covers linear dipole antennas, antenna arrays, thin-wire antennas, moment method analysis (vee dipole, folded dipole, etc.), broadband and frequency-independent antennas. Prerequisite: EE 346.

648-4 RF/Microwave Systems Design Projects
A project-oriented design course, integrating design methodology with the principles of microwave circuit analysis and electromagnetic wave propagation, developed in previous courses. Formal documentation, design reviews, and reporting are required. Prerequisite: EE 646.

649-4 Pulse and Digital Circuits
Design, analysis, and application of pulse and switching circuits using both Field Effect Transistors (FETS) and Bipolar Junction Transistors (BJTS). Transistor level design of digital integrated circuits including NMOS, CMOS, TTL, and ECL logic families. Design of digital interface and buffer circuits. Transmission line effects in digital applications. 3 hours lecture, 3 hours lab. Prerequisite: EE 631, 632.

651-4 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.

654-4 VLSI Design
(Also listed as CEG 654.) Introduction to VLSI system design. Topics include CMOS devices and circuit design techniques, basic building blocks for CMOS 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, EE 632, and EE 651.

655-4 Electronic Circuits Design Project
A project-oriented design course, integrating design methodology with principles of integrated circuit design developed in previous courses. Focus is an integrated circuit design project including the topics of project selection, planning and management, system specification, documentation, design reviews, written and oral reports, and testing. 2 hours lecture, 4 hours lab.
656-4 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 andinverse kinematics, trajectory planning, Jacobians, and control. Prerequisite: MTH 253; proficiency in Pascal, C, or FORTRAN programming.

658-4 Digital Integrated Circuit Design with PLDs and FPGAs
(Also listed as CEG 658.) Design and application of digital integrated circuits using programmable logic devices (PLDs) and field programmable gate arrays (FPGAs). A commercial set of CAD tools ( Mentor Graphics and Xilinx) are used in the lab portion of the course. Prerequisite: EE 651.

659-4 Integrated Circuit Design Synthesis with VHDL
(Also listed as CEG 659.) Application of VHIC hardware description language (VHDL) to the design, analysis, multi-level simulation, and synthesis of digital integrated circuits. A commercial set of CAD tools (Mentor Graphics) are used in the lab portion of the course. Prerequisite: CEG 220, EE 260.

673-4 Communication Systems Design
The concept of probability is reviewed and extended to the analysis of random process theory. Topics include the central limit theorem and the study of narrowband Gaussian noise. A complete noise study of the AM and FM analog modems is made. The matched filter is also introduced. 3 hours lecture, 2 hours lab. Prerequisite: STT 363 and EE 421.

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.

676-4 Communication/Signal Processing Design Projects
A project-oriented communication and signal processing design course involving a problem definition stage, an analysis and design stage, and a final implementation stage. Specific topics include project selection, planning and management, system specification, design reviews, written and oral reports, and final system testing. 2 hours lecture, 4 hours lab. Prerequisite: EE 636 and either EE 635 or EE 673.

678-3 Coding Theory
(Also listed as MTH 656 and CEG 678.) Introduction to the essentials of error-correcting codes, the study of methods for efficient and accurate transfer of information. Topics covered include basic concepts, perfect and related codes, cyclic codes, and BCH codes. Prerequisite: MTH 253 or MTH 355 (or equivalent).

680-1 to 4 Selected Topics in Electrical Engineering
Topics and prerequisites vary.

699-1 to 5 Special Problems in Engineering
Special problems in advanced engineering topics. Titles vary. May be taken for a letter grade of pass/unsatisfactory.

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. Graded pass/unsatisfactory.

701-4 Linear Systems
(Also listed as EGR 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: EE 521.

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: Familiarity with Linear Algebra.

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, 761.

716-4 Kalman Filters and Applied Estimation
Least square estimation, minimum mean square error estimation, maximum likelihood estimation, maximum a posterior estimation, consistency testing, Kalman filters, extended Kalman filters, iterated extended Kalman filters, α-β-γ filters, adaptive estimation, Monte Carlo simulations and case studies.
Prerequisite: EE 702, 761.

717-4 Multisensor/Data Integration
Prerequisite: EE 702, 761.

718-4 Multitarget Tracking and Data Association
Prerequisite: EE 702, 761.

720-3 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 617, 702.

725-3 Principles of Modern Control Theory
Calculus of variations for continuous processes. Euler-Lagrange equations and the use of Lagrange 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.

738-4 Analysis and Simulation of Communication Networks
Analysis and simulation of networks, including both LANs and WANs. Dependence of network throughput, latency, average delay, robustness on network protocol, routing, flow control, and traffic dynamics as modeled by queuing theory. Required design project based on COMNETIII software.
Prerequisite: EE 521, STT 363 or equivalent.

740-4 Information 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: EE 761.

741-4 Power Semiconductor Devices
General-purpose, fast-recovery, and Schottky diodes; performance parameters: power BJT's, MOSFET's, and MOSIFT's; 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 632.

742-4 Power Electronics II
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.

743-4 Power Electronics III
Power factor correction under nonlinear load conditions, harmonic reduction, utility line disturbances, uninterruptible power supplies, international standards on electromagnetic pollution, low-frequency inverters, residential and industrial applications of power electronics, and characteristics of electric energy storage components. Course includes an independent project.
Prerequisite: EE 742.
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.

746-4 Electromagnetic Simulation Methods I: Finite Difference Time Domain Method
Direct solution of Maxwell's differential equations in the time domain using the finite-difference time-domain (FDTD) method. Absorbing boundary conditions and waveguide or plane wave excitation methods. Application to the solution of problems relevant to radiation, radar cross-section (or scattering) and microwave circuit design. Prerequisite: EE 545, 546 or equivalent.

747-4 Electromagnetic Simulation Methods II: MoM
Wave equation and integral formulations for electromagnetic (EM) problems. Methods of moments (MoM) and its implementation. Application of one-and two-dimensional EM problems. Comparison with the finite element method. Prerequisite: EE 545, 546 or equivalent.

752-4 VLSI Subsystem Design
(Also listed as CEG 752.) CMOS VLSI subsystems including data path operators, counters, multipliers, memory elements, and programmable logic arrays. VLSI circuits for FIR and IIR filters. VLSI circuits for digital data exchange systems. 3 hours lecture, 2 hours lab. Prerequisite: EE 654 or CEG 654.

753-4 VLSI Design Synthesis and Optimization
(Also listed as CEG 753.) VLSI architectural-level synthesis and optimization including data-path synthesis, control-unit synthesis, scheduling, and resource sharing. Logic-level synthesis and optimization including two-level and multi-level combinational logic optimization, and sequential logic optimization. 3 hours lecture, 2 hours lab. Prerequisite: EE 654 or CEG 654.

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 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.

761-4 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: Familiarity with Fourier Theory.

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.
880-1 to 4 Selected Topics in Systems Engineering
Selected topics in current research and recent developments in systems theory and engineering. Titles vary.

890-1 to 4 Special Problems
Special problems in advanced engineering topics. Titles vary.

895-1 to 5 Ph.D. Dissertation Research

899-1 to 5 Thesis
Graded pass/unsatisfactory.

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.

699-1 to 5 Special Problems in Engineering
Special problems in advanced engineering topics. Prerequisite: instructor approval. Graded pass/unsatisfactory.

701-4 Linear Systems
(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: EE 521.

702-4 Systems Engineering and Analysis
Exposes students to the design of systems and tools for the analysis of complex technological systems. Prerequisite: STT 361, MTH 232, MTH 233.

703-4 Computational Engineering Analysis
Course is designed to expose students to practical and efficient computational techniques that are routinely encountered in modeling, simulation, and analysis of engineering problems. Prerequisite: programming, linear algebra, and differential equations.

704-4 Design Optimization
Concepts of minima and maxima; linear, dynamic, integer and nonlinear programming; variational methods. Interdisciplinary engineering applications are emphasized.

705-4 Design and Analysis of Engineering Experiments
Introduction to planning and analysis of engineering experiments. Topics include basic statistics review, linear models, regression, analysis of variance, experiment designs, response surface methods, and engineering applications.

691-1 Ph.D. Seminar
Ph.D. seminar course required of all students seeking the Ph.D. in Engineering. Graded pass/unsatisfactory.

Engineering Physics/EP

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

622-4 Applied Optics
(Also listed as PHY 622.) 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 244.

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 242 and 244; PHY 260 or CHM 121.

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.

533-4 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.

547-4 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.

600-4 Advanced Technical Writing
Reviews the fundamentals of technical writing with an 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.

602-4 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 British Literature
Intensive study of British literary history and/or the work of individual British writers. Intended to develop an understanding of literature within the contexts of the author's life, literary production, or historical background.

620-4 Studies in American Literature
Intensive study of American literary history and/or the work of individual American writers. Intended to develop an understanding of literature within the contexts of the author's life, literary production, or historical background.

630-4 Studies in Literature, Gender, and Sexuality
Intensive study of literature from the perspectives of gender theory. Intended to develop an understanding of gender and sexuality as important both to literature and to its critical appreciation.

640-4 Studies in Ethnic and Regional Literature
Intensive study of literature from different regions of America or reflecting the experiences of different ethnic groups. Intended to develop an understanding of race, region, and ethnicity as important both to literature and to its critical appreciation.

650-4 Studies in Literary Theory
Intensive study of literary theory in order to develop an understanding of critical questions and approaches.

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 Genres and Themes
Intensive study of literary genres (e.g. poetry, the novel, satire) or of literary themes. Intended to develop an understanding of formal and structural aspects of literature.

670-4 Studies in World Literature
Intensive study, in English, of non-European literature, focused nationally, regionally, cross-culturally, thematically, or generically.

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 Language and Literacy
Intensive study of linguistic and/or rhetorical approaches to language. Intended to develop an understanding of language history, structure, theory, pedagogy, and context.

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.

684-4 TESOL Methods and Materials
Readings in approaches and methodologies for teaching English to speakers of other languages. Evaluation of techniques and materials used in communicative second or foreign language teaching. 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.

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.

703-4, 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, literature 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. 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, 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.

702-3 Management of Financial Institutions
Analysis of issues relating to the financial management of financial institutions. Prerequisite: MBA 532.

710-3 Investment Management
Concepts, theories, and techniques underlying the development of investment policies and strategies. Prerequisite: MBA 532.
711-3 Seminar in Investments
Advanced treatment of selected topics in investments including options, futures, and portfolio theory. Prerequisite: FIN 710.

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: MBA 731.

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: MBA 731.

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: MBA 532.

760-3 Special Topics in Finance
In-depth analysis of a current trend in finance. Titles vary. Prerequisite: MBA 731.

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: MBA 731.

799-1 to 9 Thesis

French/FR

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

623-4 Seventeenth- and Eighteenth-Century Novel
Mme de La Fayette, Scarron, Fénelon, Montesquieu, Lesage, Prévost, Diderot, and Laclos. Graduate standing and instructor permission required.

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.

654-4 The Nineteenth-Century Short Story
Intensive study of such authors as Balzac, Stendhal, Nodier, Mérimeé, Flaubert, Maupassant, and Huysmans. Prerequisite: Permission of instructor.

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.
648-5 GIS Applications
Students apply GIS techniques to solve public/private sector information and development problems. Solutions entail data analysis and forecasting, using ARC/INFO geographic information system methods. Prerequisite: GEO 647.

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. Prerequisite: GEO 203 or 353 or permission of instructor.

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.

Geological Sciences/GL
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

599-1 to 6 Special Problems
Research and problems designed for specific needs and talents of the students.

600-3 Introduction to Solid Earth Geophysics
The basics of seismic, gravimetric, magnetic, and heat conduction principles as used to determine the geophysical properties of the solid earth. Emphasis on the deeper parts of the crust, the mantle, and the core.

601-4.5 Rocks and Minerals
Study of the structure, symmetry and composition of minerals. The composition, classification, and origin of rocks. Lab emphasizes mineral and rock identification. Prerequisite: GL 252.

604-3 Earth Resources and Environmental Quality
Study of Earth Resources as the economic base of civilization. Natural geologic processes and geochemical cycles of global change are compared with human-induced impact on the environment. Emerging trends in technology and policy matters and their influence on environmental quality are analyzed. Prerequisite: GL 105 and 106, or equivalent.

605-3 Theory and Practice of Ground Water Monitoring
Examines the principles of ground water monitoring system design, drilling/installation of monitoring wells, vadose zone monitoring, and tracer tests. Field practices include well/lysimeter installations, sampling, tracer experiment, logging, and survey with theodolite. Graded Pass/Unsatisfactory.

606-4.5, 607-4.5, 608-4.5 Earth Science for Teachers
Sources and forms of energy operating on the earth and the effects of these operations on the origin, history, and evolution of the earth. 3 hours lecture, 3 hours lab.

609-4 Geologic Hazards and Environmental Quality
Hazards from geologic materials: reactive minerals, the asbestos controversy, radioactive and toxic gasses. Hazards from geologic processes: earthquakes, volcanic eruptions, slope processes, subsidence, floods, coastal hazards. Geologic hazards monitoring, mitigation, and avoidance. Risk evaluation. 3 hours lecture, 3 hours lab.

511-4.5 Structural Geology
Geometry of the structural features of rocks, their geographic distribution, and possible causes. 3 hours lecture, 3 hours lab.

613-5 Geochemistry
Principles governing the distribution of the elements within the earth. Introduction to geochemical methods of research. 3 hours lecture, 4 hours lab.

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
Study of the structure of the Earth as revealed by solid earth geophysics and dynamics of internal geologic processes, and of the large-scale tectonic structure of the North American continent obtained through the Decade of North American Geology Project. Prerequisite: GL 311 or permission of instructor.

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 Applied Geophysics
Introduction to gravity, magnetic, seismic, and electrical methods of subsurface investigation.

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.

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.

631-4 Electrical Methods in Environmental Geophysics
The principles and practices of acquisition and interpretation of data from electrical and electromagnetic geophysical techniques. Prerequisite: GL 622 or permission of instructor.

632-4.5 Sedimentary Systems and Sequences: Carbonates
Interpretation of ancient and modern carbonate systems using sequence stratigraphic principles. Carbonate facies models as predictive tools for hydrocarbon exploration and aquifer modeling. Composition, origin, and diagenesis of carbonate rocks. Prerequisite: GL 382 or 487 or equivalent.

633-1 to 6 Geophysical Field Research
Geophysical research participation in a project of the department. Content and techniques will depend on the particular project, but will normally have an extensive component of field data acquisition. May be taken for letter grade or pass/unsatisfactory.

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 Diagenesis of Sedimentary Rocks
Theory and application of petrographic techniques to studies of carbonate and clastic rocks, with emphasis on diagenesis and porosity development. 2 hours lecture, 2 hours lab. Prerequisite: GL 429 or equivalent.

637-4 Subsurface Digital Imaging and Processing
Digital processing and visualization of seismic reflection and ground penetrating radar data. 2 hours lecture, 4 hours lab.

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 Advanced Facies Analysis
Facies models as prediction tools in oil and gas exploration, interpretation of seismic 2D and 3D data, and resolving ground water and environmental problems in non-regolith aquifers. Prerequisite: GL 251, 253, 487 or equivalents, or instructor permission.
Courses/Geological Sciences

642-4.5 Fossil Vertebrates and Plants
Morphology, geologic record, and geographic distribution of major vertebrate and plant groups characterized by significant fossil representation. 3 hours lecture, 3 hours lab. Recommended preparation: GL 255, 256.

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.

654-4 Ground Water Flow and Transport
Covers the occurrence and movement of ground water, and the advection and dispersion of contaminants in ground water flow regimes. Lab introduces interpreting the hydraulic properties of ground water flow regimes from field data. 3 hours lecture, 2 hours lab. Prerequisite: MTH 230, PHY 244.

655-4 Hydrogeochemistry
Lectures focus on the chemical interactions between natural waters and their geologic environments. Included are chemical principles, carbonate system, silicate equilibria and weathering, and redox reactions. Isotope hydrology and hydrochemical modeling are also introduced. 3 hours lecture, 2 hours lab. Prerequisite: CHM 121, 122, 123 or CHM 191, 192, 193.

656-4 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. Prerequisite: GL 107.

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.

660-0.5 Seminar in Hydrogeology
Explores current topics and contemporary research programs and ideas. Graded pass/unsatisfactory.

661-4 Geologic and Environmental Applications of GIS
Introduces principles and essential elements of Geographic Information System (GIS). DRASIC concept of ground water vulnerability to contamination is incorporated to illustrate data analysis, map algebra, and decision making using GIS. 2 hours lecture, 2 hours lab. May be taken for letter grade or pass/unsatisfactory.

662-4 Process Geomorphology
Study of the processes that create and modify landforms; classification of landforms and what they reveal of past geologic processes and climates. Prerequisite: GL 253, 254 or GEO 201, 322.

663-4 Geologic and Environmental Application of Remote Sensing—Aerial Photographs
The use of aerial photographs for geological mapping, exploration of mineral resources, hydrogeology, hazard monitoring, environmental problems, and land use monitoring and analysis.
664-4 Geologic and Environmental Applications of Remote Sensing—Satellite and Radar Imagery
The use of satellite and radar imagery for geological mapping, exploration of mineral resources, hydrogeology, hazard monitoring, environmental problems, and land use monitoring and analysis. Prerequisite: GL 251, 253, 311 or instructor permission.

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.

670-3.5 Contaminant Hydrogeology
Reviews sources and types of contaminants and discusses their physico-chemical properties and their interactions with the geological environment. The remediation and monitoring of contaminated sites are also introduced. Prerequisite: GL 450/650 or GL 455/655.

674-3 X-Ray Spectral Analysis
Electron microprobe and X-ray fluorescence analysis of rocks, minerals, and other substances are explained and demonstrated.

680-4.5 Crystallography and Optics
Introduces symmetry of crystals and crystal optics. Determination of optical constants of crystals by use of the polarizing microscope. 3 hours lecture, 3 hours lab.

681-4.5 Mineralogy
Chemistry and physics of minerals. Laboratory includes identification of minerals by microscopic, macroscopic, and X-ray techniques. 3 hours lecture, 6 hours lab.

682-4.5 Igneous and Metamorphic Petrology
Study the origin of igneous and metamorphic rocks. Thin sections and hand specimens are used in the laboratory for mineral identification, rock structures, and classification. 3 hours lecture, 3 hours lab.

683-3.5 Sedimentary Petrology
A survey of sedimentary rocks in hand specimen, thin section, and field occurrences, with emphasis on their origin, tectonic significance, and economic potential. Prerequisite: GL 380.

685-3.5 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.

686-4.5 Invertebrate Paleontology
Morphology, geologic record, and geographic distribution of major invertebrate groups characterized by significant fossil representation. 3 hours lecture, 3 hours lab. Prerequisite: GL 255, 256.

687-4 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.

691-4 Geology and Paleontology of Northern Rockies
Three-week field trip to the northern Rocky Mountains is held following summer B term. Participants travel in vans, sleep in tents, and cook their own meals while visiting selected geological and paleontological sites. Prerequisite: Permission of instructor.

692-4 Geology of Southwestern United States
Two and one-half week field trip to the southwestern United States, possibly extending into Mexico, immediately following exam week of fall quarter. Participants travel in vans, sleep in tents, and cook their own meals while visiting selected geological and paleontological sites. Prerequisite: Permission of instructor.

695-3 Geochemical Surveying
Theory, techniques, and application of geochemistry to exploration for economic mineral deposits including hydrocarbons.

699-5 to 6 Special Problems
Research and problems designed for specific needs and talents of the students. May be taken for a letter grade or pass/unsatisfactory.

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.

720-3.5 Isotope Hydrology
Theories and applications of environmental isotopes to hydrologic studies. Both stable isotopes (oxygen, hydrogen, carbon, strontium, nitrogen, sulfur) and radioactive nuclides (H-3, C-14, Cl-36) will be discussed. Prerequisite: CHM 121, 122.
740-3 Sedimentary Basin Analysis
Tectonic classification of sedimentary basins.

748-2 Aquifer Test Analysis Laboratory
This laboratory provides hands-on experience in analyzing and interpreting data from aquifer tests. Case-study data sets are used that come from confined, unconfined, fractured, bounded, leaking, and partially penetrated formations. Constant rate, variable rate, and slug tests are covered. May be taken for letter grade or pass/unsatisfactory. Prerequisite: GL 654 (544). Corequisite: GL 749.

749-4 Advanced Ground Water Flow and Transport
Second-level course in subsurface fluid flow, providing the theoretical background necessary to solve problems involving ground water flow, well hydraulics, aquifer characterization, and contaminant transport. Prerequisite: GL 654 (454). Corequisite: GL 748.

750-4.5 Numerical Analysis of Ground Water Flow and Contaminant Transport
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.

751-4 Ground Water Flow Modeling
The first half of the course introduces the techniques used in constructing and applying mathematical models of ground water flow. The second half features the use of the USGS 3-D flow model. 3 hours lecture, 2 hours lab. Prerequisite: GL 450 (650) and completion of courses in calculus and FORTRAN.

754-4 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. 3 hours lecture, 2 hours lab. Prerequisite: GL 453 (653).

759-2 Advanced Ground Water Management
Study of ground water management case histories and special topics. Prerequisite: GL 650.

760-1 to 3 Hydrogeology Research Seminar
Advanced seminar that addresses current research and special topics in hydrogeology. May be taken for letter grade or pass/unsatisfactory. Prerequisite: GL 450 (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, Hofmannsfhal, Kaiser, Toller, Brecht, and others.

650-1 to 4 Independent Graduate Research
Titles vary.

Health/HLT
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

616-1 to 4 Special Topics in Health
Topics vary. Specific titles announced in quarterly class schedule.
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.

640-1 to 10 The Role of the Nurse in Schools
The nurse as a member of the school health service team. Topics include educational foundations, administration of school health programs, school health services and environment, health counseling (including mental health), and legal and ethical issues. Instructor permission required.

643-1 to 10 School Nursing Practicum
An opportunity for the student to take full responsibility for the application of principles of school health in a school setting under supervision of qualified university and school personnel. May be taken for a letter grade or pass/unsatisfactory. Instructor permission required. Prerequisite: HPR 640.

688-1 to 6 Independent Study (Variable Title)
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.

712-4 Motor Development for Low Incidence Disabilities
Understand how disabilities impact psychomotor development. ADL, mobility, and independence of individuals with disabilities. Knowledge of activities that contribute to an active lifestyle. Prerequisite: HPR 710 or permission of instructor.

713-3 Art, Music, Physical Education
Designed to enhance student's understanding and philosophies of art, music, and physical education as part of the total school curriculum. May be taken for letter grade or pass/unsatisfactory.

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
From the decline of the Western Roman Empire to ca. 1300. Emphasis on Italy, Germany, and France. 590: 265-814, 591: 814-1100, 592: 1100-1350.
605-4 Ancient History
Selected problems in Roman history to the death of Constantine in A.D. 337.

610-4 The Middle Ages
From the decline of the Roman Empire to ca. 1450. Topics vary and can include European, Islamic, and Byzantine civilizations.

615-4 Medieval and Early Modern 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 problems in Latin American nations (e.g., Mexico), particular topics (e.g., Authoritarianism), and colonial Latin American. Titles vary.

660-4 Southeast Asian History
Examines periods of history in nations located between China and India (e.g., Vietnam), or selected topics (e.g., nationalism). Titles vary.

665-4 East Asian History
Examines various periods of Chinese, Japanese, and other East Asian histories or special topics.

670-4 Early American History
Examines colonial, revolutionary, and early republic periods of American history.

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 Asian 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 curatorialship. Prepares students for careers as manuscript librarians, archivists, oral historians, and records management specialists. Prerequisite: HST 710.

715-5 Historical Management Internship
Gives public history plan students a 300-clock-hour internship in cooperating historical agencies. Practical training in various aspects of historical management. 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

720-1 Project
This requirement may be fulfilled either by completion of a historical project, (editing a diary, processing a manuscript collection, curating an exhibit, etc.), or completing a research paper. Prerequisite: HST 715, 727, 730, and 740.

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 Human Factors in Engineering and Design
Introduction to the study of human factors in the design and operation of machine systems. Prerequisite: PSY 105, PSY 110, MTH 230.

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 equipment design. Prerequisite: HFE 506/306, ME 212.

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 506/306, EE 521/321.

650-3 Human Factors Engineering Analysis Methods
Covers a variety of engineering and behavioral analytic techniques critical to the study of work performance. Prerequisite: PSY 105, 110, STT 560/360.

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 advanced human-computer interface design and evaluation of interfaces to simulations. Prerequisite: CEG 220, STT 561/361, HFE 650/450.

665-4 Interactive Systems Modeling, Analysis, and Design
(Also listed as CEG 665.) Provides students with experience in interactive real-time simulation and design, implementation, and evaluation of interfaces to simulations. Prerequisite: CEG 220 or any one of the following: CEG 221, 241, 242 or instructor permission.

671-4 Systems Performance Modeling
Studies quantitative techniques to analyze and predict systems performance. Topics include queueing models, system simulation, model validation, data collection, quantitative analysis of system performance, and system design evaluation. Prerequisite: HFE 650/450, STT 561/361.

676-4 Human Factors Engineering in Aerospace System Design
Application of human factors engineering concepts to aerospace system design. Develops human factors engineering influence on aerospace system dynamics, structure, and control as well as impact on reliability and maintainability. Prerequisite: HFE 671/471.
680-4 Engineering in Occupational Safety and Health
Discusses and demonstrates the role and responsibility of engineers in occupational safety and health related issues. Focuses on the application of human factors engineering design principles as a proactive approach for controlling occupational injuries. Prerequisite: HFE 506(306), 507(307), 650(450).

699-1 to 5 Special Problems in Human Factors Engineering
Topics vary.

711-3 Advanced Human Factors Bioengineering
Advanced applications from a variety of bioengineering subfields are identified and defined with respect to their importance in the practice of human factors engineering. Prerequisite: BME 628(428) or permission of instructor.

723-3 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.

724-2 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 676/476.

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 650/450.

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.

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.

734-4 Experimental Research and Evaluation in HFE
Reviews issues related to designing, conducting, and analyzing experiments. Topics include experimental design, experimental ethics, evaluating statistical results, and writing research papers. Students are required to conduct and analyze an experiment. Prerequisite: HFE 506/306, STT 561/361, or STT 666/466, 667/467.

735-3 Advanced Systems Models
Studies quantitative means of modeling, analyzing, and predicting the performance of human-machine systems. Topics include control theory, estimation theory, fuzzy set theory, information theory, and knowledge-based systems. Prerequisite: HFE 671/471.

743-3 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.

745-3 Advanced Industrial Ergonomics
Discusses and demonstrates the use of ergonomics methods and techniques for controlling physical and physiological stress in the workplace. Specialized biomechanical models introduced. Prevalent ergonomic problems discussed. Real cases from worksites welcomed for discussion. Prerequisite: HFE 507/307.

749-3 Ergonomic Biodynamics
Covers quantitative assessment of human motions. Mathematical descriptions include anthropometry, kinematics, kinetics, and dynamics. The methods of kinesiology, biomechanical modeling, and electromyography are emphasized. Prerequisite: BME 628(428) or permission of instructor.

760-3 Human Factors Engineering in Virtual Reality
Introduction to engineered systems associated with virtual reality. Human factors engineering introduction to engineering details underlying the development of virtual environmental displays. Prerequisite: HFE 671.
780-3 Special Topics in Occupational Cumulative Trauma Disorders
Provides and discusses background knowledge and current issues on cumulative trauma disorders, including epidemiological statistics, pathology, risk factors, analysis methods, control measures, and surveillance tools. Students welcomed to bring real worksite cases for discussion. Prerequisite: HFE 506(306), HFE 507(307).

789-1 Continuing Registration
May be taken for letter grade or pass/unsatisfactory.

690-1 to 5 Special Problems in Human Factors Engineering
Topics vary.

898-1 to 5 Ph.D. Dissertation Research

899-1 to 5 Thesis
Graded pass/unsatisfactory.

Humanities/HUM
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

700-4 Graduate Introduction to Humanities I
A general introduction to interdisciplinary graduate study in the humanities.

710-4 Graduate Research Methods in the Humanities
An introduction to graduate research in the humanities with primary emphasis on research writing.

720-4 Graduate Introduction to Humanities II
Exploration of a single topic or problem from the perspective of a number of disciplines in the humanities.

730-1 to 9 Humanities Project
Individual project with an advisor. Graded pass/unsatisfactory.

791-2 to 4 Topics in Humanities
Problems, approaches, experiments, and speculations in the Humanities.

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.

620-3 Legal Aspects of Managing a Diverse Workforce
(Also listed as LAW 420). Employment discrimination is examined in the broader context of workforce diversity. Major federal laws, court cases, and changing demographics impose obligations and present opportunities for employers and employees.

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.

781-1 to 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.

675-3 Small Business Consulting
Students will work in teams with small businesses to develop a business plan. They will look at marketing, finances, staffing, etc. and will need to start a business or grow an existing business. Provides excellent hands-on application of previous course work.

680-1 to 6 Special Topics
Seminar in an area of current interest in management or human resource management. Topics vary. May be taken for letter grade or pass/unsatisfactory.

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.

703-3 Seminar in Human Resource Management
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: MBA 551.

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: MBA 751.

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: MBA 751.

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: MBA 551.

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.

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: MBA 551.

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 an aid in the design and redesign of organizations. A research project is required. Prerequisite: MBA 551.

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: MBA 551 or equivalent.

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: MBA 551, MGT 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. Prerequisite: MBA 551 and MGT 770.
780-3 to 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. Titles vary.

781-1 to 3 Special Studies in Management
Intensive reading or research in a selected
field of advanced management. Titles vary.

799-1 to 9 Thesis

Management Information Systems/
MIS
Note: See quarterly class schedule or
departmental advisor for further enrollment
restrictions, requirements, or special course
information.

521-3 Survey of Information Systems Technology
Orientation to types of information systems,
database concepts, systems development
processes, and telecommunications.
Fundamentals of modern programming
concepts, environments, tools, and lab
experience. Prerequisite: MBA 572 and
MBA 573 or equivalent.

710-3 Database Management
Database concepts, data modeling using
ER and 00 approaches, relational model,
relational database design, structured query
language, database system implementation,
distributed database concepts, and role of
commercial databases in application
environments. Prerequisite: MIS 521.

720-3 Telecommunications Management
Includes data communications hardware,
software, terminology, and network topology.
Discusses the impact of communications on
business operations, globalization and
management practices, and investigates
the issues related to managing networks.
Prerequisite: MIS 521.

750-3 Information Systems Planning
Focuses on the strategic impact of
information systems, assessment of
organizational technology needs, strategic
and operational planning, and systems
integration. Prerequisite: MIS 521.

760-3 Systems Analysis Methodologies
Surveys basic concepts and techniques of
managing information systems development,
requirements determination, structured
analysis, data analysis, object-oriented
analysis, and documentation. Prerequisite:
MIS 521 or equivalent.

761-3 Systems Design Methodologies
Continuation of MIS 760. Emphasis is on
design concepts and techniques including
structured design, user-interface design,
object-oriented design, coding, testing, and
prototyping. Prerequisite: MIS 760.

770-3 Information Systems Implementation
Focus is on the impact of information
systems, user involvement, diagnosing and
resolving resistance to systems, and applying
implementation strategies. Emphasis on
effective IS implementation. Students
complete a team project, cases, and
readings. Prerequisite: MIS 521.

781-1 to 4 Special Studies in Management
Intensive research in a selected field of
management information systems. Titles vary. Prerequisite: permission of instructor.

Management Science/MS
Note: See quarterly class schedule or
departmental advisor for further enrollment
restrictions, requirements, or special course
information.

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, MBA 581, 582.

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: MBA 782.

755-3 Advanced Quality Management
Advanced study of quality management
philosophy and techniques, including
coverage of ISO 9000 quality standards.
Prerequisite: MBA 781 and MBA 783.

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: MBA 782.
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: MBA 782.

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 World Class Strategies
Through lecture/discussion and case analyses of world-class companies, the development of a company's operations strategy and the key role it plays in directing corporate strategy are examined. Prerequisite: MBA 782.

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.

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.

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: MBA 561.

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: MBA 532, 561.

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: MBA 561.

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: MBA 761, 781.

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: MBA 561.

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: MBA 561.

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: MBA 561.

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: MBA 561.

730-3 Consumerism and Social Issues in Marketing
Critical study of marketing concepts and practices as related to contemporary social issues in the American economy: consumerism, ecology, product safety, truth in advertising, poverty, national interest, social responsibility, and government's role in consumer protection. Emphasis on the institutional and managerial philosophy points of view, not a legal perspective. Prerequisite: MBA 561.
780-3 to 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. Titles vary.

781-1 to 6 Independent Studies in Marketing
Readings or research in a selected field of marketing.

799-1 to 9 Thesis

Master of Business Administration/Courses

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

511-2 Survey of Accounting
An introductory course for students with no previous course work in accounting. Students are introduced to financial statement interpretation as well as managerial uses of accounting information for planning, decision making, and control.

531-2 Financial Reporting and Analysis
An introduction to the concepts and techniques for analysis of financial statements and development of financial reports. Students should be capable of reconstructing firm performance from reports. Prerequisite: MBA 511.

532-2 Survey of Finance
Theories, concepts, and techniques of financial management. Designed for students with no previous course work in financial management and for those with a need to review the basic techniques. Prerequisite: MBA 531.

541-2 Survey of Law
Examines economic, political, and social forces which shape law and impact the management of business. Public law topics include government regulation of markets and employment relationships. Private law topics include contracts, torts, and property.

551-2 Survey of Management
Designed for those with no previous course work in management. Addresses both traditional managerial processes (planning, organizing, leading, and controlling) as well as more contemporary approaches. Covers leadership, motivation, empowerment, and team dynamics.

561-2 Survey of Marketing
Provides an introduction to the structure and function of marketing processes. Discussion focuses on management of the marketing mix variables and how these factors relate to the marketing concept.

571-1 Research & Reports for Business
Develops competency in researching and reporting business issues. Topics include electronic communications and search techniques, business report and presentation fundamentals, and the mechanics of using presentation and word processing software.

572-1 Business Applications Using Database
Introduction to business problem solving using databases. Topics include basic understanding of database fundamentals, application of database to business scenarios, and the mechanics of using personal database software.

573-1 Business Applications Using Spreadsheets
Introduction to business problem solving using spreadsheet software tools. Topics include a basic understanding of quantitative model building, application of spreadsheets to business problems, and the mechanics of using spreadsheet software.

581-2 Survey of Mathematics for Business
Develops competence in quantitative methods for the analysis of business problems. Includes intermediate and advanced algebra, and differential and integral calculus.

582-2 Survey of Statistics
Basic statistical analysis within a problem solving and decision making context. Topics include sampling, probability and distribution, confidence intervals and central location. Statistical software package used. Prerequisite: MBA 581 or equivalent.

680-1 to 6 Independent Study

711-3 Strategic Cost Management
A core MBA course to develop understanding of cost management in the new manufacturing environment. Students must not only understand accounting concepts, but must also demonstrate their application in many different situations. Case work required. Prerequisite: MBA 511, 531, and 532 or equivalent and MBA 783.

731-3 Financial Analysis and Decision Making
Application of finance concepts, theories, and techniques. Emphasis on case problems and decision making. Prerequisite: MBA 532.
741-3 Law, Regulation, Politics and the Social Environment of Business
Interdisciplinary study of the legal, political, regulatory, and social environment of U.S. business firms. Legal and economic regulation topics include restraints on competition, environmental regulation, product safety, health, and quality regulation. Prerequisite: 21 of 27 credit hours from the Business Competency and Functional Area courses.

751-3 Managing People in Organizations
A hands-on, experience-based course devoted to leading people and teams in today's workplace. Emphasizes communication, conflict resolution, influencing strategies, and empowerment principles. Prerequisite: MBA 551 or equivalent.

753-3 Developing and Implementing Organizational Competitive Strategies
Competitive strategy is presented as practice in business and other types of organizations from an integrated (cross-functional) perspective. Industries, competition, and other environmental forces are analyzed to determine an organization's competitive strategy. Students are required to work in teams. Prerequisite: 21 of 27 credit hours from the Business Competency and Functional Area courses.

761-3 Marketing Strategy
Overview of managing the marketing mix variables and discussion of marketing plans, formation of strategies and problem solving. Material will be covered by readings and discussion of cases. Individual and team exercises will be assigned. Prerequisite: MBA 561 or equivalent.

762-3 Business Professionalism
Systematic assessment and development of individual, group, and organizational communication and integrity-building skills as a career foundation for professional business performance. Projects in business ethics and organizational communication develop proficiency in business professionalism tools. (Previously listed as MBA 752.)

771-3 Information, Technology and Organizations
Critical examination of organizational data/information needs, information management strategies, and the technology used to support information management. Using a systems theory approach, this course analyzes both intra- and inter-organizational data flow. Prerequisite: 21 of 27 credit hours from the Business Competency and Functional Area courses.

781-3 Quantitative Methods for Decision Making
Develop quantitative models to aid in analysis and decision making. Decision analysis, time series analysis, queuing models, simulation, linear and nonlinear programming. Prerequisite: MBA 582, MBA 573.

782-3 Managing Operations
Introduction to the management of production and operating systems. Focus on both the design and management of operations. Topics include plant layout, project management, forecasting, production planning, inventory policy, job design, and measurement. Prerequisite: MBA 573, MBA 781.

783-3 Quality Management and Continuous Improvement
Concepts, objectives and applications of quality management with emphasis on continuous improvement in business organizations. Includes application of statistical process control techniques.

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, either MTH 253 or 255, and one of CS 142, 220, 241, EGR 153, for 517, MTH 233, 316, and either MTH 253 or 355.

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, 233.

540-3 History of Mathematics

543-4 Algebra and Functions for Elementary/Middle School Teachers
Polynomial, exponential, logarithmic, rational, and trigonometric functions are studied from a perspective appropriate for a teacher. Computing, programming, graphing, and data collection technology is used. Prerequisite: MTH 128.

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.

546-4 Problem Solving and Mathematical Modeling for Elementary and Middle School Teachers
A framework and useful heuristics for solving problems. Visual thinking and reasoning, metacognition, problem-solving logs and summaries, problem solving individually and in groups, and application of mathematical modeling to real world problem. Prerequisite: MTH 244, 343.

546-4 Concepts in Calculus
An exploration and study designed to provide a conceptual understanding of differentiation and integration with examples of their diverse applications and their connections to algebra and geometry. Prerequisite: MTH 244, MTH 343 or MTH 543.

581-3 Elementary Number Theory
Divisibility properties of integers, prime numbers, congruences, the Chinese remainder theorem, quadratic reciprocity law, Mobius inversion formula, Euler $\phi$-function, other number-theoretic functions. Prerequisite: MTH 231 or junior standing.

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.

607-3 Optimization Techniques
(Also listed as CS 607.) Concepts of minima and maxima; linear programming; simplex method, sensitivity, and duality; transportation and assignment problems; and dynamic programming. Prerequisite: MTH 233, and either MTH 253 or 255.

610-4 Theoretical Foundations of Computing
(Also listed as CS 610.) Turing machines; $\mu$-recursive functions; equivalence of computing paradigms; Church-Turing thesis; undecidability; intractability. 3 hours lecture, 2 hours lab. Prerequisite: CS 666.

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, OR 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 255.

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 255 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.

656-3 Coding Theory
    Introduction to the essentials of error-correcting codes, the study of methods for efficient and accurate transfer of information. Topics covered include basic concepts, perfect and related codes, cyclic codes, and BCH codes. Prerequisite: MTH 253 or MTH 355 (or equivalent).

657-3 Combinatorics
    Topics from permutations, combinatorics, generating functions, recursion relations, and Polya's theory of counting. Prerequisite: MTH 231.

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, and either CS 142 or 241.

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, and either MTH 253 or 255.

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, 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>725-4</td>
<td>Computational Logic</td>
<td>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.</td>
</tr>
<tr>
<td>731-4</td>
<td>Real Analysis I</td>
<td>Lebesgue measure and integration on the real line. Convergence theorems, differentiation of integrals, functions of bounded variation, and absolute continuity. Prerequisite: MTH 730.</td>
</tr>
<tr>
<td>733-4</td>
<td>Real Analysis III</td>
<td>Outer measure, measure, integration, general convergence theorems, Radon-Nikodým theorem, product measure, and Fubini's theorem. Prerequisite: MTH 732 or equivalent.</td>
</tr>
<tr>
<td>751-4</td>
<td>Algebra I</td>
<td>Group theory-isomorphism theorems, Jordan-Hölder theorem, permutation groups, Sylow theorems, finitely generated Abelian groups, and free groups. Prerequisite: MTH 355, 452; or equivalent.</td>
</tr>
<tr>
<td>752-4</td>
<td>Algebra II</td>
<td>Ring theory-polynomial rings, unique factorization, radicals, and Wedderburn-Artin structure theory. Prerequisite: MTH 751.</td>
</tr>
<tr>
<td>753-4</td>
<td>Algebra III</td>
<td>Field theory-simple extensions, Galois theory, solvability by radicals, cyclotomy, finite fields, and Wedderburn's theorem. Prerequisite: MTH 752.</td>
</tr>
<tr>
<td>777-4</td>
<td>Applied Analysis I</td>
<td>Function spaces, differential and integral equations, fixed point theorems, Hilbert spaces, compact operators, eigenvalues, eigenfunction expansions, and Sturm-Liouville problems. Prerequisite: MTH 730.</td>
</tr>
<tr>
<td>778-4</td>
<td>Applied Analysis II</td>
<td>Inverse operators, fixed-point theorems, compactness, variational methods, and functional analysis of numerical methods. Prerequisite: MTH 777.</td>
</tr>
<tr>
<td>792-1 to 5</td>
<td>Special Problems</td>
<td>Titles vary.</td>
</tr>
</tbody>
</table>

**Note:** See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.
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
Graphical, 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, electrolytic, 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, astronautics, 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

642-3 Vehicle Engineering
Develops students' abilities to derive and solve vehicle equations, and introduce dynamic analysis in vehicle design. Various performance criteria, control concepts, and HEV's will be studied.

644-4 Principles of Internal Combustion Engines
Thermodynamics of I.C. engines, combustion thermodynamics, friction, heat and mass losses, and computer control of the modern fuel-injected I.C. engine. Prerequisite: ME 516, 517.
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.

658-4 Instrumentation and Measurement
Develops understanding in measurements, conveys the principles and practice for design of systems including uncertainty and signal reconstruction, and establishes the physical principles and techniques used to measure those quantities most important for applications.

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.

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 513, 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

715-4 Advanced Dynamics
Introduction to classical mechanics. Application of distributed and discretized approaches to dynamic systems with rigid and deformable members. Emphasis on the understanding of fundamental theory of mechanics and applications of different techniques to dynamics. Prerequisite: Graduate standing.

716-4 Nonlinear Dynamics and Vibrations
The behavior of nonlinear mechanical systems is analyzed with numerical, symbolic, graphic, and analytical methods. Equal emphasis is placed on understanding nonlinear effects and methods of analysis.

718-4 Random Vibration
Introduction of the fundamental concepts of random signal analysis for random vibration analysis. Statistical approaches to the response of mechanical vibratory systems, and the extension of this understanding to experimental modal analysis. Prerequisite: ME 660, equivalent, or instructor approval.

720-4 Advanced Mechanics of Solids

721-4 Mechanics of Composite Materials
 Constituent properties and micromechanics of composite materials are studied. Macromechanics of fiber reinforced composites and laminates are discussed and a brief introduction to finite element analysis of composites is presented. Prerequisite: ME 720 or equivalent.

722-4 Aeroelasticity
Static and dynamic aeroelastic response of an aeroelastic airfoil and a straight wing in the presence of steady and unsteady aerodynamic loads. Use of the K and PK to determine flutter speeds. 3 hours lecture, 2 hours lab. Prerequisite: ME 612, 720.

723-4 Viscoelasticity
Extends the concepts of elasticity to include the energy dissipating effects of viscoelasticity. Linear/nonlinear viscoelastic behavior are examined in one and three dimensions. Finite element modeling of frequency dependent viscoelastic behavior is introduced. Prerequisite: ME 712 and ME 720, or equivalent.

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.

726-3 Structural Reliability
Analyze the uncertainties associated with mechanical and structural design. Methods to model various uncertainties in a design using probabilistic analysis tools. Computation of safety index and structural reliability using efficient techniques for implicit functions. Prerequisite: ME 720, ME 612 or equivalent.
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.

732-4 Boundary Layer Theory
Advanced fluid dynamics including formulation of the Navier-Stokes equations, boundary layers and exact and approximate solution of the boundary layer equations, and the transition to and characteristics of turbulent flows. Prerequisite: ME 617.

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.

740-4 Two-Phase Heat Transfer
Examination of the thermophysics of vaporization and condensation processes in heat transfer equipment. The basic physical mechanisms associated with phase-change phenomena are described, and the best empirical models are presented. Prerequisite: ME 318/518.

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.

743-4 Numerical Heat Transfer II
Use of finite difference method to solve a variety of problems in heat transfer and fluid flow. Techniques used in the numerical solution of these types of problems are developed. Prerequisite: ME 742.

744-4 Advanced Classical Thermodynamics
Critical examination of thermodynamic principles, equation of state for liquids, gases, and mixtures. Interpretation of thermodynamic functions and applications to processes, reactions, and equilibrium states. Prerequisite: ME 315/515, ME 316/516.

746-4 Statistical Thermodynamics
Critical examination of thermodynamics from the microscopic point of view, models of molecular distributions like the Maxwell-Boltzmann velocity distribution, and calculation of partition functions and their use in the determination of macroscopic thermodynamic properties. Prerequisite: ME 316/516.

748-4 Fundamentals of Plasma Science
Properties, characteristics, and use of ionized gases. Fundamentals of gaseous electronics including kinetic theory, excitation, ionization, equilibrium, non-equilibrium, and local thermodynamic equilibrium. Plasma generation, glow discharge, rf-discharges, plasma torches, and free-burning arcs. Prerequisite: ME 746.

754-4 Nonlinear Control
Nonlinear behavior and controllers are emphasized. Gain scheduling, model following, time-delay and slide-mode techniques will be discussed. Rule-based fuzzy logic and neural networks will be developed. Emphasis will be on theory, algorithms, and applications. Prerequisite: EE 613.

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 Phase Diagrams and Diffusion
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 Transformations in Solids I
This is the first course in a two course sequence. Covers the theory of homogenous and heterogeneous nucleation and diffusion and interface controlled growth.

763-4 Transformations in Solids II
This is the second course in a two course sequence. Covers recovery, recrystallization, grain coarsening, eutectoid decomposition, and spinodal decomposition. Prerequisite: ME 762.

768-4 Quantitative Microscopy
Deals with quantifying microstructural features, such as volume fraction, grain size, shape, and orientation of phases. The course covers stereology, the science of relating 2-dimensional images to 3-dimensional structure, and image analysis. Prerequisite: MTH 233, ME 585 or equivalent.

782-3 Processing of Engineering Materials
In-depth study of processing-microstructure-property relationships for selected engineering materials.

786-4 Applied Plasticity and Metal Forming

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.

898-1 to 5 Ph.D. Dissertation Research

899-1 to 5 Thesis
Graded pass/unsatisfactory.

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 790.) 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.

737-6 Recombinant DNA Methods Laboratory
(Also listed as BMS 790.) Microbial and molecular techniques for producing, cloning, and characterizing recombinant DNA molecules; laboratory exercises in gene manipulation gives an understanding of the principles of genetic engineering. Graded pass/unsatisfactory. Prerequisite: BCh 750 and 752 (could be concurrent enrollment); BIO 654 and BIO 734/BMS 779 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.
770-4 Intercellular Communication
(Also listed as BMS 805, P&B 776.)
Introduces the concepts of intercellular communication through an interdisciplinary presentation of immune neuroendocrine system functions. Emphasizes the similarities between the systems and the multidisciplinary approaches used to study each.

775-5 Pathogenic Mechanisms
(Also listed as BMS 775.) This advanced level course will expand the knowledge of basic microbiology by focusing on human-microbial pathogen interactions. The molecular basis of the pathogenic mechanisms will be emphasized. In addition, the student will gain a better appreciation and understanding of the complexities of interactions between microbes and their human hosts.
Prerequisite: BIO 210 or equivalent molecular biology course and BIO 252 or equivalent introductory microbiology course.

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&l 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&l 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.

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&I 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&I 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.

665-3 Computer Applications in Music
Study of computer technology and music software applications. Emphasis is placed upon using MIDI for electronic score notation, sequencing, and basic courseware design.
Courses/Music

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 Advanced Studies in Special Subjects
May be taken for letter grade or pass/unsatisfactory.

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, in-service 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.

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

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

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

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.

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
Analytical study of representative compositions of the Middle Ages, Renaissance, and Baroque period.

734-3 Analytical Techniques II
Analytical study of representative compositions of the Classical and Romantic periods.

735-3 Analytical Techniques III

736-3 Contrapuntal Techniques
Analytical study of representative compositions of the twentieth century. Study of contrapuntal techniques with practical application in writing and analysis.
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.

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

710-1 Applied Music
Open only to music majors or minors. All students must have auditioned for and have received departmental approval before registering for applied music.

720-2 Applied Music
Open only to music majors or minors. All students must have auditioned for and have received departmental approval before registering for applied music.

740-4 Applied Music
Open only to music majors or minors. All students must have auditioned for and have received departmental approval before registering for applied music.

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 College of Nursing and Health for current course descriptions and requirements.

614-3 Selected Topics
Special topics. For nursing majors only.

617-2 to 4 Selected Topics
Special topics.

640-2 School Nursing
Roles and responsibilities of school nurses in Ohio. Overview of national trends in school nursing. Emphasis on preparing an individual to assume the role of school nurse.

641-1 Children With Special Needs
Roles and responsibilities of the nurse in caring for children with special needs in the school setting.

642-2 Health Assessment of Children and Adolescents in Schools
Health assessment course with emphasis on health history and physical assessment of children and adolescents in the school setting.

643-1 to 10 School Nursing Practicum
Application of roles and responsibilities of school nurses in Ohio. Graded pass/unsatisfactory.

644-2 Health Promotion in School Nursing
Exploration of the art, principles, and strategies of promoting health in the school setting. Examination of existing community-based materials available for school nurse use.

707-3 Research Design and Methods
Critical analysis of components, methodology, and state-of-the-art research. Application of the research process in developing a research proposal. Prerequisite: NUR 708.
708-3 Theoretical Foundations for Nursing
Analysis of nursing and other selected concepts, models, and theories as related to nursing practice, administration, and education. Emphasis on development and application to nursing science. Pre- or corequisite: NUR 750.

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.

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.

716-4 Family Centered Child/Adolescent Health Nursing
Selected family theories and family research methods are analyzed for use in nursing care of children and adolescents. Clinical practicum will incorporate nursing care for diverse child/adolescent in family populations. Prerequisite: NUR 707, 708.

717-2 Issues in Child/Adolescent Health Nursing
Examination of social, political, legal, economic, and ethical concerns and analysis of initiatives to promote the health and well-being of children, adolescents, and their families. Prerequisite: NUR 716.

718-4 Nursing Care of Children/Adolescents in Families I
Application of theory and nursing interventions for children and adolescents in families. Clinical practicum to assist in analyzing variables in the delivery of comprehensive health care in various settings. Prerequisite: NUR 717.

719-8 Nursing Care of Children/Adolescents in Families II—Practicum
Application of theoretical frameworks and nursing interventions to provide care for children/adolescents in families. Clinical practicum incorporates research and multi-disciplinary collaboration in analyzing situations and delivering health care to children/adolescents in families. May be taken for letter grade or pass/unsatisfactory. Prerequisite: NUR 718.

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 to 8 Practicum in Adult Health and Illness
Observation, participation, and practice in area of clinical specialization. Seminars synthesize previous learning with application to the role of the advanced practice nurse. Clinical practicum required. Graduate standing in the College of Nursing and Health required. Prerequisite: NUR 724, 725, 751, 752, 754, and 755.

724-4 Adult Health and Illness
Use of primary care and advanced practice concepts in the care of adult clients experiencing changes in their bio-psycho-social-spiritual being. Prerequisite: NUR 708, 761, 762; NUR 707, 751, 760 pre- or corequisite.

725-4 Adult Health and Illness II
Examination and application of models for advanced practice roles. Use of primary care and advanced practice concepts in the care of adult clients. Prerequisite: NUR 724.

730-3 Organizational Theory and Behavior in Nursing Administration
Evaluation of the concepts, models, theories and principles of nursing administration. Provides an in-depth macro focus on organizational theories and behaviors applicable to the nurse administrator in a variety of settings. Pre- or corequisite: NUR 708.

731-5 Leadership and Management Strategies in Nursing Administration

732-3 Human Resource Management in Nursing Administration
Analysis of human resource management in health care organizations. Specific application is made to the nurse administrator role. Graduate standing in the College of Nursing and Health required. Prerequisite: NUR 708.

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 731, 732, 734, 751, 752, 753, and 755.

740-4 Nursing Curriculum and Program Development
Analysis of learning theories and models of nursing curriculum design. Development and evaluation of nursing curriculum and educational 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. Prerequisite: NUR 708 or permission of instructor.

742-3 Evaluation Strategies in Nursing Education
Examination and application of the art, principles, theories, models, and strategies of evaluation in nursing. Prerequisite: NUR 740, 741.

743-7 Practicum in Nursing Education
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, 742, 751, 753, 754, 755, 761, and 724 or 763 and 770.

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. Restricted to students with graduate nursing degree status.

751-3 Health and Well-being
Identification of theoretical foundations of health promotion, disease prevention, and well-being for individuals and aggregates. Application and investigation of epidemiological concepts, cultural diversity, multidisciplinary collaboration, and national goals and trends affecting health care. Restricted to students with graduate nursing degree status.

752-2 Concepts of Education in Nursing
Analysis of conceptual models of education and instructional technologies for advanced practice. Restricted to students with graduate nursing degree status.

753-2 Concepts of Advanced Practice
Analysis of concepts and models for advanced practice. Restricted to students with graduate nursing degree status.

754-2 Concepts of Nursing Leadership and Management
Analysis of models and concepts of leadership and management for advanced nursing practice. Restricted to students with graduate nursing degree status.

755-1 Informatics in Health Care Seminar
Introduction to trends and issues of informatics in health care with an emphasis on effective use of hardware and software in information technology. May be taken for a letter grade or pass/unsatisfactory.

756-2 to 3 Concepts of Nursing Leadership
An introduction to theories and concepts as a basis for leadership in complex, interdisciplinary health care systems with an emphasis on implications for nursing practice, administration, and education. Restricted to students with graduate nursing degree status or permission of instructor.

761-3 Advanced Physiology for Nurses
Examines selected major physiological concepts associated with nursing diagnoses. Physiological concepts are integrated with diagnosis and treatment of human responses to health problems. Includes cardiovascular, pulmonary, renal, neurological, endocrine, reproductive, and gastrointestinal physiology.

762-3 Advanced Health Assessment
Application of cognitive processes and psychomotor skills needed for comprehensive health assessment. Emphasis on health history, physical, developmental, and nutritional assessment; and identification of common client problems across the life span.

764-3 Applied Pharmacology for the Advanced Practice Nurse
Focuses on prescriptive knowledge of pharmacologic agents used in treatment of common primary health care problems and stable chronic disease states. Emphasis on indications, mechanisms of action, drug interactions, side effects, and client education.

765-4 Pathophysiology of Children/Adolescents for Nurses
Advances study of physiologic systems and common pathologies for children/adolescents. Emphasis on knowledge for provision of nursing care for acute and chronic conditions as well as disease prevention and health promotion.

766-3 Advanced Health Assessment of Children and Adolescents
Application of processes and skills for comprehensive health assessment of children/adolescents. Emphasis on health history, physical assessment of children/adolescents incorporating various instruments to assess growth and development issues.

770-4 Community/Public Health Nursing I
Examination of the community nurse specialist in community assessment, primary care, multidisciplinary practice, health promotion, and disease prevention. Community health research regarding implications for clinical practice are analyzed. Prerequisite: NUR 706; pre- or corequisite: NUR 707 and 751.
771-4 Community/Public Health Nursing II
Examination of the role of the community nurse specialist in community, programming, planning, evaluation, and consultation. Appraisal of related public health policies, legislation, and reimbursement. Prerequisite: NUR 761, 762, 763, 770.

772-7 to 8 Practicum: Community/Public Health Nursing
Participation and practice as a community health nurse specialist. Seminars synthesize previous learning with application to the role of community health nurse specialist. Clinical practicum required. Prerequisite: NUR 771, 752, 754, 755.

781-2 to 3 Thesis/Scholarly Project Seminar
Development of a proposal for a thesis or scholarly project. Seminars include application of statistics, analysis, interpretation, and presentation of data. 4 hours of seminar required weekly. Prerequisite: NUR 707.

790-2 Nurse Practitioner with Family as Client
Analysis of the concepts and roles of the family nurse practitioner. Study of family theory as it relates to practice. Supervised lab for specialty skills. Pre- or corequisite: NUR 761, 762, 764.

791-1 to 7 Family Nurse Practitioner Preceptorship
Intensive clinical focus provides students the opportunity to apply relevant theories, concepts, and research findings to clinical care. Stresses development of clinical competence required in delivering primary health care. Graded pass/unsatisfactory. Prerequisite: NUR 791, 792, 793. Titles vary.

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.

710-3 Principles of Pharmacology I
(Also listed as BMS 876.) Describes 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.

750-3 Principles of Pharmacology II: 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, reproductve, 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.

870-3 Physiology and Pharmacology of Vascular Cells
(Also listed as BMS 870 and P&B 870.) Physiological steady state and pharmacological properties of vascular cells—circulating erythrocytes, endothelial cells, and smooth muscle cells in particular—as a basis of pathophysiologic aberrations and clinical disorders.

876-2 to 3 Principles of Pharmacology I
(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.

898-3 Neuropharmacology
(Also listed as BMS 898.) In-depth treatment of the anatomy, biochemistry, physiology, and functions of neurotransmitter systems and the effects of drugs on the nervous system.

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. Titles vary.

632-4 Modern Political Philosophy
(Also listed as PLS 603.) 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
Independent study.
Physics/PHY

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

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.)

600-3 Introduction to 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, 242 and CHM 121.

602-3 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.)

620-3 Thermodynamics I*
First and second laws of thermodynamics. General thermodynamic formulas with applications to matter. Prerequisite: PHY 210 and 211 or 244.

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 244 or equivalent.

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 260 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 242, MTH 232, 233.

660-4 Introduction to Quantum Mechanics
Mathematical structure of quantum mechanics. Applications to selected one- and three-dimensional problems with emphasis on atomic structure. Prerequisite: PHY 260, 372, MTH 333.

661-4 Introduction to Solid State Physics
Selected properties of solids and their quantitative explanation in terms of simple physical models. Applications of quantum mechanics to solids. 3 hours lecture, 2 hours lab. Prerequisite: PHY 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 244; 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.

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**

**726-2 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 728. Corequisite: PHY 481 (681) or permission of instructor.

**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.

**760-3 to 6 Fundamental Principles of Fourier Transform NMR**
(Also listed as BMB 762 and BMS 762.) Covers the fundamental theory of nuclear magnetic resonance spectroscopy with emphasis on pulse fourier transform methods. Prerequisite: Organic Chemistry, PHY 111, 112, 113 or equivalent; MTH 132, 133, or equivalent; or permission of instructor.

**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.

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**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.

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**Physiology and Biophysics/P&B**

*Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.*

**501-4 Human Physiology I**
Includes homeostasis; cell, nerve and muscle function; nervous system regulation; and cardiovascular and circulatory systems.

**502-4 Human Physiology II**
Includes gastrointestinal and metabolic systems; respiratory and renal systems; acid-base balance; endocrinology and temperature regulation.

**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.

**610-5 Human Physiology**
(Also listed as BMS 862.) An overview of human/mammalian organ physiology. Fundamental mechanisms and the experimental basis for current understanding is emphasized. Prerequisite: Introductory biology, chemistry, physics, or permission of instructor.

**642-4 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: BIO 105, CHM 101 or equivalent.
650-3 Glial Cell Physiology
(Also listed as BMS 856.) Concepts of glial cell physiology based on the analysis of current primary literature. Topics include interactions between glia and other cell types and the role of glia in pathophysiology. Prerequisite: P&B 642.

666-3 Introduction to Physiology and Biophysics
Each student participates in a one-week tutorial study with each P&B faculty member. Tutorials are given sequentially over the fall quarter for entering P&B Master of Science students. Learning opportunities include readings, discussions, and written assignments. May be taken for a letter grade or pass/unsatisfactory.

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 historical survey related to a completed research project. May be taken for a letter grade or pass/unsatisfactory.

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, and 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 967.) 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 neuronal information, and the role of neuronal circuits in motor control and sensory systems. Prerequisite: P&B 642 or permission of instructor.

722-4 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 659.) 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 660.) Survey of endocrinological mechanisms and their role in integration of body function. Prerequisite: P&B 703 or permission of instructor.
776-4 Intercellular Communication
(Also listed as M&S 770, BMS 805.)
Introduces the concepts of intercellular communication through an interdisciplinary presentation of immune and neuroendocrine system functions. Emphasizes the similarities between the systems and the multidisciplinary approaches used to study each.

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.

805-2 General Biophysics Seminar
(Also listed as BMS 990.) Faculty and students present scientific information/findings.

808-1 Neuroscience Seminar
(Also listed as BMS 990.) Students present a current scientific article to colleagues and faculty. Graded pass/unsatisfactory.

870-3 Physiology and Pharmacology of Vascular Cells
(Also listed as BMS 870 and PHA 870.) Physiological steady state and pharmacological properties of vascular cells—circulating erythrocytes, endothelial cells and smooth muscle cells in particular—as a basis of pathophysiologic aberrations and clinical disorders. Prerequisite: P&B 601.

899-2 to 18 Graduate Research
Supervised thesis research. May be taken for letter grade or pass/unsatisfactory.

Political Science/Courses

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

540-4 Law and Society
Theories of law and the nature and functions of the judicial process.

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
The nature and classification of public policy. Emphasis on fragmentation, incrementalism, and bargaining as means of policy development. Impact of citizens on public policy evaluation. Examination of illustrative Selected issues in the study of Latin American politics with an emphasis on the nature of the state and the role of institutions, such as the military and unions in politics. Examples from major Latin American states and Mexico will be examined. Prerequisite: PLS 222.

552-4 Politics of Nationalism
Compares ethnic identity and politics in western societies, including the United States, Canada, Great Britain, and France. Topics include minorities and the welfare state, affirmative discrimination, and Black Politics in the United States.

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.

574-4 International Human Rights
Examines the role of human rights in international relations. Considers contending definitions of human rights and debates over policy by focusing on case studies including South Africa, China, Guatemala, and Bosnia.

575-4 Human Rights in USA
Examines controversies over human rights in the U.S. Considers contending definitions of human rights and debates over policy by focusing on a range of issues including immigration, pornography, gay rights, race relations, and poverty.
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.

582-4 U.S.-Japan Foreign Relations
Examines the course of the relationship between the U.S. and Japan. Includes political, security, and economic issues.

599-1 to 4 Studies in Selected Subjects
Problems, approaches, and topics in the field of political science. Topics vary.

602-4 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.

603-4 Political Thought: Hobbes to Mill
(Listed jointly with PHL 632.) Critical examination of political ideas from 1600 to 1900 with emphasis on Hobbes, Locke, Rousseau, Montesquieu, Hume, Burke, Hegel, Bentham, Marx, and Mill.

604-4 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.

605-4 Feminist Political Theory
An exploration of feminist interpretations and critiques of Western political theory and an examination of the development of contemporary feminist political thought. Prerequisite: PLS 200 or PLS 225 or WMS 200.

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 waste, 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.

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.

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 formulation and implementation.

650-4 Political Anthropology
(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.
Professional Psychology/Courses

653-4 Soviet Successor States
Examines the political life in the former Soviet Union, with emphasis on the legacy of communism and the role of economics and politics in the transition to democracy.

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.

673-4 Politics of Gender Violence
A cross-cultural examination of women's human rights and gender violence. Considers the range of violence as well as its sources and solutions. Topics include domestic abuse and rape, female circumcision, purdah, anorexia, and reproductive rights.

674-4 Politics of Women Terrorists
Survey of the political behavior of women in crime and terrorism, including the roles played by women in criminal activities and terrorist groups. Prerequisite: PLS 222 or permission of instructor.

682-4 Legislative Internship
Experiential internship in the office of a state legislator, including office work, constituent assistance and research.

686-4 Model UN Seminar
Model UN is an experiential learning opportunity built around the seminar, with intensive training in research, public speaking, bargaining, and conflict resolution. It culminates at the national collegiate conference in New York, simulating the United Nations.

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.

801-3 History and Systems of Psychology
Historical and philosophical precursors philosophers' and recent thinkers' views of epistemology, existentialism, consciousness, and behavior. (Previously listed as PSI 811.)

802-3 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. (Previously listed as PSI 812.)

803-1 to 3 Fundamentals of Learning
An overview of theories of learning including classical and operant conditioning and verbal learning. Course includes application of learning theories in the development and treatment of psychological disorders. Titles vary.

804-1 to 6 Advanced Statistics & Experimental Design I
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. Titles vary. (Previously listed as PSI 814.)

805-3 Advanced Statistics and Experimental Design II
This is a continuation of PSI 804—Advanced Statistics and Experimental Design I. Titles vary. (Previously listed as PSI 815.)

806-3 Interviewing I
Process of client designation, problem identification, and functional analysis. Client expectancy, establishing relationships, developing information base for linking, consultation, and referral. Interviewing styles and types. Lecture, lab, field work. Titles vary. (Previously listed as PSI 914.)

807-1 to 6 Interviewing II
808-1 to 6 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. Titles vary. (Previously listed as PSI 980.)

810-1 to 6 Psychological Assessment I
The basics of psychological assessment. Reliability and validity of measurements; current issues in measurement, clinical interviewing and mental status examination are covered. As time allows, an introduction to theories of intelligence is presented. Titles vary. May be taken for letter grade or pass/unsatisfactory. (Previously listed as PSI 910.)

810L-1 to 3 Psychological Assessment I Lab
Lab portion of PSI 810—Psychological Assessment I. Titles vary. (Previously listed as PSI 910L.)

811-3 Psychological Assessment II: Cognitive
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. (Previously listed as PSI 911.)

811L-1 to 3 Psychological Assessment II: Cognitive Lab
Lab portion of PSI 811—Psychological Assessment II: Cognitive. (Previously listed as PSI 911L.)

812-3 to 5 Psychological Assessment III
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. (Previously listed as PSI 912.)

812L-1 to 3 Psychological Assessment III Lab
Lab portion of PSI 812—Psychological Assessment III. (Previously listed as PSI 912L.)

813-1 to 5 Projective Assessment I
Overview of the administration, scoring, and interpretation of several projective techniques including projective drawings, Incomplete Sentence Blanks, the Thematic Apperception Test (TAT), the Children’s Apperception Test (CAT), and other storytelling techniques. Titles vary. May be taken for a letter grade or pass/unsatisfactory. (Previously listed as PSI 913.)

814-1 to 3 Educational Assessment
Covers the issues and methods surrounding the assessment of various types of academic/learning problems including academic underpreparation, impact of psychological impairment, impact of physical impairment, specific learning disabilities, and adult ADHD. Titles vary. May be taken for a letter grade or pass/unsatisfactory.

820-1 to 6 Multicultural Lab
Focuses on the recognition of cultural diversity issues as an integral component of a psychologist’s clinical and professional responsibilities and the incorporation of these issues into one’s evolving professional identity. Titles vary.

821-3 Ethnocultural Issues
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. (Previously listed as PSI 874.)

822-1 to 6 Gender Issues
Explores the impact of gender on human behavior with specific focus on the role of gender in psychological assessment and practice. Titles vary.

830-3 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. (Previously listed as PSI 850.)

831-3 Adult 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. (Previously listed as PSI 851.)

832-3 to 5 Child Psychopathology
Classification and diagnostic systems related to children. Behavioral problems and related problems in life adaptation, learning, and adaption to peers. Current theories of etiology and treatment interventions. (Previously listed as PSI 939.)
835-3 Human Development
Conceptualizations of infancy, early childhood, and adolescence including physical, cognitive, intellectual, social, and interpersonal development. Lecture, lab, field work. Titles vary. (Previously listed as PSI 852.)

840-3 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. (Previously listed as PSI 870.)

841-3 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. (Previously listed as PSI 938.)

842-3 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. Concurrent enrollment in lecture and lab is required. (Previously listed as PSI 932.)

850-3 Physiological Psychology
Physiology of body systems including endocrine, nervous, musculoskeletal, respiratory, cardiovascular, reproductive, and renal systems. Autonomic and endocrine regulation of body systems in homeostasis and during stress. (Previously listed as PSI 830.)

851-1 to 6, 852-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. Topics vary. May be taken for a letter grade or pass/unsatisfactory.

872-3 Service Delivery Systems
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. (Previously listed as PSI 972.)

873-3 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. (Previously listed as PSI 941.)

874-3 Organizational Psychology
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. (Previously listed as PSI 877.)

875-3 to 5 Forensic Psychology I
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. (Previously listed as PSI 876.)

880-1 to 6, 881-1 to 6, 882-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. Topics vary.

908-1 to 6 Practice Tutorial
Exposure to a variety of clinical case materials using a vertical team format. Titles vary. (Previously listed as PSI 981.)

910-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Topics vary.

911-3 to 6 Neuropsychology I
Neuropsychology 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. (Previously listed as PSI 832.)

911L-1 to 3 Neuropsychology I Lab
Lab portion of PSI 911—Neuropsychology I. (Previously listed as PSI 632L.)

912-1 to 3 Neuropsychology II
Introduction to the field of clinical neuropsychological assessment. Students will be provided with information relevant to the selection, administration, scoring, and interpretation of neuropsychological tests in different clinical situations.
912L-1 to 3 Neuropsychology II Lab
Lab portion of PSI 912—Neuropsychology II. Designed to provide students with hands-on experience in administration, scoring, and interpretation of neuropsychological tests such as those from the Benton laboratory, Halstead-Reitan Battery, and Boston process approach.

913-3 Projective Assessment II
Continuation of PSI 813—Projective Assessment I. 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.

914-1 to 3 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. Topics vary.

915-1 to 6 Child Assessment
Overview of child assessment theory, techniques, and strategies to prepare students for further practical work in the assessment of child functioning. Titles vary. Topics vary.

916-1 to 6 Forensic Assessment
Focuses on the interface between psychological assessment and the legal arena. Titles vary.

917-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. Topics vary.

918-1 to 6 Integrative Assessment
Provides a format for integrating various psychological tests into a coherent battery. In addition to addressing the evaluation of various psychological disorders, an approach is provided for constructing batteries for unique populations. Titles vary.

920-1 to 4 Multicultural Couples
Explores multicultural issues in couples therapy and combines clinical theory and skills development with an appreciation of ethnicity, race, family of origin, values, and sexual orientation as cultural perspectives. Titles vary.

921-1 to 3 Gay/Lesbian Issues
Issues central to psychological intervention with gay/lesbian clients including dealing with homophobia/heterophilia, development of a positive gay/lesbian identity, coming-out issues and issues for gay/lesbian couples and families. Titles vary.

922-1 to 6, 923-1 to 6, 924-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. Topics vary.

930-1 to 6 Psychodynamic Psychotherapy I
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. Titles vary. (Previously listed as PSI 931.)

931-1 to 6 Psychodynamic Psychotherapy II
Second quarter of a three quarter sequence designed to teach theory, research, and applications of psychodynamic, object relations, and self psychology. Titles vary.

932-1 to 6 Psychodynamic Psychotherapy III
Focuses on the efficacy of brief dynamic treatments, examines the research on empirically validated and nonvalidated dynamic treatment protocols for DSM-IV Axis I and II disorders. Titles vary.

933-3 Behavioral Psychotherapy I
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. Titles vary.

934-1 to 6 Behavioral Psychotherapy II: Cognitive
Continuation of PSI 933. Titles vary.

935-1 to 3 Behavioral Psychotherapy III: Advanced Cognitive Therapy

936-3 Humanistic Psychotherapy I

937-1 to 6 Humanistic Psychotherapy II
Continuation of PSI 936. Course is the second quarter of a three quarter sequence. Titles vary.

938-1 to 3 Humanistic Psychotherapy III
Seminar exploring in-depth Humanistic theory, research, and practice skills that can be utilized by a general practitioner of clinical psychology. Titles vary.
940-3 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. (Previously listed as PSI 880.)

941-1 to 6 Advanced Group Therapy
Addresses practical and clinical aspects of conducting group therapy. Titles vary. (Previously listed as PSI 956.)

942-1 to 6 Brief Psychotherapy
Study and discussion of problem-focused, time-limited interventions. Study of concepts and techniques; use of programmatic and group methods. Titles vary. (Previously listed as PSI 957.)

943-1 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.

944-3 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. (Previously listed as PSI 917.)

945-1 to 5 Medical Family Therapy
Multidisciplinary seminar introducing students to principles of family-focused health care and collaborative team practices.

946-1 to 3 Couples/Family Therapy Methods
Different from a beginning survey course, students will apply a more limited focus to the study of family psychology and family therapy. Students will select a theoretical framework or approach to treatment which they intend to research and/or apply to case examples and scholarly exposition. Titles vary.

947-1 to 3 AIDS: Clinical Issues for Clients and Families
Explores the physiological, psychological, social, economic, and political aspects of HIV infection and AIDS with an emphasis on the unique role of psychologist as one of the many health care professionals with whom PLWAs and their families interact. Titles vary.

948-1 to 3 Domestic Violence
Seminar addresses research and clinical issues regarding domestic violence. Explores impact on and intervention with victims, perpetrators, children and adolescents, and society. Titles vary.

949-1 to 5 Introduction to Sex Therapy
Assists students in expanding their knowledge base of human sexuality, developing awareness of personal sexual values, and increasing competence in intervening with clients’ sexual concerns.

950-3 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. (Previously listed as PSI 853.)

951-1 to 6 Serving the Chronic Mentally Ill
Designed to impact the student’s knowledge, skills, and attitudes about working with individuals and families affected by chronic mental illness. Titles vary.

952-3 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. (Previously listed as PSI 935.)

953-3 Health Psychology
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. (Previously listed as PSI 881.)

954-1 to 6 Introduction to Clinical Hypnosis
Beginning-level course addresses the nature and theory of hypnosis as well as the integration of this therapeutic technique into clinical practice. Titles vary.

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. Titles vary.

956-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary.

957-1 to 3 Psychology of Women
Seminar addresses issues including, but not limited to, female development; the interaction of gender, race, ethnicity, and SES; body image; impact of female gender role on mental health. Feminist therapy is also covered. Titles vary.
958-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. Topics vary.

959-3 Integrative 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. (Previously listed as PSI 970.)

965-1 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. (Previously listed as PSI 974.)

966-1 to 5 Professional Ethics/Issues
Provide a working knowledge of APA ethical principles and code of conduct, and Ohio law and rules governing psychologists. Increase sensitivity to potential ethical dilemmas and develop skills in identifying and resolving ethical dilemmas in professional psychology. (Previously listed as PSI 976.)

967-1 to 3 Ethics in an Interprofessional Context
Study and discussion between faculty and students from medicine, professional psychology, and theology concerning ethical issues and implication for client/patient care across professional disciplines. Titles vary. May be taken for a letter grade or pass/unsatisfactory.

968-1 to 3 Introduction to Multiprofessional Team Practice in Community Based Care
Brings together faculty and students from allied health, medicine, nursing, professional psychology and social work to study access to and utilization of primary care and prevention services in urban communities. Titles vary. May be taken for a letter grade or pass/unsatisfactory.

970-1 to 3 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. Topics vary.

972-3 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. (Previously listed as PSI 816.)

973-1 to 5 Teaching of Psychology
Seminar provides participants with a forum for exploring issues associated with teaching psychology in higher education settings. Titles vary.

974-1 to 3 Grant Writing
Methods for locating funding sources as well as researching and writing grant applications. Seminar includes formats employed by state and federal funding agencies. Titles vary. May be taken for a letter grade or pass/unsatisfactory.

975-1 to 6 Forensic Psychology II
Continuation of PSI 875. Focuses on civil court proceedings such as civil commitment, family law, and professional practice issues. Forensic Psychology I is not a prerequisite, but those who have not had the course must meet with the instructor prior to enrolling. Titles vary. May be taken for a letter grade or pass/unsatisfactory.

976-1 to 6 Elective
Intensive treatment of subject materials or techniques providing students with increased experience or specialization in specific interventions, assessments, concepts, or approaches. Titles vary. May be taken for a letter grade or pass/unsatisfactory.

980-1 to 3 Elective
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 Elective
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. Titles vary.

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 Study
Individualized course of readings completed under faculty supervision.
996-1 to 5 Elective
Research or evaluation performed under faculty supervision. Titles vary.

997-1 to 6 Supervised Experience
Faculty supervised clerkship, field placement, or other isolated circumscripted professional experience.

998-1 to 5 Professional Dissertation
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 361 or 411 or permission of instructor.

637-4 Behavior Modification
Applications of psychological principles to a wide variety of behaviors. Prerequisite: PSY 331 or 411 (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.

700-4 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.

704-0 Methodological Problem Solving

707-4 Multivariate Methods in Psychology
The techniques of multivariate analysis will be reviewed and developed. Techniques will include MANOVA, discriminant 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
System design and development are described, and human factors activities at each phase are explained. Macroergonomic as well as microergonomic considerations are reviewed.

725-4 Experimental Methods in Social Psychology
The experimental method as it is applied to social psychological problems. Provides experiences in both laboratory and field techniques. Prerequisite: PSY 325 or permission of instructor.
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 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
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.

778-4 Cortical Visual Processes
In-depth consideration of visual processes that originate in the cerebral cortex. Topics include binocular vision, motion perception, eye movements, and the application of these to human factors research. Prerequisite: PSY 776 and 777.

782-4 Instrumentation in Psychology
Review of instrumentation used in psychological research and applications—relevant microprocessor 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.

797-1 to 15 Internship
Internship in private or governmental organizations under the direction of a faculty advisor. Does not count for graduate credit toward the M.S. or Ph.D. degree in psychology. Graded pass/unsatisfactory.

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 topic and give oral presentation 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. Goals and the setting of objectives by employees are discussed. The design of work is discussed.  
Prerequisite: Permission of department.

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  
The 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. May be taken for a letter grade or pass/unsatisfactory.

887-1 to 4 Topics in Psychology  
Seminars with in-depth coverage of special topics in psychology. Topics vary. Departmental permission required.

888-1-4 Topics in Industrial/Organizational Psychology  
Seminars with in-depth coverage of special topics in industrial or organizational psychology. Topics vary. Permission of Instructor. May be taken for a letter grade or pass/unsatisfactory.

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 1-15 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.

*Not available for graduate credit toward the M.S. or Ph.D. degree in psychology.
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.

704-1 to 5 Psychological Adjustment: Severe Disability
Psychological issues associated with specific disabling conditions. An in-depth review of the general adjustment process to disability and definitions of normality and abnormality. Prerequisite: RHB 701.

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.

707-1 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.

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.

712-1 Rehabilitation Counseling Industrial Rehabilitation (IR)
Familiarizes rehabilitation professionals and students with industrial rehabilitation (IR), and how IR programs assist in the successful placement of people with disabilities. May be taken for a letter grade or pass/unsatisfactory. Prerequisite: Graduate standing or permission of instructor.

714-1 Rehabilitation Counseling Work Incentives
Familiarizes rehabilitation professionals and students with the available legislated and regulatory work incentives, and how they assist in the placement of people with disabilities. Includes the following programs: Social Security Act (SS), state and federal Workers Compensation, Targeted Job Tax Credit (TJTC), and various personal insurance (LTDD, STD, Catastrophin). May be taken for a letter grade or pass/unsatisfactory. Prerequisite: Graduate standing or approval of program consultant.

716-3 Rehabilitation Counseling Employment Specialist Training
Familiarize rehabilitation professionals and students with the concept of Supported Employment including definition, worker identification, learning styles, worksite and task analysis, development and implementation of skill training and support services; and demonstrates how Supported Employment is used in placement of people with disabilities. May be taken for a letter grade or pass/unsatisfactory. Prerequisite: Graduate standing or approval of program consultant.
718-5 Developing Relationships with Business and Industry
Exposes rehabilitation professionals and students to the philosophy and practices of business and industry; incorporates specific skill competencies in job development and job placement in working with business and industry; and demonstrates how these skills assist in enhancing employment opportunities and job placement of people with disabilities. May be taken for a letter grade or pass/unsatisfactory. Prerequisite: RHB 711, graduate standing, or permission of instructor.

720-4 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.

770-1 to 3 Independent Reading and Minor Problems in Rehabilitation
Independent study in areas of interest to students but not readily available in any existing course. Graded pass/unsatisfactory.

774-3 Selected Problems
Examines techniques of rehabilitation applied to selected disability groups such as mental retardation, drug abuse, emotional disturbances, alcoholism, and cultural and social deprivation.

775-1 to 4 Graduate Seminar
Includes the study of community-related rehabilitation program efforts in terms of individualized systems analysis. 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.

865-4 Rehabilitation Counseling Practicum
Provides counseling experience in which students, under supervision, actually counsel individuals with rehabilitation concerns including vocational, educational, medical, psychosocial, and personal issues. Prerequisite: Grade of B or better in RHB 701, 702, 704, and CNL 863.
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.

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.

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.

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.

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.

635-4 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.
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.

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.

687-4 Evolution, Religion, and Ethics
(Also listed as BIO 617.) Introduction to the biological, philosophical, theological, and ethical aspects of evolution.

693-4 Seminar in Religion
Topics vary.

694-3 to 4 Existentialism
(Also listed as PHL 694.) Representative writers of the existentialist movement.

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.

Russian/RUS
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

599-4 Studies in Selected Subjects
Problems, approaches, and topics in the field of Russian. Topics vary. Prerequisite: RUS 203 or equivalent.
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

510-4 Sociology of Gender
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. 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 Work
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.

**Statistics/STT**

Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

542-4 **Probability and Statistics for Elementary/Middle School Teachers**  

560-4 **Applied Statistics I**  
Introduces probability, random variables and their expectations, some commonly used discrete and continuous distributions, concept of random sampling and sampling distributions. Uses computer software packages for simulating, summarizing, and displaying data. Prerequisite: MTH 229 and 230, or equivalent.

561-4 **Applied Statistics II**  
Introduces statistics, standard statistical methods for estimation of parameters and hypothesis testing, regression analysis and analysis of variance techniques, and exposure to data analysis using packaged computer programs. Prerequisite: STT 560.

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 Quality Control and Improvement
Statistical process control for attributes and variables data: probability distributions, sampling plans, control charts, statistical control, process capability, process improvement, tolerance intervals, evolutionary operation, and applications. Prerequisite: STT 361 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.

630-4 Environmental Statistics
Statistical methods suitable for the collection, analysis, and interpretation of the temporal and spatial data arising in the environmental studies are discussed. Computer packages for the data analysis are introduced. Prerequisite: STT 265 or equivalent.

646-4 Statistical Methods for Engineers I
Classical statistical techniques for analysis and interpretation of research data, with extensive use of statistical software. Includes review of basic statistics. Simple, multiple, and polynomial regression, and single factor analysis of variance are covered. Prerequisite: STT 361 or 561 or permission of instructor.

647-4 Statistical Methods for Engineers II
Continuation of STT 646. Analysis of variance, techniques for interpretation of research data, with extensive use of statistical software. Includes factorial experiments, fixed and random effects, crossed and nested factors, and repeated measures. Prerequisite: STT 646 or 466 or 666.

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 Design
Techniques of blocking, randomization, replication, factorial design. Topics from complete and incomplete block designs, confounding, fractional factorial designs, split-plots, response surface methods, parameter design, hierarchical designs. Statistical software used extensively. Prerequisite: STT 667 or permission of instructor.

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: STT 662, MTH 253, and completion of a statistical methods course or permission of instructor.

761-4 Theory of Linear Models
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 Topics in Linear Models
Computing techniques and applications of the general linear model. Correlation and regression are emphasized. Prerequisite: STT 761.

764-4 Topics in Experimental Design
Continuation of STT 669. Topics from incomplete block designs, blocked and fractional asymmetric factorial designs, mixture experiments, split-plot designs, response surface methods, parameter design, hierarchical designs, variance components, mixed models. Prerequisite: STT 669 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.

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.

796-1 to 5 Topics in Statistics and Probability

**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 Administration/URS**
**Note:** See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

599-4 Studies in Selected Subjects
Deals with problems, approaches, and topics in the field of urban studies. Topics vary.

612-4 Cities and Technology
Deals with the evolving relationship between technology and urban growth, physical form, government, and politics. Explores how "technological fixes" for complex urban problems have shaped urban development and politics.

614-4 Urban Fiscal Administration
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.

615-4 Community Development I
Focuses on the importance, the profession, and the practice of community development. Introduces theories of community and development and studies current neighborhood programs and policies.

616-4 Community Development II
Examines three fundamental organizing strategies—self-help, technical assistance, and conflict—which are used to improve a community's quality of life. The course combines classroom learning and field observation.
617-4 Public Sector Labor Relations
Examines collective bargaining, the negotiation process, impasse resolution, and contract and grievance administration in local government. (Previously listed as URS 717.)

618-4 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.

620-4 Public Safety Administration
Policing, corrections, fire, emergency medical services, and emergency management systems will be surveyed to provide an understanding of the services offered, technologies used, problems faced, and alternatives available in each of the areas.

623-4 Issues in Urban Administration
Courses taught under this title explore issues and topics related to the administration of urban nonprofit organizations, community development agencies, and local governments. Titles vary.

624-4 Issues in Urban Planning
Various issues related to planning urban environments. Topics include housing, funding non-profit organizations, strategic planning, vision planning, and economic development action plans. Titles vary.

625-4 Issues in Urban Development
Explores issues that impact urban development such as housing, pollution, or privatization. Emphasizes an approach for understanding the issues and formulating effective responses.

627-4 Urban Policy Analysis
(Also listed as PLS 427/627) Study of the policy development process and its relationship to past and current urban issues. The course focuses on a current urban issue through discussion, reading, and research.

650-4 Ethics in Public Service
Systematic development of ethics in public service, including individual roles and obligations, values, standards, and codes of conduct.

670-4 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.

675-4 Management of Urban Nonprofit Agencies
Examines the organizational and managerial foundations of nonprofit organizations. Areas such as the nature and mission of nonprofit organizations, strategies for achieving the mission, roles, involved, evaluating performance, resource development/fundraising, and managing volunteers are explored.

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 Urban Empirical Analysis
Focuses on different aspects of policy evaluation by obtaining facts and analyzing information on the impact of public programs. Deals with controversy over the use of objective performance indicators and citizen surveys as program performance measures. Prerequisite: URS 710 or 711, or permission of instructor.

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.

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.

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.

720-4 Urban Decision Analysis
Survey of the methodologies and concepts for analyzing the efficiency and effectiveness of decision-making, information management, and processes of the public organization.
722-4 to 8 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 to 8 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: permission of internship director.

724-4 to 8 Urban Research Project
Research project for the master's degree in urban administration. Prerequisite: permission of department chair.

799-4 to 8 Urban Thesis
Under the supervision of a thesis committee and chair, students select an urban administration problem, prepare a proposal detailing the research question, complete the research, write their thesis with full documentation and defend their work before the committee.

Vocational Education/VOE
Note: See quarterly class schedule or departmental advisor for further enrollment restrictions, requirements, or special course information.

611-3 Workforce Classroom Laboratory Management
Course consists of a system of strategies for selection and arrangement of learning activities in the classroom and laboratory setting, procedures for safety, handling and storage of materials and supplies, student personnel systems, records and reports, maintenance of equipment, rotation of assignments, and student evaluation.

613-3 Organization and Operation of a Cooperative Education Program for At-Risk Students
Designed to present the fundamentals of establishing and operating a cooperative program following state and federal guidelines for at-risk, work/study students.

614-3 Teaching in a Cooperative Education Program I
A study of the methods used in the operation of programs that are vocationally cooperative, including the coordination of classroom related instruction with on-the-job experience. Includes the development and use of a variety of individualized methods of instruction as well as group procedures. Prerequisite: VOE 613.

615-3 Teaching in a Cooperative Education Program II
A study of the methods used in the operation of programs that are vocationally cooperative, including the coordination of classroom related instruction with on-the-job experience. Includes the development and use of a variety of individualized methods for at-risk students who are academically, economically, or socially disadvantaged. Prerequisite: VOE 613, 614.

616-3 Teaching in a Cooperative Education Program III
The State Department of Education requires each vocational cooperative teacher to complete in-service training as partial completion of the requirements for a four-year provisional teaching certificate. This course offers instruction, clinical experiences, and field experiences, each designed to develop a quality cooperative education program for those teachers who qualify for a cooperative certificate. Prerequisite: VOE 613, 614, 615.

618-4 Historical and Philosophical Foundations of Vocational Education
Course provides historical and philosophical antecedents to present day workforce education including vocational and technical education. It examines social influences which have affected legislation which supports vocational and technical education.

621-3 Student Behavior Management in Workforce Education
Course is designed to provide the vocational instructor with the opportunity to explore various management techniques which will allow him or her to more effectively organize, manage, and control the students in the laboratory and classroom.

631-3 Student Performance Assessment in Workforce Education
Student performance assessment in workforce education.

642-3 Science Content in the OWA/OWE Classroom
Provides instruction in science content for the teacher in the Occupational Work Adjustment/Occupational Work Experience classroom.

643-3 English/Language Arts Content in the OWA/OWE Classroom
Provides background information, specific content, and methods leading to the endorsement for teaching English/language arts in an Occupational Work Adjustment/Occupational Work Experience classroom.
644-3 Mathematics Content in the OWA/OWE Classroom
Provides instruction in mathematics content for the teacher in the Occupational Work Adjustment/Occupational Work Experience classroom.

645-3 Social Studies Content in the OWA/OWE Classroom
Provides instruction in social studies content for the teacher in the Occupational Work Adjustment/Occupational Work Experience classroom.

646-3 English/Language Arts Methods in the OWA/OWE Classroom
Provides instruction in English/language arts methods for the teacher in the Occupational Work Adjustment/Occupational Work Experience classroom.

647-3 Mathematics Methods in the OWA/OWE Classroom
Provides instruction in mathematics methods for the teacher in the Occupational Work Adjustment/Occupational Work Experience classroom.

648-3 Social Studies Methods in the OWA/OWE Classroom
Provides instruction in social studies methods for the teacher in the Occupational Work Adjustment/Occupational Work Experience classroom.

649-3 Science Methods in the OWA/OWE Classroom
Provides instruction in science methods for the teacher in the Occupational Work Adjustment/Occupational Work Experience Classroom.

650-3 Teaching in Workforce Education Program
Provides students with an overview of teaching workforce education. Workforce education philosophy, workforce education instructional organization, lesson planning, integrated academics, and workforce classroom/laboratory planning will be presented or implementation in classroom instruction.

651-3 Strategies and Techniques in Workforce Education Teaching
Provides students with a foundation for teaching workforce education competencies. Workforce education philosophy, workforce education instructional organization, lesson planning, integrated academics, and workforce classroom/laboratory planning are the focus. Students incorporate functioning in a multicultural/pluralistic society into their classrooms. Prerequisite: VOE 671.

652-3 Assessment of Workforce Teacher Performance
A program of teacher assessment using three assessment methods, direct observation of classroom practice, review of written documentation prepared by the teacher, and semi-structured interviews before and after the observation. Required for certification of new, unlicensed workforce teachers completing the licensure program.

664-3 Methods and Strategies for At-Risk Students
Since many of the secondary vocational students are considered at risk, teachers must know and employ the most effective methods and strategies to enhance student achievement. It is imperative that workforce education teachers be able to identify, define, and practice intervention techniques. Alternative methods to teach basic academic skills will be explored.

669-3 Coordination Techniques in Workforce Education
Effective coordination strategies and procedures in the administration and management of cooperative programs in high schools and in adult and postsecondary education.

670-1 to 4 Workshop in Vocational Education
Intensive practical study in vocational education.

671-3 Instructional Design of Workforce Education
The development of basic cognitive and performance skills required by new non-vocational certified teachers to earn a one-year vocational teaching certificate.

672-3 Supervised Teaching in Workforce Education I
Development of basic knowledge, skills, attitudes, and values required for vocational certification of new, non-certified vocational teachers.

673-3 Supervised Teaching in Workforce Education II
Development of basic knowledge, skills, attitudes, and values required for vocational certification of new, non-certified vocational teachers.

674-3 Supervised Teaching in Workforce Education III
Development of basic knowledge, skills, attitudes, and values required for vocational certification of new, non-certified vocational teachers.

675-3 Workforce Education Integration Workshop
The refinement of curriculum development, motivation, leadership, and human relations skills required by employed one-year certified vocational teachers.
706-3 Survey of Workforce Education
An overview of the instructional programs in workforce education and their administration at the national, state, and local levels. Current legislation, School-to-Work initiatives, Tech-Prep, and trends affecting workforce education programs are addressed and explored.

723-4 Education and the Changing Workplace
Designed to assist counselors, teachers, and administrators in implementing an effective Career Guidance Program within their respective schools.

724-4 Business/Industry Linkages for Improving School-to-Work Experiences
Externship program designed to be an action-oriented collaboration with business and industry to establish networks to advance counselor and school-to-work, vocational, tech-prep, and academic teacher learning and professional development in the workplace.

725-3 Administration and Supervision in Workforce Education
In-depth study of the principles, theories, and practices in the supervision of vocational education programs.

726-4 Adult Workforce Education
Investigation of workforce education programs for adults, including curriculum, special methods, and the development of curriculum materials suitable to such programs.

727-4 Preparing to Work with Adult Learners and Marketing Adult Education Programs
Information about adult learners in terms of development, learning capabilities, and learning needs is presented. Students will take part in planning and implementing a marketing effort for adult programs.

728-4 Determining Individual Training Needs and Planning Instruction for Adults
Various methods of determining individual training needs and planning instruction for adults are presented.

729-4 Managing the Instruction Process and Evaluating the Performance of Adults
Instructional techniques effective with adults are presented to help the student manage the adult instructional process. Evaluating the adult learners' progress in meeting specified objectives is covered.

824-3 Curriculum for Workforce Education
Comprehensive study of curriculum designs including occupational task analysis, innovations, sequential structuring, preparation and development of teaching units, evaluation, and change in the workforce education programs.

825-3 Facilities and Management of Workforce Education
Planning, evaluation, and management of workforce education laboratories and related areas.

826-3 Program Development Techniques for Workforce Education
Overview of coordination techniques used in a workforce 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.

827-3 Evaluation of Workforce Education
Developing procedures and involvement in the use of instruments for conducting evaluations for programs including teachers, students, facilities and equipment, and curriculum.

828-3 Teaching Strategies and Equipment Adaptations for the Disadvantaged and Handicapped Student in Workforce Education
Develops teaching strategies and equipment adaptations for disadvantaged and handicapped students in workforce education.

Women's Studies/WMS
Note: See quarterly class schedule or department advisor for further enrollment restrictions, requirements, or special course information.

599-4 Studies in Selected Subjects
Problems, approaches, and topics in the field of women's studies. Titles vary. Prerequisite: WMS 200 or permission of instructor. May be taken for a letter grade or pass/unsatisfactory.

699-1 to 4 Independent Study
Supervised individual research on selected topics. Arranged between students and faculty member directing the study. Titles vary. May be taken for letter grade or pass/unsatisfactory. Prerequisite: WMS 200 or permission of instructor.
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B.S., 1950, Cairo University (Egypt); Postdoctoral, Oxford University (England), 1962–64, London University (England), 1964–68, Harvard University, 1968–72

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B.S., 1956, M.S., 1958, Punjab University (India); Ph.D., 1961, University of Arizona

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B.S., 1953, City College of New York; M.A., 1954, Ph.D., 1957, Duke University

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Bellisari, Anna  Associate Professor of Anthropology  
Director, University Honors Programs; B.A., 1962, Wittenberg University; M.A., 1975, Ph.D., 1984, The Ohio State University

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Bergstein, Paul L. Assistant Professor of Computer Science and Computer Engineering B.S., 1978, State University of New York College of Environmental Science at Syracuse; M.S., 1981, MIT; M.S., 1990, Ph.D., 1994, Northeastern University

Bernhardt, Gregory R. Professor of Education and Counseling Education, Dean, College of Education and Human Services B.A., 1971, Colorado State University; M.S., 1973, Kansas State Teachers College; Ed.D., 1979, University of Northern Colorado

Bernstein, Jack M. Professor of Medicine and of Microbiology and Immunology M.D., 1975, Medicine, Georgetown University School of Medicine, Posidocrtoral, University of Rochester, 1978–80

Berra, P. Bruce Professor of Computer Science and Engineering and Director, Information Technology Research Institute B.S.E.E., 1968, M.S.E.E., 1962, University of Michigan; Ph.D., 1966, Purdue University

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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

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University Faculty Officers

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President-Elect
David Barr 1998–99

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Robert Dixon 1985–86
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James Jacob 1983–84

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Presiding Officers of Faculty Meetings
Norman Anon 1967–68
Edward Cox 1966–67

Chair of Academic Council
Nicholas Piediscalzi 1966–67
University Aim Statement
Adopted by the WSU Board of Trustees
December 3, 1996.
Wright State University will be a catalyst for educational excellence in the Miami Valley.

Mission Statement
Adopted by the WSU Board of Trustees
December 3, 1996.
Wright State University will be a catalyst for educational excellence in the Miami Valley, meeting the need for an educated citizenry dedicated to lifelong learning and service. To those ends, as a metropolitan university, Wright State will provide: access to scholarship and learning; economic and technological development; leadership in health, education and human services; cultural enhancement; and international understanding while fostering collegial involvement and responsibility for continuous improvement of education and research.

University Ethics Statement
Adopted by the WSU Board of Trustees
Wright State University's goal of excellence and its dedication to innovation in teaching, research, and service rests upon an individual and a collective commitment to ethics. The purpose of this statement is to provide general guidelines for strengthening the integrity of the university. It sets forth basic principles for enabling the university to accomplish its mission and serves the public interest in an ethical way.

This statement also identifies a basic process for integrating these principles into the institution's culture. The university expects the administration, the faculty, the staff, and the students to exemplify these principles in their words and actions.

To guide the conduct of the university community, Wright State University endorses the following principles:

Honesty
Members of the university community will be guided in all their activities by a high regard for truth.

Respect
Members of the university community will show concern for the individuality of others and their ideas.

Justice
Members of the university community will treat others fairly.

Accountability
Members of the university community will be responsible stewards of the public trust.

To integrate these principles into the institution's culture and to encourage ethical conduct, Wright State University is committed to an ongoing process which will involve the creation of a standing advisory and resource committee to support ongoing formal ethics education, and to assist the university in developing ethics policies and procedures.
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 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 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) Any person once classified as a nonresident upon 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 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, and 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.
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 Affairs, the Office of the Registrar, the College 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 records, files, documents, or other materials to be "education records": (a) records made by campus security; and (c) medical and counseling records used solely for treatment. (Records pertaining to students, which are maintained by university offices, are official records, and as such, remain the property of Wright State University.)

Students may seek access to their records by submitting a written and dated request on forms provided by each office from which information is sought. The head of that unit will make the records available within forty-five days and give students the right to challenge any material contained therein on the basis of it being inaccurate, misleading, or inappropriate. The right to challenge grades does not apply under the act unless the grade was inaccurately recorded.

Exceptions to the right to review records by students are as follows: (a) financial records of parents; (b) confidential letters and statements of recommendation made prior to January 1, 1975, and any other recommendations for which the student has voluntarily waived the right to access.

Wright State University does not maintain education records in any one central office. Records are maintained generally in the respective colleges and schools, the Offices of the Registrar, Student Affairs, Career Services, Admissions, Financial Aid, University Division, Veterans Affairs, Bursar, Athletics, Residence Services, Student Health Services, and Disability Services. Questions concerning the location of individual student records should be directed to the Office of Student Affairs 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 Student Affairs. 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.

Diversity Statement

Wright State University celebrates diversity. Our daily life is made rich by the diversity of individuals, groups, and cultures. The interplay of the diverse stimulates creativity and achievement in all facets of our existence.

Respect, tolerance, and goodwill are the keystones to enjoying the diversity of our world. We are all linked to each other in a world created for all of us to share and enjoy. Each member of humanity has a potential contribution to make to the whole. It is our duty to encourage and promote that contribution.

Wright State University is committed to achieving an intellectual, cultural, and social environment on campus in which all are free to make their contribution. We will achieve an environment in which every student may think, and learn, and grow without prejudice, without intimidation, and without discrimination. We will achieve an environment in which personal dignity and respect for the individual are recognized by all.

Wright State University promotes the acceptance and appreciation of every individual regardless of race, gender, age, ethnicity, ability or disability, sexual orientation, socioeconomic status, religious affiliation, or national origin. We encourage appropriate activities and events that foster learning about the diversity of our world.

Wright State University will be a model for our geographic region, exemplifying that a human community can exist that celebrates diversity, enjoys the richness that diversity brings to our lives, and grows stronger with every new member.
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