1-2004

2004 Graduate Bulletin

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Use the menu to the right to explore by department, program, or courses. These search options produce three common elements: a description, a list of programs, and a list of courses. Each of these elements can be collapsed or expanded. The main elements can be expanded and collapsed by using the link directly to the right of the element title. Individual programs and individual courses can be expanded and collapsed by using the + / - box to the left of the individual item title, or by clicking on the title itself.

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School of Engineering  
(AEE) Aerospace Engineering  
(Collapse Description)

Kevin P. Hallinan, Chair of the Department

Programs  (Expand All)

- Doctorate of Engineering in Aerospace Engineering (AEE)
- Doctorate of Philosophy in Aerospace Engineering (AEE)
- Master of Science in Aerospace Engineering (AEE)

Courses  (Expand All Courses)

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School of Engineering
(AEE) Aerospace Engineering (Collapse Description)
Kevin P. Hallinan, Chair of the Department

Programs (Collapse All)
Program Name
Doctorate of Engineering in Aerospace Engineering (AEE)
See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Doctorate of Philosophy in Aerospace Engineering (AEE)
See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Master of Science in Aerospace Engineering (AEE)

The program of study leading to the Master of Science in aerospace engineering must include a minimum of 30 semester hours of credit consisting of the following:

1. Twelve semester hours in the major area. Major areas of study include aerodynamics, aircraft propulsion, and aircraft structures.
2. Twelve semester hours of core electives. Core electives will be selected from current course offerings that best satisfy the student's requirements and meet with the advisor's approval. At least one mathematics course is strongly recommended.
3. Six semester hours of research leading to a master's thesis. Research may be replaced by six semester hours of additional coursework with the approval of the advisor and the department chair.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the advisor.

Courses (Collapse All Courses)

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<tr>
<td></td>
<td>Numerical analysis topics include the solution of systems of linear and nonlinear algebraic equations; matrix eigenvalue problems; ordinary differential equations; optimization techniques; numerical integration and interpolation. Engineering applications presented. Computer programming required.</td>
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<tr>
<td>AEE 501</td>
<td>ADVANCED AERODYNAMICS I</td>
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<td></td>
<td>Fundamentals of aerodynamics including viscosity and compressibility phenomena for subsonic, supersonic, and transonic flow. Emphasis on force and moment determination for bodies, including theory of lift.</td>
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<td>AEE 502</td>
<td>ADVANCED AERODYNAMICS II</td>
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<td></td>
<td>Advanced analytical development of compressible aerodynamics as applied to lifting surfaces and slender bodies. Approximations to lifting surface</td>
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</tbody>
</table>
theory and numerical solution. Introduction to unsteady aerodynamics.

**Prerequisite(s):** AEE 501

**AEE 503 INTRODUCTION TO CONTINuum MECHANICS**

Tensors, calculus of variations, Lagrangian and Eulerian descriptions of motion. General equations of continuum mechanics, constitutive equations of mechanics, thermodynamics of continua. Specialization to cases of solid and fluid mechanics.

**Prerequisite(s):** EGM 303 or EGM 330

**AEE 504 FUNDAMENTALS OF FLUID MECHANICS**

An advanced course in fluid mechanics with emphasis on the derivation of conservation equations and the application of constitutive theory. Navier-Stokes equations. Ideal fluid approximation. Exact and approximate solutions to classical viscous and inviscid problems. Compressible and incompressible flows.

**Corequisite(s):** MEE/AEE 503

**AEE 505 MECHANICAL BEHAVIOR OF MATERIALS**

Description of the state of stress and strain in materials, plastic deformation, fatigue, fracture, creep, and rupture.

**Prerequisite(s):** EGM 303, EGM 330, or consent of instructor

**AEE 507 ORBITAL DYNAMICS**

Solution of the two-body problem; coordinate systems; time measurement; orbital elements. Basic orbital maneuvers; transfers; rendezvous; ground-tracks. Methods of orbit determination. Restricted three-body problem and introduction to artificial satellite theory.

**Prerequisite(s):** MTH 219 and EGM 202 or equivalent

**AEE 508 AIRCRAFT PERFORMANCE AND CONTROL**

Elementary development of aircraft equations of motion; performance in level flight; climbing and descending performance; turning performance; takeoff and landing performance; static stability and control in all three axes.

**Prerequisite(s):** AEE 501

**AEE 510 INTRODUCTION TO THE FINITE ELEMENT METHOD**

Introductory development of the Finite Element Method (FEM), and solution of one- and two-dimensional field problems from fluid, solid, and thermal mechanics. Principles of virtual work and Hamilton; approximate methods; description of stiffness, nodal force, and mass matrices; matrix assembly procedures. Course emphasis on a broad understanding of FEM theory and applications. Not open to Aircraft Structures majors.

**Prerequisite(s):** EGM 303

**AEE 513 PROPULSION**

Principles of propulsive devices, aerothermodynamics diffuser and nozzle flow, energy transfer in turbo-machinery, turbojet, turbo-fan, prop-fan engines, turbo-prop and turboshaft engines. RAM and SCRAM jet analysis and a brief introduction to related materials and air frame-propulsion interaction.

**Prerequisite(s):** MEE 418

**AEE 515 CONDUCTION HEAT TRANSFER**


**AEE 516 CONVECTION HEAT AND MASS TRANSFER**


**Prerequisite(s):** MEE 410

**AEE 517 RADIATION HEAT TRANSFER**

AEE 519 ANALYTICAL DYNAMICS
Dynamical analysis of a system of particles and rigid bodies. Lagrangian and Hamiltonian formulation of equations of motion; classical integrals of motion. Stability analysis of linear and nonlinear systems. **Prerequisite(s):** MTH 219 and EGM 202 or equivalent

AEE 520 THEORETICAL KINEMATICS
Introduction to the mathematical theory underlying the analysis of general spatial motion. Analysis of mechanical systems including robots, mechanisms, walking machines and mechanical hands using linear algebra, quaternion and screw formulations. Fundamental concepts include forward and inverse kinematics, workspace, Jacobians, and singularities.

AEE 521 FLIGHT VEHICLE DYNAMICS
Dynamics of flight vehicles that emphasize the fundamental theory of flight and its application to aerospace systems. Static and dynamic stability including the characteristic longitudinal and lateral perturbation motions about the equilibrium state. **Prerequisite(s):** AEE 501

AEE 522 GEOMETRIC METHODS IN KINEMATICS
Trajectories and velocities of moving bodies are designed and analyzed via the principles of classical differential and algebraic geometry. Fundamentals include centroids, instantaneous invariants, resultants and center point design curves. Curves, surfaces, metrics, manifolds and geodesics in spaces of more than three dimensions are analyzed to study multi-parameter systems.

AEE 523 ENGINEERING DESIGN OPTIMIZATION
An introduction to the theory and algorithms of nonlinear optimization with an emphasis on applied engineering problems. Fundamentals include Newton's method, line searches, trust regions, convergence rates, and linear programming. Advanced topics include penalty, barrier and interior-point methods.

AEE 527 AUTOMATIC CONTROL THEORY
Stability and performance of automatic control systems. Classical methods of analysis including transfer functions, time-domain solutions, root locus and frequency response methods. Modern control theory techniques including state variable analysis, transformation to companion forms, controllability, pole placement, observability and observer systems. **Prerequisite(s):** ELE 432 or MEE 435 or equivalent

AEE 535 MECHANICAL VIBRATIONS
Review of undamped, damped, natural and forced vibrations of one and two degrees of freedom systems. Lagrange's equation, eigenvalue/eigenvector problems, modal analysis for discrete and continuous systems. Computer application for multi-degree of freedom, nonlinear problems. **Prerequisite(s):** computer programming and MEE 319

AEE 536 RANDOM VIBRATIONS
Introduction to probability distribution; characterization of random vibrations; harmonic analysis; auto- and cross-correlation and spectral density; coherence; response to single and multiple loadings; Fast Fourier Transform (FFT); applications in vibrations, vehicle dynamics, fatigue, etc. **Prerequisite(s):** computer programming and MEE 319

AEE 538 INTRODUCTION TO AEROELASTICITY
The study of the effect of aerodynamic forces on a flexible aircraft. Flexibility coefficients and natural modes of vibration. Quasi-steady aerodynamics. Static aeroelastic problems; wing divergence and dynamic aeroelasticity; wing flutter. An introduction to structural stability augmentation with controls. **Prerequisite(s):** AEE 501

AEE 541 EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS
Introduction to the mechanical response of fiber-reinforced composite materials with emphasis on the development of experimental methodology. Analytical topics include stress-strain behavior of an isotropic materials, laminate mechanics, and strength analysis. Theoretical models are applied to the analysis of experimental techniques used to characterize composite materials. Lectures are supplemented by laboratory sessions in which
characterization tests are performed on contemporary composites.

**AEE 543  ANALYTICAL MECHANICS OF COMPOSITE MATERIALS**

Analytical models are developed to predict the mechanical and thermal behavior of fiber-reinforced composite materials as a function of constituent material properties. Both continuous and discontinuous fiber-reinforced systems are considered. Specific topics include basic mechanics of an isotropic materials, micromechanics, lamination theory, free-edge effects, and failure criteria.

**Prerequisite(s):** EGM 303 or EGM 330

**AEE 544  MECHANICS OF COMPOSITE STRUCTURES**

Comprehensive treatment of laminated beams, plates, and sandwich structures. Effect of heterogeneity and anisotropy on bending under lateral loads, buckling, and free vibration are emphasized. Shear deformation and other higher order theories and their range of parametric application are also considered.

**Prerequisite(s):** MAT 543 or consent of instructor

**AEE 545  COMPUTATIONAL METHODS FOR DESIGN**

Modeling of mechanical systems and structures, analysis by analytical and numerical methods, development of mechanical design criteria and principles of optimum design. Selected topics in mechanical design and analysis, use of the digital computer as an aid in the design of mechanical elements.

**Prerequisite(s):** computer programming

**AEE 546  FINITE ELEMENT ANALYSIS I**

Fundamental development of the Finite Element Methods (FEM) and solution to field and comprehensive structural problems. Variational principles and weak-forms; finite element discretization; shape functions; finite elements for field problems; bar, beam, plate, and shell elements; isoparametric finite elements; stiffness, nodal force, and mass matrices; matrix assembly procedures; computer coding techniques; modeling decisions; program output interpretation. Course emphasis on a thorough understanding of FEM theory and modeling techniques.

**Prerequisite(s):** AEE 503 or MEE 533

**AEE 547  FINITE ELEMENT ANALYSIS II**

Advanced topics: heat transfer; transient dynamics; nonlinear analysis; substructuring and static condensation; effects of inexact numerical integration and element incompatibility; patch test; frontal solution techniques; selected topics from the recent literature.

**Prerequisite(s):** AEE 546

**AEE 551  NOISE AND VIBRATION CONTROL**

Concepts of noise and vibration control applied to mechanical systems. Methodologies covered will include passive treatments using resistive elements (sound absorbers, vibration damping) and reactive elements (tailoring of material stiffness and mass); active control of sound and vibration; and numerical analysis.

**Prerequisite(s):** MEE 439 or MEE 319

**AEE 552  BOUNDARY LAYER THEORY**

Development of the Prandtl boundary layer approximation in two and three dimensions for both compressible and incompressible flows. Exact and approximate solutions for laminar flows. Unsteady boundary layers. Linear stability theory and transition to turbulence. Empirical and semi-empirical methods for turbulent boundary layers. Higher order boundary layer theory.

**Prerequisite(s):** AEE 504 or equivalent

**AEE 553  COMPRESSIBLE FLOW**

Fundamental equations of compressible flow. Introduction to flow in two and three dimensions. Two-dimensional supersonic flow, small perturbation theory, method of characteristics, oblique shock theory. Introduction to unsteady one-dimensional motion and shock tube theory. Method of surface singularities.

**Prerequisite(s):** AEE 504 or equivalent

**AEE 555  TURBULENCE**

**Prerequisite(s):** AEE 504 or equivalent

**AEE 556 HYPERSONIC AERODYNAMICS**

Hypersonic prediction techniques, similarity rules, Newtonian impact theory, high-temperature equilibrium properties of gases; wake characteristics; heat transfer, chemical kinetics and reacting gas flows, simulation and testing techniques.

**Prerequisite(s):** AEE 504 or consent of instructor

**AEE 558 COMPUTATIONAL FLUID DYNAMICS**

Numerical solution to Navier-Stokes equations and approximations such as the boundary layer equations for air-flow about a slender body. Numerical techniques for the solution of the transonic small disturbance equations. Numerical determination of fluid instabilities.

**Prerequisite(s):** AEE 504 or consent of instructor

**AEE 559 FUNDAMENTALS OF FUELS AND COMBUSTION**

Heat of combustion and flame temperature calculations; rate of chemical reaction and Arrhenius relationship; theory of thermal explosions and concept of ignition delay and critical mass; phenomena associated with hydrocarbon-air combustion; specific applications of combustion.

**AEE 560 COMBUSTION THEORY**

Theory of detonation (Rankine-Hugoniot relationships) and flame propagation rates in pre-mixed gas systems; turbulent flames and the well-stirred reactor; theory of diffusion flames; fuel droplet combustion; steady burning of solid materials; Ignition and flame spreading across solid materials.

**AEE 570 FRACTURE MECHANICS**

Application of the principles of fracture mechanics to problems associated with fatigue and fracture in engineering structures. The course will cover the development of models that apply to a range of materials, geometries and loading conditions.

**Prerequisite(s):** AEE 506 or consent of instructor

**AEE 580 AEROSPACE ENGINEERING PROJECT**

Student participation in an aerospace research, design, or development project under the direction of a project advisor. The student must show satisfactory progress as determined by the project advisor and must present a written report at the conclusion of the project.

**AEE 590 SELECTED READINGS IN AEROSPACE ENGINEERING**

Directed readings in the designated area to be arranged and approved by the student's advisor and the program director. May be repeated.

**AEE 595 SPECIAL PROBLEMS IN AEROSPACE ENGINEERING**

Special assignments in aerospace engineering subject matter to be approved by the student's faculty advisor and the program director.

**AEE 599 THESIS**

**AEE 690 SELECTED READINGS IN AEROSPACE ENGINEERING**

Directed readings in aerospace engineering to be arranged and approved by the student's advisory committee and the program director. May be repeated.

**AEE 695 SPECIAL PROBLEMS IN AEROSPACE ENGINEERING**

Special assignments in aerospace engineering. Subject matter to be arranged and approved by the student's advisory committee and the program director. May be repeated.

**AEE 698 D.E. DISSERTATION**

An original investigation as applied to aerospace engineering practice. Results must be of sufficient importance to merit publication.
AEE 699  Ph.D. DISSERTATION

Research in aerospace engineering. Results must be of sufficient importance to merit publication.

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The Department of Biology offers programs leading to the Master of Science and the Doctor of Philosophy. The degrees are in biology, but each program is tailored to the student's own interests and career plans. Specialization is accomplished by selection of courses, choice of thesis or dissertation topic, and participation in weekly seminars in the area of interest. The specific program is determined after consultation between the student and the advisory committee. The Department of Biology also offers a Master of Science program without a thesis requirement. Two major areas of specialization are available. These areas and the typical spectra of graduate courses available are as follows:

Environmental/Ecological Sciences
- Field Biology
- Microbial Ecology
- Biochemistry
- Molecular Biology
- Community Ecology
- Behavioral Ecology
- Biometrics
- Biochemical Genetics
- Bioinstrumentation
- Ecosystem Dynamics

Basic Biomedical Sciences
- Advanced Developmental Biology
- Biochemical Genetics
- Immunology
- Biochemistry
- Biometrics
- Advanced Microbiology
- Advanced Cell Biology
- Molecular Biology
- Bioinstrumentation

Assistantships
Qualified applicants are eligible for financial assistance in the form of fellowships, traineeships, and research or teaching assistantships. Students admitted to the doctoral program are given priority for these awards. In addition to a stipend, all appointments with financial aid are exempt from tuition during both the academic year and the summer session. Financial aid is available during the summer on a competitive basis.

Advising
Each student is assigned a provisional advisor for assistance during the first semester. Prior to registration for the second semester each student selects a major professor, who will serve as director of the student's advisory committee. The composition of this committee is representative of the general field of study in which the student expects to work.

The committee helps to plan the student's entire program. The committee generally meets with the student twice a year to offer suggestions and assess progress in the program and thesis research.

Programs (Collapse All)
- Doctorate of Philosophy in Biology (BIO)
Each student is required to complete BIO 552-553, BIO 501, BIO 601 and two
advanced courses by the end of the first year. Following completion of the first
year, each doctoral student follows the program outlined by the advisory
committee. In practice, most students find it helpful to take 45 to 60 semester
hours of graduate course credits beyond the bachelor's degree in addition to 30
credit hours of dissertation research to attain the level of competence suitable for
a doctoral candidate. When desirable, a student will be encouraged to take some
work at neighboring institutions or summer laboratories.

Ph.D. Candidacy Examination

The candidacy examination for Ph.D. students is administered by the advisory
committee, which may be supplemented by members requested by the committee
and/or department chair. The examination will be taken no later than the end
of the fourth semester for students entering with a M.S. and sixth semester for
those entering the program with a B.S. The purpose of the examination is to judge
the student's competence in the special area and in related fields. Following the
examination, the student may be directed to (a) complete the dissertation, (b)
strengthen preparation by demonstrating competence in one or more areas, (c)
withdraw from the Ph.D. program and complete a thesis M.S. degree, or (d)
withdraw from the program. At the committee's discretion, additional competence
in an area may be demonstrated by special examination or by completion of
specific courses to the committee's satisfaction. The student is considered a
candidate for the Ph.D. after successful completion of these requirements.

Defense of Thesis or Dissertation

1. The examination on the thesis, whether for the M.S. or the Ph.D., will
consist of a formal oral examination on the subject matter of the thesis or
dissertation.
2. For students electing the non-thesis option, an oral examination is held
over the subject matter of the research paper.
3. A Ph.D. student must present the dissertation for defense within five
years after admission to candidacy or repeat the candidacy examination.
4. All those working toward the master's degree must complete the program
within five years after admission to the program.

Residence Requirement

A student is strongly advised to devote as much time as possible to graduate
studies. To satisfy the residency requirement, M.S. students must attend the
University as a full-time student for at least one full year. The Ph.D. program is a
full-time only program. If the advisory committee encourages attendance of a
semester or a summer as a full-time student at a neighboring institution or in an
off-campus research site, that time may be applied to the residence requirement.

Sequence of Evaluation

The program is centered around development of professional competence. Each
student is formally assessed in the following steps:

1. A qualifying examination at the beginning of the second year of full-time
graduate study for all graduate students.
2. A candidacy examination over the area of specialization (Ph.D. students
only); and

The overall performance of each student is evaluated by the graduate
coordinating committee, at least yearly, in terms of overall progress toward
obtaining the degree. A student judged to be making unsatisfactory progress may
be placed on probation or dismissed from the program. Further details concerning
the policies of the graduate program can be found in the Manual for Graduate
Studies in the Department of Biology at the University of Dayton.

Qualifying Examination

At the beginning of the second full year of graduate work, all M.S. and Ph.D.
students will take a qualifying examination. An important purpose of the
examination is to aid the student's committee in planning the remainder of the
program. The examination will cover basic biological concepts, subject matter of
graduate courses taken, and broad areas of the student's specialty. The
emphasis will be not only on facts but on the student's command of self-
expression, ability to reason, and to integrate knowledge.

Utilizing the student's performance in both the written and oral phases of the
exam, the advisory committee may make an evaluation and suggests one of the
following possible alternatives:

1. The student should continue to work toward completion of M.S. or Ph.D.
degree.
2. The student should correct obvious deficiencies and retake the written
and/or oral examination(s) - (retake must be scheduled no later than the
middle of the next semester and result in a clear pass or fail/withdrawal
from graduate work).
3. The student should withdraw from graduate work (student has failed the examination without an opportunity of a second chance).

4. M.S. students who show outstanding ability and wish to proceed toward the Ph.D. may be encouraged to stay at UD. They are required to pass the qualifying exam, present and defend an oral research progress report, and Ph.D. proposal to their advisory committee in their third semester of the program. The advisory committee will decide if the student shows sufficient ability to enter the Ph.D. program. Upon positive recommendation from the advisory committee, the student must submit a formal application for admission to the Ph.D. program to the Admissions Committee by the third week of their fourth semester of the program. The Admissions Committee will make the final recommendation regarding their acceptance. If accepted, the student must conform to all requirements of the Ph.D. program.

5. At the time of the qualifying exam, both the student and advisory committee have the final opportunity to review the choice of the M.S. program - thesis or non-thesis option. For the non-thesis option, the nature of the requirements should be specified by the advisory committee. If under unusual circumstances, a student wishes to change options after this date and the advisory committee concurs, it should be recognized that this may result in an additional semester or more of work. However, consideration should be given to the availability of support for continuation of a M.S. program beyond two years.

Students who choose to complete a Master's degree are considered candidates for that degree after the qualifying examination. A student who wishes to continue beyond the Master's degree will be advised to continue for the doctorate (see requirements above) or to terminate his/her studies at the university on the basis of his/her performance in earning the Master's degree.

All other graduate examinations come at specific times in the progress of the student's program and are scheduled and administered by the advisor and advisory committee. These examinations consist of the Ph.D. candidacy examination, the defense of M.S. thesis or Ph.D. dissertation, and the final M.S. non-thesis program exam.

Master of Science in Biology (BIO)

The M.S. degree requires 24 semester hours of coursework plus a research thesis. Each student is required to complete BIO 552-553, BIO 501, BIO 601 and two advanced courses by the end of the first year. During the third term of the first year all students (M.S. or Ph.D.) who have not taken a biostatistics course as an undergraduate must enroll in BIO 550 (Biometrics). Individuals on teaching assistantships must complete the teaching seminar (BIO 553) and teach at least one laboratory course during their course of study.

Students declaring the non-thesis option are required to complete 30 hours of coursework consisting of the aforementioned courses. A research paper is required, and the subject matter of the paper is determined by the advisory committee.

Defense of Thesis or Dissertation

1. The examination on the thesis, whether for the M.S. or the Ph.D., will consist of a formal oral examination on the subject matter of the thesis or dissertation.
2. For students electing the non-thesis option, an oral examination is held over the subject matter of the research paper.
3. A Ph.D. student must present the dissertation for defense within five years after admission to candidacy or repeat the candidacy examination.
4. All those working toward the master's degree must complete the program within five years after admission to the program.

Residence Requirement

A student is strongly advised to devote as much time as possible to graduate studies. To satisfy the residency requirement, M.S. students must attend the University as a full-time student for at least one full year. The Ph.D. program is a full-time only program. If the advisory committee encourages attendance of a semester or a summer as a full-time student at a neighboring institution or in an off-campus research site, that time may be applied to the residence requirement.

Sequence of Evaluation

The program is centered around development of professional competence. Each student is formally assessed in the following steps:

1. A qualifying examination at the beginning of the second year of full-time graduate study for all graduate students.
2. A candidacy examination over the area of specialization (Ph.D. students only); and

The overall performance of each student is evaluated by the graduate coordinating committee, at least yearly, in terms of overall progress toward obtaining the degree. A student judged to be making unsatisfactory progress may be placed on probation or dismissed from the program. Further details concerning the policies of the graduate program can be found in the Manual for Graduate Studies in the Department of Biology at the University of Dayton.

Qualifying Examination

At the beginning of the second full year of graduate work, all M.S. and Ph.D. students will take a qualifying examination. An important purpose of the examination is to aid the student's committee in planning the remainder of the program. The examination will cover basic biological concepts, subject matter of graduate courses taken, and broad areas of the student's specialty. The emphasis will be not only on facts but on the student's command of self-expression, ability to reason, and to integrate knowledge.

Utilizing the student's performance in both the written and oral phases of the exam, the advisory committee makes an evaluation and suggests one of the following possible alternatives:

1. The student should continue to work toward completion of M.S. or Ph.D. degree.
2. The student should correct obvious deficiencies and retake the written and/or oral examination(s) - (retake must be scheduled no later than the middle of the next semester and result in a clear pass or fail/withdrawal from graduate work).
3. The student should withdraw from graduate work (student has failed the examination without an opportunity of a second chance).
4. M.S. students who show outstanding ability and wish to proceed toward the Ph.D. may be encouraged to stay at UD. They are required to pass the qualifying exam, present and defend an oral research progress report, and Ph.D. proposal to their advisory committee in their third semester of the program. The advisory committee will decide if the student shows sufficient ability to enter the Ph.D. program. Upon positive recommendation from the advisory committee, the student must submit a formal application for admission to the Ph.D. program to the Admissions Committee by the third week of their fourth semester of the program. The Admissions Committee will make the final recommendation regarding their acceptance. If accepted, the student must conform to all requirements of the Ph.D. program.
5. At the time of the qualifying exam, both the student and advisory committee have the final opportunity to review the choice of the M.S. program - thesis or non-thesis option. For the non-thesis option, the nature of the requirements should be specified by the advisory committee. If under unusual circumstances, a student wishes to change options after this date and the advisory committee concurs, it should be recognized that this may result in an additional semester or more of work. However, consideration should be given to the availability of support for continuation of a M.S. program beyond two years.

Students who choose to complete a Master's degree are considered candidates for that degree after the qualifying examination. A student who wishes to continue beyond the Master's degree will be advised to continue for the doctorate (see requirements above) or to terminate his/her studies at the university on the basis of his/her performance in earning the Master's degree.

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These examinations consist of the Ph.D. candidacy examination, the defense of M.S. thesis or Ph.D. dissertation, and the final M.S. non-thesis program exam.

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 501</td>
<td>SEMINAR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presentation of biological research data by faculty members and visiting scientists. Required of all graduate students each semester.</td>
<td></td>
</tr>
<tr>
<td>BIO 503</td>
<td>COLLEGE TEACHING SEMINAR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To assist graduate teaching assistants in acquiring information, understanding, and skills seen as important components of effective teaching.</td>
<td></td>
</tr>
</tbody>
</table>
BIO 505  MICROBIAL ECOLOGY
Study of the diversity of microorganisms and the interrelationships between microorganisms and their environments. Emphasis is placed on aquatic ecosystems.

BIO 505L  MICROBIAL ECOLOGY LABORATORY
Examination of the methods of isolation and enumeration of microorganisms and techniques for determining their activities in the field and laboratory.

BIO 511  ECOSYSTEM DYNAMICS
An advanced course examining ecosystem structure and function. Emphasis on community level interactions, applied ecology and the ways in which ecosystem biodiversity can be influenced by the biotic and abiotic forces of the environment, including the global impact of the human species.

BIO 521  BIOCHEMICAL GENETICS
An analysis of the nature of the gene and gene action. Particular attention will be given to genetic control of protein synthesis and recent advances in biochemical and physiological genetics. Two hours lecture.

BIO 522  IMMUNOLOGY
Study of innate and acquired immunity, cells and organs of the immune system, antigens and immunoglobulins. Specific emphasis on the organization and expression of immunoglobulin genes; genetic restriction; cytokines and immune regulation including hypersensitivity, immune tolerance, transplantation and autoimmunity. Biochemistry recommended.

BIO 523  ADVANCED MICROBIOLOGY
Lectures, readings and discussions of current concepts in basic and applied microbiology, with emphasis on microbial metabolism and physiology.

BIO 524  ADVANCED CELL BIOLOGY
Explores the structure and function of cells through their biochemical, molecular, and physiological activities.

BIO 530  BEHAVIORAL ECOLOGY
An advanced course examining adaptive individual and social behavior. Cost/benefit analyses of adaptive behavior, using examples from the current literature.

Prerequisite(s): Courses in ecology, genetics and animal behavior

BIO 535  PROBLEMS IN FIELD BIOLOGY
A course designed to acquaint students with field-oriented problems in biology.

BIO 538  POPULATION BIOLOGY
An advanced course considering the relationship of genetics and ecology. Emphasis on the growth and regulation of natural populations.

Prerequisite(s): ecology and genetics

BIO 538L  POPULATION BIOLOGY LABORATORY
Field and laboratory exercise to accompany BIO 538.

BIO 540L  PHYSIOLOGY OF HIGHER PLANTS LABORATORY
Laboratory concerned with uptake and transport of materials, energy metabolism and growth in higher plants.

BIO 546  PLANT DEVELOPMENT
Study of the major organ systems of the vascular plants with emphasis on the nature of their cell types and tissue composition and their patterns of development.

BIO 546L  PLANT DEVELOPMENT LABORATORY

BIO 550  BIOMETRICS
Design and analysis of experiments in quantitative biology. Parametric and nonparametric analyses of both laboratory and field-generated data sets.
BIO 552  BIOLOGICAL INSTRUMENTATION  
This course is required of 0 graduate students, and is designed to acquaint students with advanced laboratory techniques used in biological research. Topics include theory and applications of protein and nucleic acid techniques, data analysis, and preparation of scientific manuscripts, posters and grant proposals.

BIO 553  BIOLOGICAL INSTRUMENTATION  
A continuation of BIO 552.

BIO 555  LABORATORY TECHNIQUES (TOPIC)  
Advanced treatment of new techniques and instrumentation used in specialized areas of biology. Changes with advances in a specialty are reflected in the course title.

BIO 570  ADVANCED DEVELOPMENTAL BIOLOGY  
An advanced course on the principles of animal development with emphasis on concepts and experimental evidence for underlying mechanisms. This course is designed to present the latest and newest advances in development, and includes discussion on the use of current model systems. Prerequisite(s): introductory course in developmental biology, cell biology, or permission of instructor.

BIO 594  MOLECULAR BIOLOGY - THEORY AND PRACTICE  
Introduction to the theory and practice of molecular biology techniques. Topics and laboratory exercises include the enzymatic manipulation of DNA and RNA, Southern and Northern blotting, library screening, DNA sequencing, DNA amplification, and gene promoter structure and function.

BIO 596  CURRENT BIOLOGY PROBLEMS  
Consideration of recent developments in biological thought and procedure. By permission of chair only.

BIO 599  THESIS  
Research for the master's degree.

BIO 601  SPECIAL TOPICS  
Development, presentation, and discussion of topics in specialized areas of biology. Required of graduate students each semester.

BIO 699  DISSERTATION  
Research for the doctoral degree.
School of Business Administration
(MBA) Business Administration

Programs

Program Name
Master of Business Administration (MBA)

MBA Curriculum

The MBA Program is a 30 semester credit hour program for the student with a recent undergraduate background in business. For the student with a non-business background, or who lacks coursework in key areas of undergraduate business study, Foundation courses are required.

A common core of six courses, (18 semester hours), is required for all students. Additional breadth or depth in a selected subject area may be achieved by taking 12 hours of elective courses for the required program total of 30 semester hours.

Program of Study

Program Prerequisites
For international students for whom English is a second language, the University's English Language and Multicultural Institute (ELMI) offers courses for improving business verbal and written communication skills, as well as TOEFL test scores.

There are four groups of courses in the MBA program:

Group I: Foundation Segment
Group II: Integrated Core Segment
Group III: Capstone Segment
Group IV: Elective Courses

Foundation Segment: Students who need coursework in basic business knowledge and skills are required to take the appropriate course(s) from the following foundation courses. The Foundation Segment consists of a variety of courses up to a maximum of 22 hours. All foundation courses (except MBA 620 and MBA 670) are accelerated, half-semester courses.

A student applying to the MBA program may have foundation coursework waived if appropriate undergraduate studies with earned grades of C or better have been completed within seven years. Grades earned from undergraduate coursework will not be calculated in the cumulative MBA grade point average. Placement exams, which waive courses, are also available to students who can demonstrate experience or knowledge in a particular area. All placement exams should be taken prior to the second term of enrollment, and are offered at no cost to the student. They can be scheduled by calling the MBA office at (937) 229-3733. Grades earned from MBA foundation courses will be calculated into the cumulative MBA grade point average. Whenever foundation courses are required, they must, when offered, be completed before proceeding to core or elective courses. For information on appropriate undergraduate courses to waive foundation requirements, contact the MBA office.

Integrated Core Segment: The integrated core portion of the program consists of four 3.0 credit hour required courses.

Capstone Segment: The Capstone Segment of the program consists of two 3.0 credit hours required courses completed over two semesters.

Elective Courses: Twelve hours of elective courses are required. They may be selected to obtain program breadth or depth in a particular area by choosing a concentration. The student may choose from among the MBA courses offered, or with approval by the MBA director, students may elect up to six semester hours of graduate courses from other programs at the University when these are appropriate to their education plans.

Time Limitation
All coursework, exclusive of foundation courses, must be completed within five
calendar years of enrollment in the first integrated core or elective course applicable to the degree.

Program Concentrations

Students may choose their electives to acquire a program concentration. Specific concentrations are offered in accounting, finance, international business, management information systems, operations management, marketing, and technology-enhanced business/e-commerce. Selection of an area of concentration is the option of the student; however, the MBA office must be advised of the selection to provide for its administration. The area of concentration is noted on the student's transcript. A minimum of nine semester hours of concentration-based elective credit is required for each concentration selected, except for the accounting concentration, which requires 12 semester hours.

Possible Programs of Study

The University of Dayton's MBA curriculum has the flexibility often needed by business professionals: students may begin any term and may proceed at any pace from one course per term to three or four courses per term. A few curriculum requirements must be satisfied: (1) foundation courses (or waiver from them) first, (2) integrated core courses in any order but prior to the capstone courses, and (3) the second capstone (MBA 699) after the first (MBA 698). Each year, full schedules of courses are offered in the fall and winter semesters. In addition, a partial schedule of courses is offered each summer in two convenient, accelerated summer sessions.

As illustrations, the following show two programs of study to complete the MBA on a part-time basis.

Program of Study 1:
- Two courses per term pace
- Foundations already completed
- Degree requirements of 30 hrs.
- A concentration may be earned if desired

First Term:*
MBA 691 Analytic Framework for Business Decision Making
MBA 692 High Quality Operational Systems

Second Term:
MBA 693 Managing Information and People in Organizations
Elective

Third Term:
MBA 694 Managing Financial Resources for Marketing Strategies
Elective

Fourth Term:
MBA 698 Leadership, Strategy, and Stakeholder Management
Elective

Fifth Term:
MBA 699 Capstone Integrative Project
Elective

*In a summer term, this may need to be adjusted.

Program of Study 2:
- Two or three courses per term pace
- Foundations already completed
- Degree requirements of 30 hrs.
- A concentration may be earned if desired

First Term:*
MBA 691 Analytic Framework for Business Decision Making
MBA 692 High Quality Operational Systems
Elective

Second Term:*
MBA 693 Managing Information and People in Organizations
MBA 694 Managing Financial Resources for Marketing Strategies
Elective

Third Term:
MBA 698 Leadership, Strategy, and Stakeholder Management
Elective

Fourth Term:
MBA 699 Capstone Integrative Project
Elective

*In a summer term, this may need to be adjusted.
# Master of Business Administration

## Group I: Foundation Segment

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 600A</td>
<td>FINANCIAL ACCOUNTING</td>
<td>2</td>
</tr>
<tr>
<td>MBA 601A</td>
<td>MANAGERIAL ACCOUNTING</td>
<td>2</td>
</tr>
<tr>
<td>MBA 610</td>
<td>BUSINESS DATA ANALYSIS</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 611</td>
<td>STATISTICAL TECHNIQUES FOR DECISION ANALYSIS</td>
<td>5</td>
</tr>
<tr>
<td>MBA 612</td>
<td>MANUFACTURING AND SERVICE SYSTEMS</td>
<td>5</td>
</tr>
<tr>
<td>MBA 620</td>
<td>FINANCIAL ANALYSIS AND MARKETS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 630</td>
<td>MARKETING ESSENTIALS</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 640</td>
<td>MICROECONOMICS</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 641</td>
<td>MACROECONOMICS</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 650</td>
<td>ORGANIZATIONS AND THEIR ENVIRONMENTS</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 660</td>
<td>INFORMATION TECHNOLOGY AND SYSTEMS</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 670</td>
<td>ORGANIZATIONAL THEORY AND BEHAVIOR</td>
<td>3</td>
</tr>
</tbody>
</table>

## Group II: Integrated Core Segment

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 691</td>
<td>ANALYTIC FRAMEWORK FOR BUSINESS DECISION MAKING</td>
<td>3</td>
</tr>
<tr>
<td>MBA 692</td>
<td>OPERATIONAL MANAGEMENT SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 693</td>
<td>MANAGING INFORMATION AND PEOPLE IN ORGANIZATIONS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 694</td>
<td>MANAGING FINANCIAL RESOURCES FOR MARKETING STRATEGIES</td>
<td>3</td>
</tr>
</tbody>
</table>

## Group III: Capstone Segment

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 698</td>
<td>LEADERSHIP, STRATEGY, AND STAKEHOLDER MANAGEMENT</td>
<td>3</td>
</tr>
<tr>
<td>MBA 699</td>
<td>CAPSTONE INTEGRATIVE PROJECT</td>
<td>3</td>
</tr>
</tbody>
</table>

## Group IV: Elective Courses (see below)

### Elective Program Concentrations

#### Accounting (ACC) Concentration

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 602A</td>
<td>INFORMATION ASSURANCE</td>
<td>3</td>
</tr>
<tr>
<td>MBA 602B</td>
<td>FRAUD INVESTIGATION</td>
<td>3</td>
</tr>
<tr>
<td>MBA 603A</td>
<td>ADVANCED FINANCIAL ACCOUNTING</td>
<td>3</td>
</tr>
<tr>
<td>MBA 604A</td>
<td>TAXES AND BUSINESS STRATEGY</td>
<td>3</td>
</tr>
<tr>
<td>MBA 604B</td>
<td>ADVANCED ISSUES IN TAXATION</td>
<td>3</td>
</tr>
<tr>
<td>MBA 605A</td>
<td>CONTEMPORARY ISSUES IN ACCOUNTING</td>
<td>3</td>
</tr>
<tr>
<td>MBA 605B</td>
<td>INTERNATIONAL ACCOUNTING</td>
<td>3</td>
</tr>
<tr>
<td>MBA 606A</td>
<td>FINANCIAL STATEMENT/RISK ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 607A</td>
<td>STRATEGIC PERFORMANCE</td>
<td>3</td>
</tr>
<tr>
<td>MBA 608A</td>
<td>ACCOUNTING INFORMATION SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 609A</td>
<td>SPECIAL TOPICS IN ACCOUNTING</td>
<td>3</td>
</tr>
<tr>
<td>MBA 609B</td>
<td>INDIVIDUAL RESEARCH IN ACCOUNTING</td>
<td>3 - 6</td>
</tr>
</tbody>
</table>

#### Finance (FIN) Concentration

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 622</td>
<td>ADVANCED CORPORATE FINANCE</td>
<td>3</td>
</tr>
<tr>
<td>MBA 624</td>
<td>COMMERCIAL BANK MANAGEMENT</td>
<td>3</td>
</tr>
<tr>
<td>MBA 625</td>
<td>INVESTMENTS AND FINANCIAL MARKETS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 626</td>
<td>INTERNATIONAL FINANCIAL MANAGEMENT</td>
<td>3</td>
</tr>
<tr>
<td>MBA 627</td>
<td>MANAGEMENT OF FINANCIAL INSTITUTIONS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 628</td>
<td>FIXED INCOME ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 629</td>
<td>SPECIAL TOPICS IN FINANCE</td>
<td>3</td>
</tr>
</tbody>
</table>
International Business (INT) Concentration
MBA 626 INTERNATIONAL FINANCIAL MANAGEMENT 3
MBA 636 MULTICULTURAL MARKETING 3
MBA 637 GLOBAL MARKETING MANAGEMENT 3
MBA 646 INTERNATIONAL TRADE AND BUSINESS APPLICATIONS 3
MBA 656 EUROPEAN CULTURE & MANAGEMENT 3
MBA 676 INTERNATIONAL MANAGEMENT 3

Management Information Systems (MIS) Concentration
MBA 608A ACCOUNTING INFORMATION SYSTEMS 3
MBA 661 E-COMMERCE 3
MBA 662 BUSINESS TELECOMMUNICATIONS 3
MBA 663 MANAGEMENT OF INFORMATION RESOURCES 3
MBA 664 DATABASE MANAGEMENT 3
MBA 665 SYSTEMS ANALYSIS & DESIGN 3
MBA 667 DATA WAREHOUSING 3
MBA 668 WEB SITE DEVELOPMENT 3
MBA 669 SPECIAL TOPICS IN MANAGEMENT INFORMATION SYSTEMS 3

Marketing (MKT) Concentration
MBA 632 SERVICES MARKETING 3
MBA 634 CONSUMER BEHAVIOR 3
MBA 635 RESEARCH FOR MARKETING DECISIONS 3
MBA 636 MULTICULTURAL MARKETING 3
MBA 637 GLOBAL MARKETING MANAGEMENT 3
MBA 638 PRODUCT PLANNING AND DEVELOPMENT 3
MBA 639 SPECIAL TOPICS IN MARKETING 3

Operations Management (OM) Concentration
ENM 505 MANAGEMENT OF ENGINEERING SYSTEMS 3
ENM 515 HUMAN FACTORS ENGINEERING 3
ENM 521 DETERMINISTIC OPERATIONS RESEARCH 3
ENM 522 PROBABILISTIC OPERATIONS RESEARCH 3
ENM 523 NONLINEAR OPTIMIZATION 3
ENM 530 COST AND ECONOMIC ANALYSIS FOR ENGINEERS 3
ENM 555 SYSTEM DYNAMICS I 3
ENM 560 QUALITY ASSURANCE 3
ENM 561 DESIGN AND ANALYSIS OF EXPERIMENTS 3
ENM 565 RELIABILITY ENGINEERING I 3
ENM 572 SYSTEM SIMULATION 3
ENM 575 INTRODUCTION TO ARTIFICIAL INTELLIGENCE 3
MBA 607A STRATEGIC PERFORMANCE MEASUREMENT AND CONTROL: A SYSTEM'S PERSPECTIVE 3
MBA 613 JIT AND QUALITY IN MANUFACTURING AND SERVICES 3
MBA 614 ANALYSIS OF FACTORY SYSTEMS 3
MBA 618 OPERATIONS MANAGEMENT RESEARCH SEMINAR 3
MBA 619 SPECIAL TOPICS IN OPERATIONS MANAGEMENT 3
MEE 580 STATISTICAL PROCESS CONTROL BY FEEDBACK ADJUSTMENT 3
MEE 582 AUTOMATED DESIGN 3
MEE 584 INTEGRATED MANUFACTURING SYSTEMS 3
MEE 585 DESIGN FOR PRODUCIBILITY 3
Technology-Enhanced Business/E-Commerce (TEB)
Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 661</td>
<td>E-COMMERCE</td>
<td>3</td>
</tr>
<tr>
<td>MBA 662</td>
<td>BUSINESS TELECOMMUNICATIONS</td>
<td>3</td>
</tr>
<tr>
<td>MBA 667</td>
<td>DATA WAREHOUSING</td>
<td>3</td>
</tr>
<tr>
<td>MBA 668</td>
<td>WEB SITE DEVELOPMENT</td>
<td>3</td>
</tr>
<tr>
<td>MBA 669</td>
<td>SPECIAL TOPICS IN MANAGEMENT</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>INFORMATION SYSTEMS</td>
<td></td>
</tr>
</tbody>
</table>

A student applying to the MBA program may have foundation coursework waived if appropriate undergraduate studies with earned grades of C or better have been completed within seven years. See program description above for more details.

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 600A</td>
<td>FINANCIAL ACCOUNTING</td>
<td>2</td>
<td>An introduction to the concepts and procedures underlying financial accounting and the use of financial accounting information for decision making.</td>
</tr>
<tr>
<td>MBA 601A</td>
<td>MANAGERIAL ACCOUNTING</td>
<td>2</td>
<td>An introduction to the concepts underlying the preparation and use of accounting data by managers as they plan, control, and make decisions within the organization. Topics include just-in-time (JIT) systems, activity-based costing (ABC), flexible manufacturing environment, theory of constraints, and cost of quality. Prerequisite(s): MBA 600A</td>
</tr>
<tr>
<td>MBA 602A</td>
<td>INFORMATION ASSURANCE</td>
<td>3</td>
<td>An exploration of the various ways that accounting provides forms of assurance to information users in making important economic decisions through the use of traditional audit methodologies and an expansion of the audit sphere into attestation and assurance practices. Prerequisite(s): ACC 401 or permission</td>
</tr>
<tr>
<td>MBA 602B</td>
<td>FRAUD INVESTIGATION</td>
<td>3</td>
<td>Study of topics related to the detection, investigation, and prevention of accounting fraud. This course will concentrate on occupational fraud, where the victim is the employer, and financial statement fraud, where the victims are the external users of financial statement information. Prerequisite(s): ACC 305 or permission</td>
</tr>
<tr>
<td>MBA 603A</td>
<td>ADVANCED FINANCIAL ACCOUNTING</td>
<td>3</td>
<td>Study of the principles and procedures of accounting for business combinations, consolidated financial statements, government and not-for-profit organizations, partnerships, multinational subsidiaries and foreign currency transactions. Prerequisite(s): ACC 305 or permission</td>
</tr>
<tr>
<td>MBA 604A</td>
<td>TAXES AND BUSINESS STRATEGY</td>
<td>3</td>
<td>An examination of how taxes affect business decisions. This course introduces and utilizes a microeconomic framework for understanding effective tax planning for businesses and individuals, regardless of tax-law regime, rather than a strict application of the current tax code. Prerequisite(s): MBA 600A and 601A</td>
</tr>
<tr>
<td>MBA 604B</td>
<td>ADVANCED ISSUES IN TAXATION</td>
<td>3</td>
<td>Study of the current federal income tax code and its application to individuals and business entities. Emphasis is placed on the technical issues and planning opportunities that businesses face. Prerequisite(s): ACC 420 or permission</td>
</tr>
<tr>
<td>MBA 605A</td>
<td>CONTEMPORARY ISSUES IN ACCOUNTING</td>
<td>3</td>
<td>Seminar covering emerging or controversial accounting issues for the student who has a strong accounting background. Topics include the business and financial situations that underlie accounting problems and controversies, alternative accounting techniques which are accepted or proposed, and the consequences of various accounting practices. Prerequisite(s): ACC 306 or permission</td>
</tr>
</tbody>
</table>
MBA 605B INTERNATIONAL ACCOUNTING
Study of current topics in international accounting. This course will typically include a week or more of study outside of the U.S. that will include lectures and relevant site visits. In addition to normal tuition, there may be travel and other costs or fees. Foreign locations, countries, topics, and duration may vary.
Prerequisite(s): ACC 306 or permission

MBA 606A FINANCIAL STATEMENT/RISK ANALYSIS
A study of the tools and techniques of financial statement analysis to include a consideration of various alternatives and techniques and the impact of economics and accounting measurements.
Prerequisite(s): ACC 306 or permission

MBA 607A STRATEGIC PERFORMANCE MEASUREMENT AND CONTROL: A SYSTEMS PERSPECTIVE
The design and use of performance measurement and control systems from an integrated systems view of an organization. An important aspect of the course is to "think out of the box" in terms of how to design more flexible and adaptive cost management systems to help organizations become more flexible and responsive in meeting customer needs. While such traditional topics as balanced scorecards, activity-based costing, performance measurement and control are discussed, these topics are reexamined in light of an integrated systems view of an organization.
Prerequisite(s): MBA 692 and ACC 303 or permission

MBA 608A ACCOUNTING INFORMATION SYSTEMS
A study of accounting information systems and their impact on management decision making and control. Emphasis on the systems approach to the collection and reporting of accounting data, system internal controls, and computer applications for managerial and financial accounting.
Prerequisite(s): MBA 660 and ACC 341 or permission

MBA 609A SPECIAL TOPICS IN ACCOUNTING
Advanced and current topics in accounting. Topics vary.
Prerequisite(s): permission

MBA 609B INDIVIDUAL RESEARCH IN ACCOUNTING
Individual research in accounting subjects under the guidance and direction of an accounting faculty member. A formal proposal must be completed and approved by the faculty member, Department Chair, and MBA Director prior to registration.
Prerequisite(s): a strong academic and/or professional background in accounting and permission

MBA 610 BUSINESS DATA ANALYSIS
An introduction to the statistical techniques of collecting, classifying, and analyzing data, the fundamentals of probability theory, probability distributions, the central limit theorem, and estimation.

MBA 611 STATISTICAL TECHNIQUES FOR DECISION ANALYSIS
An introduction to methods that are central in generating information for decision analysis. Topics include hypothesis testing, regression analysis, and experimental design.
Prerequisite(s): MBA 610

MBA 612 MANUFACTURING AND SERVICE SYSTEMS
An introduction to both traditional and modern manufacturing and service systems, including operating philosophies that drive these systems and the important tools and techniques used therein.
Prerequisite(s): MBA 610 and 611

MBA 613 JIT AND QUALITY IN MANUFACTURING AND SERVICES
Study of the concepts and techniques of just-in-time manufacturing, total quality systems, and statistical process control. Projects, tours, and guest speakers.
Prerequisite(s): MBA 692

MBA 614 ANALYSIS OF FACTORY SYSTEMS
Study of the concepts and techniques of analysis, design, and management of factory production systems. Work-flow layout, scheduling techniques,
stochastic process models, simulations and computerized factory models.  
Prerequisite(s): MBA 610, 611, 612, 691, and business math

MBA 618   OPERATIONS MANAGEMENT RESEARCH SEMINAR   3
Individual research effort in conjunction with a faculty member. The seminar  
will meet several times during the term for research progress presentations.  
Prerequisite(s): one OPM elective

MBA 619   SPECIAL TOPICS IN OPERATIONS MANAGEMENT  3
Advanced or special topics in the analysis, design, operation, and  
maintenance of manufacturing and service systems. Topics vary.  
Prerequisite(s): Permission

MBA 620   FINANCIAL ANALYSIS AND MARKETS        3
An overview of finance to include the analysis of financial statements,  
valuation concepts, capital budgeting techniques, capital structure analysis,  
working capital management, and capital market financing instruments.  
Prerequisite(s): MBA 600A

MBA 622   ADVANCED CORPORATE FINANCE            3
This course is focused upon interesting corporate finance issues addressing  
short term financial management, long term capital budgeting, and long term  
financing choices. The course requires that the students understand these  
issues through a series of cases and projects. A significant amount of  
spreadsheet modeling together with both individual and group work will be  
required to examine the cases and projects.  
Prerequisite(s): MBA 694

MBA 624   COMMERCIAL BANK MANAGEMENT            3
Explores the environment in which banks must operate, the financial  
statements of banks, and a thorough study of bank management topics,  
including asset-liability management, the investment portfolio, sources of  
_portfolio, and the loan portfolio. Methodology includes a bank simulation game.  
Prerequisite(s): MBA 620 or MBA 694

MBA 625   INVESTMENTS AND FINANCIAL MARKETS      3
A study of investment principles and techniques used by both individual and  
institutional investors. Topics include bond and stock markets, security  
valuation methods, portfolio theory and management, and investment  
institutions.  
Prerequisite(s): MBA 620

MBA 626   INTERNATIONAL FINANCIAL MANAGEMENT       3
Integrates the international monetary environment with the multinational  
business firm and its operations. Analyzes the balance of international  
payments and exchange rate determination. Specific international financial  
management topics include export-import financing, foreign direct  
investment, foreign exchange risk management, financial controls, and  
international capital budgeting.  
Prerequisite(s): MBA 620

MBA 627   MANAGEMENT OF FINANCIAL INSTITUTIONS     3
This course studies management issues related to depositories, insurance  
companies, mutual funds, investment advisors, and investment banks. It  
includes a review of the financial system, regulatory bodies, financial  
_instruments, and interest rates. The methodology includes assignments,  
cases, and a portfolio project.  
Prerequisite(s): MBA 620 or MBA 694

MBA 628   FIXED INCOME ANALYSIS                    3
This class will expose students to a variety of fixed income instruments that  
are traded in the financial markets, their investment characteristics, the state  
of-art technology for valuing them, technique for quantifying their interest  
rate risk, and portfolio strategies for using them. Great course for CFA  
candidates, Fund Managers, Credit Risk Managers, Commercial Bankers  
and anyone interested in investing in fixed income securities as alternatives  
_to stocks.  
Prerequisite(s): MBA 610, 611, 620 and business math

MBA 629   SPECIAL TOPICS IN FINANCE               3
In-depth application of financial principles to selected areas. Topics vary. Emphasis may be on working capital management, capital budgeting, applied portfolio management, mergers and acquisitions, corporate restructuring, or selected topics.

**Prerequisite(s):** Permission

**MBA 630** MARKETING ESSENTIALS 1.5
Fundamentals of marketing, including macro and micro concepts that affect marketing management. An introduction to marketing terminology, definitions, theories, concepts, and practices. Emphasis on decision variables used by marketing managers, both at the domestic and global level.

**MBA 632** SERVICES MARKETING 3
The course is designed to focus on marketing opportunities, challenges, methods, strategies, and other aspects of marketing that are unique to services oriented businesses. The course emphasizes the environmental approach to services marketing. The students are introduced to the basic concepts of services marketing. The course material focuses on environment and on the modifications of marketing theory and its applications in the services marketing organizations.

**Prerequisite(s):** MBA 630

**MBA 633** SALES MANAGEMENT 3
A study of the basic principles and practices of sales management. Rather than viewing sales management as containing separate functions and activities, (such as staffing, training, motivation), view them as having systemic relationships with each other. All functions and activities will be viewed as a dynamic process, composed of numerous interrelated parts; all aimed at helping the organization reach its sales objectives. Analyze the structure of the sales organization, determination of sales policies, selection, training, and motivation of salesperson, and establishing sales territories, and quotas.

**Prerequisite(s):** MBA 630

**MBA 634** CONSUMER BEHAVIOR 3
Consumer Behavior is the study of those actions directly involved in obtaining, consuming, and disposing of products and services, including the decision processes that precede and follow these actions. Consumer behavior is of particular interest to those who, for various reasons, desire to influence or change that behavior, including those whose primary concern is marketing, consumer education and protection, and public policy. Consumer behavior is studied within the context of marketing strategy, and market segmentation.

**Prerequisite(s):** MBA 630

**MBA 635** RESEARCH FOR MARKETING DECISIONS 3
The purpose of marketing research is to provide decision makers with useful consumer and customer information to reduce uncertainty about alternative courses of business action, and aid in marketing management decision making and planning. To make the wisest decisions and accomplish the best, this course focuses on showing decision makers how to effectively use information provided by marketing research.

**Prerequisite(s):** MBA 630 and 611

**MBA 636** MULTICULTURAL MARKETING 3
The course is designed to introduce students to the basic concepts and theories of multicultural marketing. The main goals of this course are for students to acquire a basic understanding of the elements of other cultures, to be aware of cultural differences, and to get students to appreciate the importance of cultural adaptation in the marketing program, especially as they relate to the development of marketing systems.

**Prerequisite(s):** MBA 630

**MBA 637** GLOBAL MARKETING MANAGEMENT 3
Integration of concepts, theories, and analytical procedures associated with market analysis of global markets. This course provides a managerial and strategic perspective on global marketing. It is designed to assist students in developing appropriate business skills and making marketing management decisions in the global context.

**Prerequisite(s):** MBA 630
MBA 638 PRODUCT PLANNING AND DEVELOPMENT
Integration of various product management processes and concepts as customer-focused problem solving. Using projects or simulations, provides an opportunity to practice skills in developing and introducing a new product in a competitive environment. Emphasis on how various techniques can be interpreted to answer questions about performance.
Prerequisite(s): MBA 630

MBA 639 SPECIAL TOPICS IN MARKETING
Advanced and current topics in marketing, such as product management, consumer behavior, services marketing, sales, and advertising.
Prerequisite(s): Permission

MBA 640 MICROECONOMICS
Basic microeconomic principles and their applications. Topics include consumer behavior, production theory, and the interaction of buyers and sellers in various kinds of markets.

MBA 641 MACROECONOMICS
Basic macroeconomic principles and their applications. Topics include national income, monetary policy, fiscal policy, and the economic role of the government in the United States.

MBA 646 INTERNATIONAL TRADE AND BUSINESS APPLICATIONS
This course introduces a comprehensive and up to date exposition of the theories and applications of international trade that are essential for understanding and suggesting solutions to the important contemporary international trade problems facing firms and managers. Topics cover comparative advantage, gains from trade, imperfect competition and international trade, trade and economic growth, trade policies, economic integration, resource movements and multinational corporations.
Prerequisite(s): MBA 640 and 641

MBA 648 GAME THEORY WITH BUSINESS APPLICATIONS
This course provides a thorough discussion of economics of strategic behavior, including both non-cooperative and cooperative solutions, with a focus on practical business applications. Topics cover simultaneous-move games, sequential-move games, games with incomplete information, bargaining theory, and auction design and bidding strategy. The main objective of this course is to provide a rigorous yet accessible introduction to Game Theory (science of strategic behavior) and its business applications such as the dynamics of entering an industry, managing competitive interaction (cooperation and preemption), and corporate takeovers.
Prerequisite(s): MBA 640

MBA 649 SPECIAL TOPICS IN ECONOMICS
Advanced and current topics in economics. Topics vary.
Prerequisite(s): Permission

MBA 650 ORGANIZATIONS AND THEIR ENVIRONMENTS
A study of the social, cultural, political, and legal environments of organizations (profit and non-profit) and of their impact on management at all levels. Emphasis is given to resultant problems and their resolution to include ethical considerations in the policy decision process.

MBA 651 GOVERNMENT AND BUSINESS
Analysis of government regulations and their impact on business. An examination of how business organization operate within the financial, legal, and social constraints resulting from governmental activity.
Prerequisite(s): MBA 670

MBA 652 SOCIAL RESPONSIBILITY AND ETHICAL DIMENSIONS OF MANAGEMENT
Study of ethical responsibility in the business setting. Topics include the relationship of management to society, ethical issues in management, the virtues of leaders, strategic management for social responsiveness, management styles in the global marketplace, and the stakeholder management concept.
Prerequisite(s): MBA 670

MBA 653 CORPORATE ISSUES & SURVEY PRACTICUM
An overview of management concepts, principles, and functionality as practiced by major corporations. Each student has the opportunity to develop an innovative alternative to a current issue related to corporate finance, marketing, and/or management. Includes presentations by a team of corporate executives.

**Prerequisite(s):** Completion of all Foundation courses

**MBA 654 HUMANITIES INSTITUTE**

A weekend course designed for in-depth discussions of ethics, values, and justice based on the study of art, literature, philosophy, and history. Throughout the course, issues are assessed from the perspective of the business professional. An additional fee to cover course supplies.

**Prerequisite(s):** Completion of all Foundation courses

**MBA 655 EUROPEAN CULTURE & MANAGEMENT**

Study of the culture and business operations of Europe. This course will typically include a week or more of study outside of the U.S. that will include lectures and relevant site visits. In addition to normal tuition, there will be travel expenses. Locations, countries, and topics may vary.

**Prerequisite(s):** Completion of all Foundation courses or faculty approval

**MBA 659 SPECIAL TOPICS - ORGANIZATIONS AND THEIR ENVIRONMENTS**

Advanced and current topics in organizations and their environments. Topics vary.

**Prerequisite(s):** Permission

**MBA 660 INFORMATION TECHNOLOGY AND SYSTEMS**

An introduction to the basic technology underlying information systems and to the concepts and techniques needed to analyze, design, and manage those systems.

**MBA 661 E-COMMERCE**

This course provides an understanding of the information technologies that enable business-to-business and business-to-consumer electronic commerce while focusing on the strategic, operational, management, and societal issues associated with such technology-based commerce. Business cases, experiential exercises, and guest speakers are utilized.

**Prerequisite(s):** MBA 660

**MBA 662 BUSINESS TELECOMMUNICATIONS**

Study of computer-based business communication systems. Media characteristics, signal representation and transmission, wide and local area networks; communication protocols; message routing, network design, and network management. Assignments include a term paper requiring an in-depth study of a selected topic.

**Prerequisite(s):** MBA 610 and 660

**MBA 663 MANAGEMENT OF INFORMATION RESOURCES**

Study of the strategic and management issues associated with the effective organizational use of information technology. Role of the chief information officer; strategic planning, impacts and alliances; information technology assimilation; information technology architectures, functional organization, and operational control; information systems project management. Cases and readings.

**Prerequisite(s):** MBA 660, and 693 recommended but not required

**MBA 664 DATABASE MANAGEMENT**

Introduction to databases and their management. File organization and data structures; database management systems; major data models; conceptual, logical, and physical database design; data definition and manipulation with SQL; data administration; and client/server and distributed databases. SQL-based software tool for database project.

**Prerequisite(s):** MBA 660

**MBA 665 SYSTEMS ANALYSIS & DESIGN**

Introduction to object-oriented concepts and techniques for analyzing and designing systems. Activities performed and models created during the different phases of the development life cycle. Systems development project using a CASE tool.

**Prerequisite(s):** MBA 660
MBA 667  DATA WAREHOUSING
This course will emphasize the purpose, design, implementation, and effective use of data warehouses and data warehousing technologies. Various schemas for the design of a data warehouse, modeling time in a data warehouse, data quality management for building a data warehouse from operational data stores and legacy applications, and technologies to populate and retrieve information from data warehouses will be covered. Related topics of data marts, analytical processing, data mining, and active data warehousing will also be addressed.
Prerequisite(s): MBA 660 and 664 or an approved graduate course in database management

MBA 668  WEB SITE DEVELOPMENT
This course covers issues involved in developing Web sites for business usage. Issues covered or investigated include: site layout, implementation and management, good site design practices, connecting Web sites to company data, and processing secure transactions across the Web.
Prerequisite(s): HTML and a high-level programming language required

MBA 669  SPECIAL TOPICS IN MANAGEMENT INFORMATION SYSTEMS
Advanced and current topics in management information systems. Topics vary.
Prerequisite(s): Permission

MBA 670  ORGANIZATIONAL THEORY AND BEHAVIOR
An introduction to management topics conceptualized at the organization and subunit levels of analysis with primary focus on how organizations generate capacities for change in response to their environments. Emphasis on organizational design as a means of adaptation.

MBA 676  INTERNATIONAL MANAGEMENT
This course focuses on international aspects of organizational behavior, human resource management, labor relations, corporate strategy, and ethical issues and revolves around three objectives: examining the applicability of theory and research in the international management area; surveying topical issues in international management; and developing students' international management skills.
Prerequisite(s): MBA 670

MBA 679  SPECIAL TOPICS IN MANAGEMENT AND ORGANIZATIONAL BEHAVIOR
Analysis and interpretation of research studies as applied to management. Coverage of issues such as leadership, interpersonal conflict resolution, resistance to change, managerial development, organizational growth, effects of technology, and emergence of new control systems. Role playing, small group exercises and applications.
Prerequisite(s): Permission

MBA 680  ENTREPRENEURSHIP AND THE FAMILY FIRM
A variety of topics of interest to the student of entrepreneurship. All phases in the life span of the owner-managed enterprise, beginning with opportunity recognition and ending with succession to a next generation of management through any of a variety of means. Major topic areas include startup issues, business planning, financing, marketing, managing the growing firm, and succession. Guest speakers provide insights from their experience as entrepreneurs, and panels of experts who serve entrepreneurial clients are often utilized. Each class period uses multiple learning methodologies. Some field work and writing is required.
Prerequisite(s): All Foundation courses

MBA 681  BUSINESS SIMULATION
An integrative learning experience based on knowledge of the functional business areas and of the business environment. Computer simulation used to examine the effect of students' management decisions over time. Lectures and small groups for decision-making reporting.
Prerequisite(s): Completion of all four Integrated Core courses is recommended

MBA 682  NEW VENTURE MANAGEMENT
A study of entrepreneurship and development of opportunities in new or renewed businesses. Focus is on identifying and analyzing business opportunities, locating and obtaining venture capital, developing a business
plan, managing growth in the enterprise, and the decision-making, risk-taking, and leadership styles of entrepreneurs.

**Prerequisite(s):** MBA 694

**MBA 691 ANALYTIC FRAMEWORK FOR BUSINESS DECISION MAKING**

An examination of the role of analytic thinking and analytic models and techniques in providing support and insight for business decision making. Types of business decisions studied include product price, production level, production mix, distribution system design, operational process design, and others. Spreadsheets facilitate such analytic techniques as mathematical optimization, regression analysis, linear and integer programming models, and simulation models.

**Prerequisite(s):** MBA 691, MBA 694

**MBA 692 OPERATIONAL MANAGEMENT SYSTEMS**

High quality goods and services require efficient, effective, and adaptable operational systems. This course will focus on the design and implementation of these operational systems and their relationship to strategic cost management. Topics include systems theory, total quality management, activity-based costing/management, theory of constraints, target costing and performance measurement and control systems. The classroom environment requires significant student interaction, team-based assignments, and an interdisciplinary integration of concepts and applications.

**Prerequisite(s):** MBA 691, MBA 692

**MBA 693 MANAGING INFORMATION AND PEOPLE IN ORGANIZATIONS**

This course addresses two key resources in business organizations: information technology and people. It draws from the fields of management information systems, organizational behavior, and organization theory. Students focus on understanding how managing information, organization design, information technology, and human resources in an integrative manner can enhance the productivity of knowledge workers and work groups/teams, as well as the effectiveness of contemporary organizations.

**Prerequisite(s):** MBA 693

**MBA 694 MANAGING FINANCIAL RESOURCES FOR MARKETING STRATEGIES**

This course uses an integrative framework incorporating financial and marketing analyses to study the relationships between its customers and its contributors of financial capital, to study the sources of firm valuation, and to study corporate decision making. The methodology in the course employs cases and group projects.

**Prerequisite(s):** MBA 694

**MBA 695 INDIVIDUAL RESEARCH**

Individual research in subjects encompassed by the MBA curriculum under the guidance and direction of a faculty member. Research may be undertaken on completion of 12 hours of post-Foundation coursework. A formal proposal must be completed and approved by the faculty advisor and the MBA Director prior to registration.

**Prerequisite(s):** MBA 695

**MBA 696 LEADERSHIP, STRATEGY, AND STAKEHOLDER MANAGEMENT**

One of a two-course set of capstone integrative experiences which explores the process of creating, sustaining, and growing successful businesses in an era of change. The course deals with strategic decision making and stakeholder management related to competitive, economic, political, social, cultural, and technological environments in small, medium, and large companies in service and manufacturing settings.

**Prerequisite(s):** MBA 691, MBA 692, MBA 693, and MBA 694

**MBA 699 CAPSTONE INTEGRATIVE PROJECT**

1 - 6
Another of the two-course set of capstone integrative experiences that explores the process of creating, sustaining, and growing successful businesses in an era of change. Students work in teams to analyze the strategic environment of a firm and develop a series of recommended actions. Students gain experience in working in a team environment in a non-academic setting, and experience the pressure of delivering a high-quality product to company leaders. The approach taken is tailored to the specific needs of the business as well as the talents of the particular student team.

Prerequisite(s): MBA 698
School of Engineering
(CME) Chemical Engineering

Tony E. Saliba, Chair of the Department

Programs

Program Name

Master of Science in Chemical Engineering (CME)

The program of study leading to the Master of Science in chemical engineering must include a minimum of 30 semester hours consisting of the following:

1. Fifteen semester hours of Chemical Engineering graduate courses, including CME 505 or 507, 521 or 522, 542 or 543, and 581 or 582.
2. Nine semester hours of electives as approved by the advisor and the department chair.
3. Six semester hours on an approved thesis project; a final examination is required at the completion of the thesis. Upon the request of the student and with the approval of the faculty advisor and chair of the department, six hours of additional coursework plus three hours of special problem work may be substituted for the thesis.

A final examination is required at the completion of the thesis or coursework. See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the advisor. The program of study allows concentrations in the following areas:

- Combustion
- Environmental Engineering
- Materials Engineering
- Process Modeling and Control

Courses

Code    Title                                               Sem. Hrs.
CME 505 THERMODYNAMICS OF SOLIDS                         3

Laws of thermodynamics, auxiliary functions, thermodynamic relations, phase transitions, thermodynamic equilibrium, thermodynamic properties of solid solutions, surfaces and interfaces.

Prerequisite(s): MAT 501 or consent of instructor

CME 507 ADVANCED THERMODYNAMICS                           3


CME 508 ADVANCED TOPICS IN CHEMICAL ENGINEERING           3

Study and discussion of current problems in chemical engineering research.

Prerequisite(s): CME 521, 581, or consent of instructor

CME 509 INTRODUCTION TO POLYMER SCIENCE                    3

Technical overview of the nature of synthetic macromolecules, including the formation of polymers and their structure, structure-property relationships, polymer characterization and processing, and applications of polymers.

Prerequisite(s): College chemistry and physics

CME 510 PHYSICAL PROPERTIES OF POLYMERS                    3

Survey of high performance thermoset resins with focus on structural applications. The survey will include types of thermosets, chemistry,
processing, properties, cost, suppliers, and applications. Characterization techniques and typical properties will also be reviewed. The course will also involve a fundamental discussion or cross-linked polymer structure-processing-property relationships, the glassy state, rubber elasticity, time-temperature superposition, and cure kinetics. 

Prerequisite(s): MAT 509, general and organic chemistry, differential equations or consent of instructor

CME 511 PRINCIPLES OF CORROSION
Application of electrochemical principles, corrosion reactions, passivation, cathodic and anodic protection, stress corrosion, and high-temperature oxidation.

Prerequisite(s): MAT 501

CME 515 STATISTICAL THERMODYNAMICS
Microscopic thermodynamics; Boltzmann, Bose-Einstein, Fermi-Dirac statistics; statistical interpretation of thermodynamic quantities. Applications to perfect and real gases, liquids, crystalline solids, and thermal radiation.

Prerequisite(s): CME 311, MTH 219

CME 521 ADVANCED TRANSPORT PHENOMENA

Prerequisite(s): CME 324 and 381 or equivalent

CME 522 ADVANCED TOPICS IN TRANSPORT PHENOMENA

Prerequisite(s): CME 325 and 581 or equivalent

CME 541 PROCESS DYNAMICS
Mathematical modeling and computer simulation of process dynamics and control for chemical engineering processes.

CME 542 CHEMICAL ENGINEERING KINETICS

Prerequisite(s): CME 406 and 381 or equivalent

CME 543 CHEMICAL REACTOR ANALYSIS AND DESIGN

Prerequisite(s): CME 406 and 381 or equivalent

CME 550 AGITATION
Agitator design and scaleup for blending and motion, solids suspension, gas dispersion, and viscous operations; experimental, computational, and design tools of agitation; static mixing; and mixing with chemical reaction.

Prerequisite(s): CME 465 or consent of instructor

CME 562 PHYSICAL AND CHEMICAL WASTEWATER TREATMENT PROCESSES
The design of physical and chemical unit processes to treat wastewater originating primarily from industrial sources. Industry pretreatment technologies and the basis for their development.

Prerequisite(s): CHM 123 and CME 411 or consent of instructor

CME 563 HAZARDOUS WASTE ENGINEERING
The fundamental principles of the design and operation of hazardous waste remediation processes. Characterizing contaminated sites and conducting treatability studies for the selection of the most appropriate remediation strategy.

Prerequisite(s): CHM 123 and CME 465 or consent of instructor

CME 564 SOLID WASTE ENGINEERING
Characterizing solid waste. Managing solid waste collection, transport, minimization, and recycling. The design of solid waste disposal and resource
recovery facilities.

**Prerequisite(s):** CHM 123 and CME 411 or consent of instructor

**CME 565**  
**FUNDAMENTALS OF COMBUSTION**  
Flames and combustion waves, detonation waves in gases, the chemistry of combustion, combustion of hydrocarbons, special aspects of gaseous combustion, combustion in mixed and condensed phases, explosions in closed vessels, and combustion and the environment.  
**Prerequisite(s):** CME 311, CME 406, or consent of instructor

**CME 574**  
**FUNDAMENTALS OF AIR POLLUTION ENGINEERING I**  
Air pollution; combustion fundamentals; pollutant formation and control in combustion; pollutant formation and control methods in internal combustion engines; particle formation in combustion.  
**Prerequisite(s):** CME 306 or MEE 301, 302; CME 324 or MEE 410; or consent of instructor

**CME 575**  
**FUNDAMENTALS OF AIR POLLUTION ENGINEERING II**  
Review of the concepts of air pollution engineering; aerosols; removal of particles from gas streams; removal of gaseous pollutants from effluent streams; optimal air pollution control strategies.  
**Prerequisite(s):** CME 574 or consent of instructor

**CME 576**  
**ENVIRONMENTAL ENGINEERING SEPARATION PROCESSES**  
Discussion of the unit operations associated with environmental engineering separation processes of solid-liquid, liquid-liquid, and gas-liquid systems; general use, principles of operation, and design procedures for specific types of equipment.  
**Prerequisite(s):** consent of instructor

**CME 581**  
**ADVANCED CHEMICAL ENGINEERING CALCULATIONS I**  
**Prerequisite(s):** MTH 219, or consent of instructor

**CME 582**  
**ADVANCED CHEMICAL ENGINEERING CALCULATIONS II**  

**CME 583**  
**PROCESS MODELING**  
Mathematical description of physical and chemical processes, solution methods, and prediction interpretation. Engineering applications.  
**Prerequisite(s):** CME 582 or equivalent

**CME 586**  
**INTRODUCTION TO PETROLEUM ENGINEERING**  
Introduction to the fundamental concepts in petroleum engineering. Petroleum topics include overviews of areas such as petroleum geology, petroleum fluids and thermodynamics, drilling and completion, and production and multiphase flow. In addition this course will cover refinery operations. Second term, each year.  
**Prerequisite(s):** consent of instructor

**CME 590**  
**INTRODUCTION TO BIOENGINEERING I**  
Overview of biomedical engineering, transport phenomena in physiological systems, kinetic and reactor modeling for physiological systems, overview of biochemical engineering, bioreactors, bioseparation processes.  
**Prerequisite(s):** CHM 420 or CHM 451; CME 325 and CME 365  
**Corequisite(s):** CME 406, or consent of instructor

**CME 591**  
**BIOMEDICAL ENGINEERING I**  
Introduction to the fundamental concepts in biomedical engineering with a special focus on chemical engineering applications. Biomedical topics include overviews of areas such as biomaterials, tissue engineering, biosensors and biomedical engineering technology. Second term, each year.  
**Prerequisite(s):** BIO 151, CHM 420 or 451, CME 324 and CME 365 or consent of instructor

**CME 595**  
**SPECIAL PROBLEMS IN CHEMICAL ENGINEERING**  
Particular assignments to be arranged and approved by the chair of the department.
College of Arts and Sciences
(Chemistry (Collapse Description))

Gary W. Morrow, Chair of the Department
Kevin M. Church, Director of MS Program

The Department of Chemistry offers graduate programs leading to the Master of Science in chemistry.

The purpose of the master's program in chemistry is to present a rigorous approach to modern chemical theories and research.

The student and advisor determine the composition of the program of study with the approval of the graduate committee. All candidates for the Master of Science are required to submit proof of their ability to do independent work. Normally, this proof takes the form of a research thesis. Additional coursework may be substituted if the student has previously demonstrated research proficiency commensurate with a master's degree as judged by the graduate committee.

Assistantships

Teaching assistantships requiring a maximum of nine hours of laboratory instruction per week are available. The stipend for a 9 to 12 month appointment is supplemented by tuition remission for graduate coursework. Appointment as a teaching assistant requires fluency in spoken English. Research assistantships in selected areas are sometimes available.

Programs

Program Name

Master of Science in Chemistry (CHM)

A minimum of 30 semester hours of graduate coursework is required for the Master of Science. This includes 21-24 semester hours of coursework and 6-9 hours of research. The student and advisor determine the composition of the program of study with the approval of the graduate committee. All candidates for the Master of Science are required to submit proof of their ability to do independent work. Normally, this proof takes the form of a research thesis. Additional coursework may be substituted if the student has previously demonstrated research proficiency commensurate with a Master's degree as judged by the graduate committee.

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 502</td>
<td>PHYSICAL CHEMISTRY</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A concise treatment of theoretical chemistry.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prerequisite(s): CHM 124</td>
<td></td>
</tr>
<tr>
<td>CHM 504</td>
<td>SPECIAL TOPICS IN THEORETICAL CHEMISTRY</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Treatment of topics selected from those normally surveyed in a one-year undergraduate course in physical chemistry such as electrochemistry, symmetry, spectroscopy, polymers, or others.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prerequisite(s): CHM 304, MTH 218 or equivalents</td>
<td></td>
</tr>
<tr>
<td>CHM 507</td>
<td>SPECTROSCOPIC IDENTIFICATION OF ORGANIC COMPOUNDS</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>The use of nuclear magnetic resonance, infrared, and mass spectrometry in elucidating structures. Emphasis on interpretation and integration of spectral data.</td>
<td></td>
</tr>
</tbody>
</table>
data in problem solving.

**Prerequisite(s):** CHM 314, 314L or equivalent

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 512</td>
<td>INTERMEDIATE ORGANIC CHEMISTRY</td>
<td>3</td>
<td>Modern theory of organic chemistry and reaction mechanisms. <strong>Prerequisite(s):</strong> CHM 314 or equivalent</td>
</tr>
<tr>
<td>CHM 515</td>
<td>ANALYTICAL CHEMISTRY</td>
<td>2</td>
<td>Methods of analysis based on modern instrumentation including chemical, electrical, and spectral methods. <strong>Prerequisite(s):</strong> CHM 201, 304 or 302</td>
</tr>
<tr>
<td>CHM 515L</td>
<td>ANALYTICAL CHEMISTRY LABORATORY</td>
<td>1</td>
<td>A laboratory course to accompany CHM 515.</td>
</tr>
<tr>
<td>CHM 517</td>
<td>INORGANIC CHEMISTRY</td>
<td>3</td>
<td>An introductory course. The fundamentals of modern inorganic chemistry including atomic structure, principles of structure and bonding, acid-based chemistry, periodicity, coordination compounds, nonaqueous solvents, electrochemistry, molecular symmetry, and the chemistry of representative elements.</td>
</tr>
<tr>
<td>CHM 525</td>
<td>PRINCIPLES OF ORGANIC CHEMISTRY</td>
<td>3</td>
<td>An introduction to the fundamentals of organic chemistry. <strong>Prerequisite(s):</strong> CHM 124</td>
</tr>
<tr>
<td>CHM 525L</td>
<td>PRINCIPLES OF ORGANIC CHEMISTRY</td>
<td>1</td>
<td>Laboratory course to accompany CHM 525-526. One three-hour laboratory per week.</td>
</tr>
<tr>
<td>CHM 526</td>
<td>PRINCIPLES OF ORGANIC CHEMISTRY</td>
<td>3</td>
<td>An introduction to the fundamentals of organic chemistry. <strong>Prerequisite(s):</strong> CHM 124</td>
</tr>
<tr>
<td>CHM 526L</td>
<td>PRINCIPLES OF ORGANIC CHEMISTRY</td>
<td>1</td>
<td>Laboratory course to accompany CHM 525-526. One three-hour laboratory per week.</td>
</tr>
<tr>
<td>CHM 527</td>
<td>THEORETICAL PRINCIPLES OF CHEMISTRY</td>
<td>3</td>
<td><strong>Prerequisite(s):</strong> MTH 218.</td>
</tr>
<tr>
<td>CHM 527L</td>
<td>THEORETICAL PRINCIPLES OF CHEMISTRY</td>
<td>1</td>
<td>Laboratory course to accompany CHM 527-528. One three-hour laboratory per week.</td>
</tr>
<tr>
<td>CHM 528</td>
<td>THEORETICAL PRINCIPLES OF CHEMISTRY</td>
<td>3</td>
<td><strong>Prerequisite(s):</strong> MTH 218.</td>
</tr>
<tr>
<td>CHM 528L</td>
<td>THEORETICAL PRINCIPLES OF CHEMISTRY</td>
<td>1</td>
<td>Laboratory course to accompany CHM 527-528. One three-hour laboratory per week.</td>
</tr>
<tr>
<td>CHM 539</td>
<td>SPECIAL TOPICS IN PHYSICAL CHEMISTRY</td>
<td>3</td>
<td>Topics of current interest in areas such as chemical instrumentation, electronics, physical biochemistry, macromolecular chemistry, and spectroscopy.</td>
</tr>
<tr>
<td>CHM 541</td>
<td>TOPICS IN PHYSICAL CHEMISTRY</td>
<td>3</td>
<td>Modern aspects of physical chemistry, which may include the solid state, electrochemistry, or mathematical methods of physical chemistry.</td>
</tr>
<tr>
<td>CHM 544</td>
<td>COORDINATION CHEMISTRY</td>
<td>3</td>
<td>Properties of transition metal ions, reaction mechanisms in coordination compounds, bioorganic systems, electron transfer mechanisms, and the experimental tools common to coordination chemistry. <strong>Prerequisite(s):</strong> CHM 517 or equivalent</td>
</tr>
</tbody>
</table>
CHM 546  SPECIAL TOPICS IN MODERN ANALYTICAL CHEMISTRY
Modern analytical methods. Subject matter may include NMR, EPR, electroanalytical methods, GLC, mass spectrometry, IR and Raman spectroscopies, visible and ultraviolet spectrophotometric methods, X-ray techniques, ESCA and Auger spectroscopies, atomic absorption, and fluorescence.

CHM 550  SPECIAL TOPICS IN ORGANIC CHEMISTRY
Modern physical organic chemistry, spectroscopy, photochemistry, molecular rearrangements, stereochemistry, and natural products.

CHM 551  GENERAL BIOCHEMISTRY I
Discussion of the chemistry and biochemistry of carbohydrates, amino acids, proteins, and nucleic acids, including health-science and methodologic aspects. Descriptions of enzymology, protein purification, and carbohydrate metabolism related to such topics as bioenergetics, membranes, and disease processes.
Prerequisite(s): CHM 201, 314

CHM 552  GENERAL BIOCHEMISTRY II
Discussion of selected topics in bioenergetics, and metabolism of lipids, amino acids, porphyrins, nucleic acids, and proteins. Current aspects of nutrition, biochemical genetics, endocrinology, regulation, and genetic engineering are addressed and related to health-science topics as time permits.
Prerequisite(s): CHM 551

CHM 553  TOPICS IN BIOCHEMISTRY
Topics of current interest in biochemistry.
Prerequisite(s): CHM 551 or 552 or permission of instructor

CHM 554  DIRECTED READINGS

CHM 560  RESEARCH

CHM 561  RESEARCH

CHM 562L  INTRODUCTORY BIOCHEMISTRY LABORATORY
Spectrophotometry; pH and dissociation; thin-layer, column, and paper chromatography; enzymology and enzyme purification, qualitative and quantitative techniques for studying proteins, amino acids, lipids, carbohydrates, and nucleic acids; and radioisotopic tracer techniques.
Prerequisite(s): CHM 551 or special permission of instructor

CHM 590L  SCIENTIFIC GLASSBLOWING
Theory and practice of glass working. Under the supervision of a professional glassblower, students learn to make several standard seals and fabricate pieces of glass apparatus. Enrollment limited. One three-hour laboratory each week.
Prerequisite(s): Permission of the chairperson
School of Engineering
(CEE) Civil and Environmental Engineering

Fred K. Bogner, Chair of the Department

Programs

Program Name

- Master of Science in Civil and Environmental Engineering (CEE)

The program of study for the degree of Master of Science in civil engineering, developed in cooperation with an advisor assigned by the department chair, must include a minimum of 30 semester hours consisting of the following:

1. Fifteen to eighteen semester hours in civil engineering, engineering mechanics, and/or thesis-related courses selected from one of the following areas of concentration:
   - engineering mechanics
   - environmental engineering
   - soil mechanics
   - structural engineering
   - transportation engineering

2. Six to nine semester hours of engineering or basic science electives to be chosen from current course offerings. For the major concentration of engineering mechanics, six semester hours of mathematics (MTH 535 and 551) must be selected.

3. Six semester hours of research on a civil engineering thesis (CEE 599). Upon request of the student, and with the approval of the faculty advisor and the department chair, the six thesis hours may be replaced with six hours of coursework plus three hours of project (CEE 598). A final oral examination is required upon completion of the thesis or project.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the advisor.

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEE 500</td>
<td>ADVANCED STRUCTURAL ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Frames of variable cross section; arches; flat and folded plates; elastic stability of columns, frames, and plates; cylindrical, spherical, and barrel shells; structural dynamics of beams and frames.</td>
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</tr>
<tr>
<td></td>
<td><strong>Prerequisite(s):</strong> CEE 318</td>
<td></td>
</tr>
<tr>
<td>CEE 501</td>
<td>STRUCTURAL ANALYSIS BY COMPUTER</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Review of force and displacement methods. Introduction to direct element and substructure methods. Students write and execute computer programs to analyze plane and space trusses, grids, and frames.</td>
<td></td>
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<tr>
<td></td>
<td><strong>Prerequisite(s):</strong> CEE 316</td>
<td></td>
</tr>
<tr>
<td>CEE 502</td>
<td>PRESTRESSED CONCRETE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Discussion of the properties of concrete and prestressed steel. Theory and design of prestressed concrete beams, slabs, columns, frames, ties, and circular tanks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Prerequisite(s):</strong> CEE 412</td>
<td></td>
</tr>
<tr>
<td>CEE 503</td>
<td>INTRODUCTION TO CONTINUUM MECHANICS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Tensors, calculus of variations, Lagrangian and Eulerian descriptions of motion. General equations of continuum mechanics, constitutive equations of mechanics, thermodynamics of continua. Specialization to cases of solid</td>
<td></td>
</tr>
</tbody>
</table>
CIVIL AND ENVIRONMENTAL ENGINEERING

PREREQUISITES:

EGM 303 or EGM 330

3

Response of undamped and damped single and multi-degree-of-freedom structures subjected to harmonic, periodic, and general dynamic loadings. Special topics include nonlinear structural response, response spectra, shear buildings, and simple systems with distributed properties.

Prerequisite(s): EGM 303 or EGM 330, CEE 318 or permission

3

Analysis and design procedures based on ultimate load capacity applied to steel beams, frames, and their connections. Concept of plastic hinge, necessary conditions for the existence of plastic moment, instability, deformations, repeated and reversed loading, and minimum weight design.

Prerequisite(s): CEE 411

3

Properties and performance criteria of bricks, concrete blocks, mortar and grout; codes and construction practices; design of masonry elements.

Prerequisite(s): CEE 318

3

Study of basic wood properties and design considerations. Design and behavior of wood connectors, fasteners, beams, columns, and beam columns. Introduction to plywood and glued laminated members. Analysis and design of structural diaphragms and shear walls.

Prerequisite(s): CEE 411

3

A study of the experimental analysis of stress as an aid to design for strength and economy with emphasis on electrical strain gages. Also, photoelasticity, brittle coatings, analogies, structural similitude. Two hours lecture and one three-hour laboratory period per week.

Prerequisite(s): EGM 303 or EGM 330

3

Fundamental principles of flexible and rigid highway and airport pavement design, construction, and management.

Prerequisite(s): CEE 312

3

Advanced study of Geotechnical engineering principles and study. Stress-strain characteristics; constitutive relationships; failure theories; dynamic soil properties; difficult soils; soil improvement; stability of earth slopes.

Prerequisite(s): CEE 312

3

Application of Geotechnical engineering principles of analysis and design of shallow and deep foundations and earth retaining structures. Topics include site exploration and characterization, foundation types, bearing capacity, settlement analysis, shallow foundation design, earth pressures theories, design of retaining walls, flexible retaining structures and braced excavations, design of pile foundations and drilled piers.

Prerequisite(s): CEE 312

3

Three-dimensional stress and strain at a point; equations of elasticity in Cartesian and curvilinear coordinates; methods of formulation of equations for solution, plane stress and plane strain, energy formulations, numerical solution procedures.

Prerequisite(s): EGM 303 or EGM 330

3

Corequisite(s): EGM 503

3

Theory of plates; small and large displacement theories of thin plates; shear deformation; buckling; sandwich plate theory. Thin shell theory; theory of surfaces; thin shell equations in orthogonal curvilinear coordinates; bending, membrane, and shallow shell theories.

Prerequisite(s): EGM 533

3

Advanced study of Geotechnical engineering principles and study. Stress-strain characteristics; constitutive relationships; failure theories; dynamic soil properties; difficult soils; soil improvement; stability of earth slopes.

**Prerequisite(s):** computer programming and MEE 319

**CEE 539**  
**THEORY OF PLASTICITY**  
3  
Fundamentals of plasticity theory including elastic, viscoelastic, and elastic-plastic constitutive models; plastic deformation on the macroscopic and microscopic levels; stress-strain relations in the plastic regime; strain hardening; limit analysis; numerical procedures.  
**Prerequisite(s):** EGM 503 or 533

**CEE 540**  
**COMPOSITE DESIGN**  
3  
Design with composite materials. Micromechanics, Lamination theory. Joining, Fatigue, Environmental effects.  
**Prerequisite(s):** EGM 303 or EGM 330

**CEE 541**  
**EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS**  
3  
Introduction to the mechanical response of fiber-reinforced composite materials with emphasis on the development of experimental methodology. Analytical topics include stress-strain behavior of anisotropic materials, laminate mechanics, and strength analysis. Theoretical models are applied to the analysis of experimental techniques used for characterizing composite materials. Lectures are supplemented by laboratory sessions in which characterization tests are performed on contemporary composite materials.  
**Prerequisite(s):** EGM 303 or EGM 330

**CEE 543**  
**ANALYTICAL MECHANICS OF COMPOSITE MATERIALS**  
3  
Analytical models are developed for predicting the mechanical and thermal behavior of fiber-reinforced composite materials as a function of constituent material properties. Both continuous and discontinuous fiber-reinforced systems are considered. Specific topics include basic mechanics of anisotropic materials, micromechanics and lamination theory, free edge effects, and failure criteria.  
**Prerequisite(s):** EGM 303 or EGM 330

**CEE 544**  
**MECHANICS OF COMPOSITE STRUCTURES**  
3  
Comprehensive treatment of laminated beams, plates, and sandwich structures. Effect of heterogeneity and anisotropy on bending under lateral loads, buckling, and free vibration are emphasized. Shear deformation and other higher-order theories and their range of parametric applications are also considered.  
**Prerequisite(s):** EGM 543 or consent of instructor

**CEE 546**  
**FINITE ELEMENT ANALYSIS I**  
3  
Fundamental development of the Finite Element Method (FEM), and solution of field problems and comprehensive structural problems. Variational principles and weak-forms; finite element discretization; shape functions; finite elements for field problems; bar, beam, plate, and shell elements; isoparametric finite elements, stiffness, nodal force, and mass matrices; matrix assembly procedures; computer coding techniques; modeling decisions; program output interpretation. Course emphasis on a thorough understanding of FEM theory and modeling techniques.  
**Prerequisite(s):** CEE 513 or 533

**CEE 550**  
**HIGHWAY GEOMETRIC DESIGN**  
3  
Advanced topics in horizontal and vertical alignment design controls and criteria, sight distance, intersection and interchange design.  
**Prerequisite(s):** CEE 403

**CEE 551**  
**TRAFFIC ENGINEERING**  
3  
Characteristics of traffic, including the road user, vehicle, traffic control devices, accident analysis, signal operations and design and the fundamentals of signal system progression.  
**Prerequisite(s):** CEE 403

**CEE 552**  
**INTELLIGENT TRANSPORTATION SYSTEMS**  
3  
Fundamentals of planning, design, deployment and operations of ITS. Integrated application of ITS architecture, traffic flow principles, advanced equipment, communications technologies and management strategies to
provide traveler information and increase the safety and efficiency of the surface transportation system.

**CEE 558 TRAFFIC ENGINEERING RESEARCH**
Practical problems in control or capacity restraints based on studies of actual local situations.

**CEE 560 WASTEWATER ENGINEERING**
Measuring the characteristics and estimating the quantity of wastewater produced from domestic and industrial sources. Principles of designing and operating wastewater treatment plants that primarily use microbiological treatment processes. Process selection criteria will be emphasized.

**CEE 562 PHYSICAL AND CHEMICAL WASTEWATER TREATMENT PROCESSES**
The design of physical and chemical unit processes to treat wastewater originating primarily from industrial sources. Industry pretreatment technologies and the basis for their development.

**CEE 563 HAZARDOUS WASTE ENGINEERING**
The fundamental principles of the design and operation of hazardous waste remediation processes. Characterizing contaminated sites and conduct treatability studies for the selection of the most appropriate remediation strategy.

**CEE 564 SOLID WASTE ENGINEERING**
Characterizing solid waste. Managing solid waste collection, transport, minimization, and recycling. The design of solid waste disposal and resource recovery facilities.

**CEE 565 ENVIRONMENTAL CHEMISTRY**
Basic principles of safety engineering, environmental health, and partitioning and transformation of pollutants in the environment. Basic environmental analytical methodology including pollutant characterization and microbiological quantity and activity measurements.

**CEE 570 CEE COMPUTER APPLICATIONS**
Innovative solutions to common civil engineering problems in environmental, geotechnical, structures, transportation, and water resources through the use of personal computer applications.  
**Prerequisite(s):** CEE 320

**CEE 574 FUNDAMENTALS OF AIR POLLUTION ENGINEERING I**
Air pollution, combustion fundamentals, pollutant formation and control in combustion, pollutant formation and control methods in internal combustion engines, particle formation in combustion.  
**Prerequisite(s):** CME 311 or MEE 301; CME 324 or MEE 410 or consent of instructor

**CEE 575 FUNDAMENTALS OF AIR POLLUTION ENGINEERING II**
Review of the concepts of air pollution engineering; aerosols; removal of gaseous pollutants from effluent streams; optimal air pollution control strategies.  
**Prerequisite(s):** CME 574 or consent of instructor

**CEE 576 ENVIRONMENTAL ENGINEERING SEPARATION PROCESSES**
Discussion of the unit operations associated with environmental engineering separation processes of solid-liquid, liquid-liquid, and gas-liquid systems; general use, principles of operation, and design procedures for specific types of equipment.  
**Prerequisite(s):** consent of instructor

**CEE 580 HYDROLOGY AND SEEPAGE**
Detailed study of the hydrologic cycle with a focus on rainfall/runoff generation techniques. Practical application of hydrologic fundamentals is demonstrated through the design of urban storm water systems. Introduction to sub-surface hydrology and groundwater modeling.  
**Prerequisite(s):** CEE 312, CEE 313

**CEE 582 ADVANCED HYDRAULICS**
Detailed examination of unsteady flow in closed-conduits and open channels. Practical methods for solving waterhammer and flood routing problems are presented. Physical modeling integrated with dimensional analysis and similitude is presented.

**Prerequisite(s):** CEE 313, CEE 333

CEE 584 OPEN CHANNEL FLOW 3

Open channel flow in its various forms will be studied. Major topics to be covered include energy and momentum principles, uniform and gradually varied flow, rapidly varied flow, spatially varied flow and an introduction to unsteady flow. Pragmatic applications such as channel design, water surface profile computations, and culvert analysis will also be covered. Well-established solution approaches and widely accepted computer methods will be used to solve real-world problems.

**Prerequisite(s):** CEE 313, CEE 333

CEE 590 SELECTED READINGS IN CIVIL ENGINEERING 1 - 3

Directed readings in a designated area arranged and approved by the student's faculty advisor and the department chair. May be repeated.

CEE 595 SPECIAL PROBLEMS IN CIVIL ENGINEERING 1 - 6

Special assignments in civil engineering subject matter to be arranged and approved by the student's advisor and the department chair.

CEE 598 PROJECT 1 - 6

CEE 599 THESIS 1 - 6
College of Arts and Sciences
(COM) Communication (Collapse Description)

Kathleen B. Walters, Chair of the Department
James D. Robinson, Director of Graduate Studies

The graduate program of the Department of Communication leads to the Master of Arts.

The focus of the Department of Communication is upon symbolic processes in human communication. Such a focus is distinguished by the contributions of scholars in rhetoric, communication theory, and mass communication. A solid grounding in research, theory, message development and analysis will prepare graduates to begin or advance their careers in education, business, mass media, and government.

The master's student should begin study in the Department of Communication with the standard undergraduate competencies. If the student lacks such competencies, they should be developed prior to attempting the master's program. Students receiving the master's degree from the Department of Communication must:

1. Have a thorough grounding in theories relevant to a particular area of interest, and have the ability to apply this knowledge to the solution of a variety of communication-related problems;
2. Have been exposed to a variety of research and analytical or critical methods, have a basic understanding of these, and have demonstrated a working command of at least one methodology; and
3. Have a basic knowledge of and appreciation for approaches to the study of communication from a variety of perspectives.

Assistantships

Graduate assistantships are available. The assistantships carry a stipend and tuition remission for courses required for the degree. The assistantships are for one year with possible renewal for one additional year. No student can receive an assistantship for more than two academic years.

Assistantships in the department are, for the most part, teaching assistantships. However, some assistantships may carry a reduced teaching load when combined with other departmental responsibilities such as faculty research assistance.

The minimum requirements for assistantship in the department are:

1. The equivalent of an academic minor in communication and related areas or a demonstrated successful professional background in a communication-oriented occupation for a minimum of three years.
2. A 3.0 undergraduate cumulative point average (or the equivalent) and a 3.0 in the academic major or minor (communication).
3. Admission to the master's degree program in communication on regular status.

Advising

The advisor serves the student in planning the program of study, supervising the administration of comprehensive examinations, and (when appropriate) directing the student's thesis project.

The graduate program director serves as a temporary advisor to assist the student with initial enrollment and program planning. The student should choose a permanent advisor from among available communication faculty before the middle of the second semester (or completion of nine semester hours). The student must gain approval from the faculty member and the program director before the faculty member will be appointed as permanent advisor. Subsequent changes of advisor require approval of the program director.

After consultation with the permanent advisor, the student should submit a proposed program plan (on forms provided by the program director) no later than the end of 12 semester hours. A copy of the proposed program should be on file in the program director's office.

The advisor will conduct a mid-program review of the student's progress toward the
degree. The time of this review should be specified during the initial program planning meeting; however, it should take place by the time 15 semester hours are completed.

Programs

Program Name

- Master of Arts in Communication (COM)

General Requirements

All students enrolled in the program are subject to the following general requirements.

1. The number of semester hours as specified by the program options described below.
2. All students must complete the following core requirements: COM 501, COM 538, COM 502 or COM 503, COM 517 or COM 571.
3. Demonstration of satisfactory progress toward the degree which includes the requirement that students maintain a minimum average of B (3.0) in coursework. Students who fail to meet this requirement will be dismissed from the program.
4. Students are permitted no more than six semester hours with grades of C or lower. Students who fail to meet this requirement will be dismissed from the program.
5. It is the student's responsibility to know and to meet the requirements of the University and of the Department of Communication graduate program.

NOTE: It is expected that each master's students will enroll in the required core courses as early as possible.

Program A-Communication Non-Thesis Option

Program A consists of 36 semester hours of coursework, of which 24 semester hours must be from the Department of Communication. Students who choose Program A are required to successfully complete the core requirements as early as possible in the academic program. Students in Program A are encouraged to complete a capstone project or independent study project in their final semester of coursework.

All students choosing Program A must take the comprehensive examination during their last semester of classes. (See the subsequent section on Comprehensive Examination for more information.)

Program B-Communication Thesis Option

Program B consists of 30 to 33 semester hours of coursework, 18 semester hours of which must be from the Department of Communication. In addition, students complete three to six credit hours of Thesis (COM 598 and/or COM 599). Students choosing to write a thesis must complete the comprehensive examination during their final term of coursework. (See the subsequent section on Comprehensive Examination for more information.)

The student will select a thesis committee consisting of the advisor and at least two other faculty members. (One of the faculty members may be from outside the Department of Communication.) Students may register for three semester hours of Thesis (COM 598) during the term that the prospectus will be presented to the thesis committee for approval.

The thesis should report original research on some important question relevant to the study of communication. The prospectus should also include a detailed description of the research methods to be used as well as suggested analytic techniques.

The prospectus will be developed in consultation with the thesis advisor, although the student must have the methodological competence necessary to complete the proposed project. Once the prospectus is approved by the advisor, it must be presented to the thesis committee for approval. The completed prospectus will constitute the first half of the thesis and serves, essentially, as a contract between the student and the committee.

After the prospectus has been approved, the student may register for an additional three hours of thesis credit while completing the thesis (COM 599). The student will then collect and analyze the data required to answer the questions raised in the prospectus. Once this has been completed, the prospectus will become the first half of the thesis, followed by a chapter reporting the results of the study and a chapter discussing the implications of those results. The thesis will be revised until the advisor considers it satisfactory, at which time it will be presented to the members of the thesis committee by the student, who will orally defend the thesis in an examination conducted by the thesis committee. The
master's degree is not completed until the thesis has been approved by the committee.

Should a student fail the final oral defense, the thesis may be defended again, provided the student's thesis committee recommends a second attempt. The second attempt to defend the thesis will be final. Failure of the second oral defense will require a majority vote of the student's thesis committee.

Program C - Communication/Interdisciplinary

Courses in business administration, English, psychology, and political science have been designated for Communication/Interdisciplinary study leading to the Master of Arts.

Students take 36 semester hours of coursework; 24 of those hours must be in communication and 12 in one of the interdisciplinary areas. Students who choose Program C are required to successfully complete the core requirements. All students choosing Program C must take the comprehensive examination during their last semester of classes. (See the subsequent section on Comprehensive Examination for more information.)

Program D - 5 Year BA + MA

A five-year BA+MA program in communication is also available. Communication majors maintaining a 3.2 overall GPA are invited to apply during their junior year. Students accepted into the program will take two graduate courses during their senior year. These six credits will count toward their MA degree as well as toward their BA degree. Contact the Director of Graduate Studies at (937) 229-2028 for further information about the program.

Comprehensive Examination

After consulting with the Program Director and advisor, the student selects faculty members (with their approval) to form an examination committee. The examination committee writes the examination questions, evaluates the student's written answers, and conducts the oral examination. Normally, at least three faculty members write questions and evaluate the comprehensive exam. The advisor may or may not participate in the writing and evaluating of exam questions. One of the members of the examination committee may be from outside the Department of Communication. The advisor administers the examination.

The comprehensive examination consists of a written examination at least six hours in length and a one-hour oral defense. The form and content of the exam is determined by the advisor and the faculty examination committee.

Written Examination

The written examination covers the coursework completed by the student, including both research methods and communication theory. The particular topic areas covered, and the number of hours of examination devoted to each topic area are determined by the student, the advisor, and the examination committee.

The exam will be written without notes, at a time and place specified by the Program Director. Specific resource materials may be permitted only if indicated by the examiner on the test question.

Oral Examination

After satisfactory completion of the written examination, the student will defend answers in an oral examination. Students prepare for the oral examination by consulting the advisor and examination committee concerning performance on the written exam.

Under extreme circumstances, an oral exam may be retaken once, only if recommended by the committee. Generally, prior to retaking the oral exam, the student must complete either additional coursework or a research paper. A student who has already taken additional classes and written a research paper will be dismissed from the program. Failure of the second oral exam will result in dismissal.

Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 501</td>
<td>COMMUNICATION RESEARCH AND METHODS</td>
<td>3</td>
</tr>
<tr>
<td>COM 502</td>
<td>RHETORICAL CRITICISM</td>
<td>3</td>
</tr>
</tbody>
</table>

Introduction to the study of communication research and methods. Required course for all communication graduate students.
Critical survey and application of traditional to contemporary methods of rhetorical criticism.

**COM 503 COMMUNICATION RESEARCH SEMINAR**
Focused study on the methods and process of conducting communication-related research. Builds upon fundamentals covered in COM 501.
**Prerequisite(s):** COM 501

**COM 504 PRINCIPLES OF COMMUNICATION EDUCATION**
Practical application of research, theory, and principles related to communication education. Development of students' pedagogical skills and strategies. Required course for graduate teaching assistants.

**COM 506 ETHICS OF COMMUNICATION**
Investigation and application of the general ethical principles of persuasion and the special problems related to professional areas: platform and business communication, electronic and print journalism, public relations, classroom communication, and forensic behavior.

**COM 508 INTERPERSONAL COMMUNICATION**
Focus on the theories, concepts, constructs, and research related to the process of interpersonal communication.

**COM 511 THEORIES OF PERSUASION**
An examination of the major approaches to the study of persuasion from classical rhetorical to contemporary behavioral theorists.

**COM 515 LANGUAGE AND MEANING**
Focuses on the origin and development of language and meaning. Comprehensive exploration of the many perspectives and theories of language and meaning.

**COM 517 ORGANIZATIONAL COMMUNICATION**
A study of communication activities within organizations: theories and systems of organizational communication, internal communication systems, research methods, and the interface of management and communication.

**COM 520 PUBLIC COMMUNICATION CAMPAIGNS**
Investigation of noncommercial public communication campaigns concentrating on social change or public information. Analysis and development of campaigns through mass media, organizational, group and interpersonal communication.

**COM 525 COMMUNICATION TRAINING & DEVELOPMENT**
Explores the theories, methods, and practice of developing, instituting, and evaluating communication training and development programs.

**COM 526 COMMUNICATION CONSULTING**
Explores the theories, methods, and practice of developing, instituting, and evaluating communication consulting programs.

**COM 527 SMALL GROUP COMMUNICATION**
An examination of the theoretical and practical aspects of small group communication. Focus on communication as it relates to decision making, group processes, leadership and roles, and member relations.

**COM 530 DEVELOPMENT OF MASS MEDIA**
History and analysis of the development and interdependence of mass media, print and electronic. Emphasis on its role and responsibility in political and economic progress of the U.S.

**COM 531 DIRECTED STUDY IN COMMUNICATION**
An intensive study of a specialized area of communication selected through consultation with the instructor. Permission. May be repeated for up to six semester hours.

**COM 536 THEORIES AND MODELS OF COMMUNICATION**
Survey and analysis of current theories and models of communication. Required course for all communication graduate students.
COM 537  CONFLICT MANAGEMENT
An analysis of the role of communication in the process of conflict, with special emphasis on communication strategies for managing conflict. Special focus on types of conflict, conflict contexts, power, and communication style.

COM 547  SEMINAR IN HEALTH COMMUNICATION
An examination of communication theory and research related to health care. Issues include reassurance, the role of the patient, interviews, health organizations, the media and health, compliance, providing explanations, and health care professions frequently neglected.

COM 555  PUBLIC RELATIONS
Focuses on the theoretical principles behind the current-day practice of public relations. Special emphasis on public opinion, diffusion, persuasion, problem analysis, and audience assessment within the PR context.

COM 562  TOPICS IN COMMUNICATION
Selected topics in communication, for example: argumentation, listening, law and the news media, historical and contemporary public address and criticism. Repeated when topic and instructor change.

COM 571  MASS COMMUNICATION PROCESSES AND EFFECTS
An examination of the historical and current research as it relates to our understanding of the processes and effects of mass communication.

COM 598  THESIS

COM 599  THESIS

COM 617  ORGANIZATIONAL RHETORIC AND SYMBOLISM
Examination of discourse and symbolism as the principal communicative media through which organizational power relations are maintained and reproduced, member meanings are created, and organizational culture is enacted.

COM 620  ELECTION CAMPAIGN COMMUNICATION
Survey of communication research and theories concerning election campaign communication including candidates, voters and the media. Analysis of campaign communication including development of appropriate research methodologies.

COM 622  PROPAGANDA ANALYSIS
An examination of the foundations of modern propaganda analysis. Topics include classical rhetorical contributions to argumentative analysis; historical development of propaganda; points of propaganda analysis. Special emphasis on modern mediated propaganda from World War I to the present.

COM 630  ISSUES IN INTERNATIONAL COMMUNICATION
Discussion of current issues in international communication. Possible topics include international news flow, globalization of mass media, communication and development, comparative mass media, mass media in political revolutions, democracy and terrorism.
College of Arts and Sciences
(CPS) Computer Science (Collapse Description)

James P. Buckley, Chair of the Department
Raghava G. Gowda, Graduate Program Director

The graduate program in computer science offers a comprehensive approach to the theory and application of computer science. Graduates of the program will have:

1. a thorough grounding in the theory of computing science and the ability to apply that knowledge to a variety of problem areas,
2. been exposed to a variety of analytical methods and will demonstrate a basic understanding of those methods, and
3. been exposed to a wide breadth of computer science information by having studied several of the dominant sub-disciplines of computer science.

The program is individualized to meet each student's needs and provides a firm foundation for continuing on to the doctorate or a professional career. The program accommodates both full-time and part-time students.

Assistantships

Graduate assistantships are offered to qualified students for assisting with or teaching sections of introductory computer science courses and assisting faculty with research. Competent assistants making satisfactory progress toward the degree can normally renew their assistantships for a second year. Recipients are expected to complete the requirements for the master's degree in two years. Assistants contribute half-time service of 20 hours per week.

Stipends and complete tuition remission for six semester hours per term are provided. Detailed information and application forms may be obtained from the computer science department.

International Students

Students from foreign countries should request information and applications for admission to graduate studies from Enrollment Management and International Graduate Admission. A score of 550 or better is required on the TOEFL exam. A student from a foreign country seeking admission must have earned a bachelor's degree or its equivalent and taken the GRE. For further details, see International Graduate Admission.

Facilities

Two types of computing facilities are available to students: those provided by the university (through UDit, Academic Technology Services) and those provided by the Computer Science Department.

The Computer Science Department has two laboratories in Anderson Center that house the departmental servers and workstations. In addition, the department has a third laboratory with microcomputers and a fourth laboratory for digital design, microcomputer interfacing, and networking.

UDit provides general educational computing facilities to all university students. These facilities include a DEC Alpha computer and a variety of network services.

All of the computers provide access to a large variety of application packages and programming languages. Around-the-clock telephone dial-up services to all systems are available to students with appropriate access equipment.

Programs

Program Name

Master of Science in Computer Science (CPS)

The degree requires 36 semester hours, 24 of which must be taken from computer science courses numbered 510 or above, six of which constitute a final, culminating experience, and six of which are free electives that may be acquired.
by taking graduate courses of other university departments (or from additional 
CPS courses numbered 510 or above).

The 24 departmental credits include required fundamentals, breadth 
requirements, and one CPS elective course. Six credits must include CPS 530 
and CPS 536; fifteen must include three credits from each of the following sub- 
disciplines of computer science: (1) Software Development Methodologies, (2) 
Database/Technology, (4) Systems and Architecture, and (5) Languages. The remaining three credits may be acquired by taking any other 
CPS course numbered 510 or above.

The student must also complete a 6-credit final, culminating experience consisting of either (1) a master's thesis, (2) a software engineering project, or (3) two 
additional CPS courses (numbered 510 or above), which are to be taken from one 
of the above-listed computer science sub-disciplines. Note: the final six credits 
must be taken in residence for all students choosing option (3).

Each student's program requires the advance approval of a faculty advisor. A student failing to make normal progress will be required to withdraw from the 
program.

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>CPS 502</td>
<td>COMPUTING-GENERAL SURVEY</td>
<td>3</td>
</tr>
<tr>
<td>CPS 509</td>
<td>TOPICS IN COMPUTER SCIENCE</td>
<td>1 - 3</td>
</tr>
<tr>
<td></td>
<td>Lectures in special areas of interest determined by the department. May be taken more than once for additional credit when the topics or contents change. Prerequisite(s): permission of the department chair</td>
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<tr>
<td>CPS 510</td>
<td>SYSTEMS ANALYSIS</td>
<td>3</td>
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<td></td>
<td>Process-oriented, data-oriented, and object-oriented approaches for systems development; comparison of various systems development life cycles; DFD methodology for systems analysis using state-of-the-art CASE (Computer Aided Software Engineering) tools; logical and event analyses of DFD specifications; tools and techniques for modeling real-time systems; data modeling; introduction to object-oriented analysis methodologies. Prerequisite(s): CPS 350</td>
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<tr>
<td>CPS 512</td>
<td>SYSTEMS DESIGN</td>
<td>3</td>
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<tr>
<td></td>
<td>Principles of design, introduction to software design methodologies; issues in transition from analysis to logical and physical designs; detailed discussion of structured design methodology (Yourdon, Constantine, Myers); design guidelines; transform analysis; Warnier/Orr design methodologies; designing methodologies for real-time systems; introduction to object-oriented design; CASE tools and code generators. Prerequisite(s): CPS 510</td>
<td></td>
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<tr>
<td>CPS 514</td>
<td>MANAGEMENT INFORMATION SYSTEMS</td>
<td>3</td>
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<tr>
<td></td>
<td>The systems approach to managing information; MIS organization within the company; application of organizational behavior to MIS; manager's view of computer systems; planning, designing, and implementing MIS; advanced concepts of MIS. Prerequisite(s): CPS 510</td>
<td></td>
</tr>
<tr>
<td>CPS 518</td>
<td>SOFTWARE ENGINEERING</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Explores major issues of software engineering, comparison of various manual/automated analysis and design methodologies; testing and quality assurance; software metrics and configuration management; software productivity and human factors in software development; CASE tools for various phases of software development. Prerequisite(s): CPS 350</td>
<td></td>
</tr>
<tr>
<td>CPS 520</td>
<td>OBJECT-ORIENTED SYSTEMS DEVELOPMENT</td>
<td>3</td>
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</table>

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000471&p=1000000505&c=-1 7/10/2012
Unified Modeling Language (UML), use cases, class diagrams, sequence diagrams, collaboration diagrams, state charts, activity diagrams, component and deployment views, design patterns, and implementation of various UML models through team projects.

**Prerequisite(s):** CPS 350 and CPS 510

**CPS 522 SOFTWARE PROJECT MANAGEMENT**
Cost and effort estimation models for software projects, planning techniques, productivity metrics, risk management, maintenance, reuse, quality assurance, configuration management, Capability Maturity Models (CMM and P-CMM), and ISO 9001.

**Prerequisite(s):** CPS 510 or CPS 518 or CPS 520

**CPS 528 DISCRETE STRUCTURES**
Survey of various mathematical topics with applications to computer science.

**CPS 530 ALGORITHM DESIGN**
The design and analysis of computer algorithms, including order notation, sorting, dynamic programming, graph algorithms, string matching, matrix multiplication, NP-completeness.

**Prerequisite(s):** CPS 350

**CPS 532 DATA STRUCTURES**
Review of basic data concepts, linear lists, strings, arrays, and orthogonal lists, trees and graphs, multilinked structures. Searching and sort techniques. Algorithm design, accessing methods, run time cost and efficiency.

**Prerequisite(s):** CPS 530

**CPS 536 OPERATING SYSTEMS I**
Models and algorithms pertinent to the design of computer operating systems; concurrent processes including synchronization, communication and deadlock problems, process and device scheduling policies, design of file systems, reliability and protection.

**Prerequisite(s):** CPS 350

**CPS 538 OPERATING SYSTEMS II**
Design and implementation of a multi-user operating system, including concurrent processes, use of monitors and kernels, virtual memory with paging, process synchronization and communication, input and output spooler, interrupts, distributed system concepts.

**Prerequisite(s):** CPS 536

**CPS 542 DATABASE MANAGEMENT SYSTEMS**
Physical and logical organization of data files; hierarchical, network, and relational database models; data definition language and data manipulation language of a commercial database management system; query languages.

**Prerequisite(s):** CPS 350

**CPS 543 COMPARATIVE LANGUAGES**
The evolution of programming languages. Study of the concepts common to languages, constructs, organization, specification, and analysis of languages. The role of languages in software development.

**Prerequisite(s):** CPS 350

**CPS 544 SYSTEMS PROGRAMMING**
Analysis of compilers and their construction; programming techniques discussed in the current literature; advanced computer applications in both mathematical and nonnumeric areas.

**Prerequisite(s):** CPS 350

**CPS 545 SYSTEMS PROGRAMMING**
Analysis of compilers and their construction; programming techniques discussed in the current literature; advanced computer applications in both mathematical and nonnumeric areas.

**Prerequisite(s):** CPS 350

**CPS 552 DISCRETE EVENT SIMULATION TECHNIQUES**
Simulation models; random number generation testing, special purpose simulation languages, statistical analysis of output; regenerative models;
trace-driven models. Emphasis on models related to computer operating system design and performance evaluation.

Prerequisite(s): CPS 350, statistics

CPS 553 NUMERICAL METHODS
Solution of nonlinear equations, interpolation and approximation, differentiation and integration, systems of linear equations, eigenvalues, eigenvectors, and introduction to solution of ordinary differential equations. Emphasis placed on applications.

Prerequisite(s): CPS 132 or 150 and MTH 169

CPS 554 NUMERICAL METHODS
Solution of nonlinear equations, interpolation and approximation, differentiation and integration, systems of linear equations, eigenvalues, eigenvectors, and introduction to solution of ordinary differential equations. Emphasis placed on applications.

Prerequisite(s): CPS 132 or 150 and MTH 169

CPS 555 NUMERICAL ANALYSIS
Functional approximation, quadrature methods, numerical solution of differential equations; matrices and large-scale systems, modern iterative matrix methods; minimax approximations; data smoothing.

Prerequisite(s): CPS 132 or 150, MTH 302, 319

CPS 556 NUMERICAL ANALYSIS
Functional approximation, quadrature methods, numerical solution of differential equations; matrices and large-scale systems, modern iterative matrix methods; minimax approximations; data smoothing.

Prerequisite(s): CPS 132 or 150, MTH 302, 319

CPS 560 COMPUTER GRAPHICS
Types of graphic hardware and their characteristics. Overview of software and techniques used in computer graphics. Two- and three-dimensional graphics displays.

Prerequisite(s): programming ability in a procedure oriented language, CPS 350

CPS 562 DATABASE MANAGEMENT SYSTEMS II
Study of query execution and optimization, transaction management, concurrency control, recovery and security techniques. Advanced data models and emerging trends in database systems, like object-oriented database systems, distributed database systems, client-server architecture, multidatabase and heterogeneous systems. Other current database topics and emerging technologies will be discussed.

Prerequisite(s): CPS 542

CPS 565 ADVANCED COMPUTER ARCHITECTURE
Hierarchical memory structure, cache and main memory organization; I/O processors and I/O channels; pipeline computers; array computers, multiprocessor systems and their interconnection structures.

Prerequisite(s): CPS 345 or equivalent

CPS 570 DATA COMMUNICATIONS
The study of networks of interacting computers. The analysis of distributed processing and distributed databases.

Prerequisite(s): CPS 350

CPS 572 COMPUTER NETWORKING
A unified view of the broad field of local area and long haul networks. A survey of the state of the art. Topics covered include networking theory, design approaches, standards, topologies and protocols.

Prerequisite(s): CPS 536, 570

CPS 577 COMPUTER SYSTEM DESIGN
Introduction to design and analysis of combinational and sequential circuits of MSI devices to design arithmetic and other computer functions. Analysis of a specific microcomputer architecture including usage of its machine and assembler language. Interfacing of various components with computers.

Prerequisite(s): CPS 250
Introduction to design and analysis of combinational and sequential circuits of MSI devices to design arithmetic and other computer functions. Analysis of a specific microcomputer architecture including usage of its machine and assembler language. Interfacing of various components with computers.

Prerequisite(s): CPS 250

CPS 580 ARTIFICIAL INTELLIGENCE
Presentation of theoretical concepts for artificial intelligence in the areas of knowledge representation and search techniques. These are examined in the context of applications for expert systems, semantic networks, and planning problems. Issues concerning functional programming and logic programming are also presented.

Prerequisite(s): CPS 350

CPS 581 ADVANCED ARTIFICIAL INTELLIGENCE
This course continues the studies pursued in Artificial Intelligence CPS 580. It delves more deeply into certain areas such as multiple agent systems and induction, and introduces new areas, such as neural networks and planning, not covered in CPS 580. As in CPS 580, each student shall complete a final project investigating some area of research in Artificial Intelligence. The project will encompass a literature search, paper, presentation, and implementation.

Prerequisite(s): CPS 580

CPS 582 AUTOMATA THEORY
Finite automata, sequential machines. Turing machines, computability, existence of self-reproducing machines.

Prerequisite(s): CPS 528

CPS 591 SPECIAL RESEARCH PROBLEMS
Individual readings and research in a specialized area. May be taken for at most six semester hours.

Prerequisite(s): permission of the department chair

CPS 592 SPECIAL TOPICS
Lectures and/or laboratory experience in some areas determined by the department.

Prerequisite(s): permission of the department chair

CPS 595 SOFTWARE ENGINEERING PROJECT I
First of a two-course project sequence. Students, either individually or in teams, must propose a project, conduct background research, justify the adequacy of the work for a graduate project, complete analysis and design using appropriate methodologies and CASE tools, and write preliminary coding. Students are expected to write code and minimize the usage of visual or other development environments. A minimum of three class presentations is expected for project proposal, progress, and final analysis/design.

Prerequisite(s): CPS 510, 530, and permission of department chair

CPS 596 SOFTWARE ENGINEERING PROJECT II
Continuation of CPS 595. Students are required to implement the analysis and design of their projects and make periodic presentations. Special attention needs to be given to the overall architecture of the system, usability, testing, and documentation. A minimum of two class presentations is expected for design and implementation.

Prerequisite(s): CPS 595

CPS 597 SOFTWARE ENGINEERING PROJECT III
This is a continuation of the CPS 595/596 sequence. Students continue progress on the analysis, design, and coding of their Software Engineering Project. A minimum of two class presentations is expected for status and evaluation assessments.

Prerequisite(s): CPS 595, 596

CPS 598 SOFTWARE ENGINEERING PROJECT IV
This is a continuation of CPS 595/596/597 sequence. Students continue progress on the analysis, design, and coding of their Software Engineering Project. A minimum of two class presentations is expected for status and evaluation assessments.

Prerequisite(s): CPS 595, 596, 597

CPS 599 THESIS

Prerequisite(s): CPS 595, 596, 597
The goals of the Department of Counselor Education and Human Services are:

1. To prepare elementary and secondary school counselors; student service personnel in higher education; school psychologists; and counselors for community, mental health and other agency settings to reflect the human service practitioner as a facilitator of individual and community growth.

2. To provide teachers and other helping professionals with specific course offerings designed to build skills and develop understanding relative to identified professional functions within the learning communities. These two missions are conducted at the University of Dayton campus, Lima, Columbus, and other sites as approved.

The department offers seven programs at the graduate level:

1. School Counseling
2. Teacher as Child/Youth Development Specialist
3. College Student Personnel
4. Higher Education Administration
5. Community Counseling
6. Human Development Services
7. School Psychology

In addition, selected courses in behavioral and social science and other related disciplines lead to certification as a school counselor or school psychologist, as well as to Professional Counselor licensure and Professional Clinical Counselor licensure for social agency personnel. True to Marianist ideals, the faculty are committed to developing the human service practitioner as a skilled facilitator of individual and community growth and as a person knowledgeable of self and children, and youth and adults from varying socioeconomic backgrounds.

Programs

Program Name
Master of Science in College Student Personnel (EDC)

The master's degree program in college student personnel is designed to assist students in gaining the practice, theoretical perspectives, and appropriate integration to be successful in working on college and university campuses in a variety of positions. The program was recently revised using CAS Standards and includes six new courses. Coursework emphasizes the development of the professional, working with individual and groups of students, and designing campus environments. Students complete three internships at surrounding colleges and universities. Many of our students hold graduate assistantships in Student Development at the University of Dayton and Wilmington College.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDC 554</td>
<td>INTRODUCTION TO HIGHER EDUCATION AND STUDENT AFFAIRS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 672</td>
<td>HISTORY OF HIGHER EDUCATION IN THE UNITED STATES</td>
<td>3</td>
</tr>
<tr>
<td>EDC 550</td>
<td>STUDENT DEVELOPMENT THEORY</td>
<td>3</td>
</tr>
<tr>
<td>EDC 557</td>
<td>STUDENT CULTURES IN THE UNIVERSITY ENVIRONMENT</td>
<td>2</td>
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</table>
EDC 560 LEADERSHIP IN COLLEGE AND UNIVERSITY ENVIRONMENT 3
EDC 568 RESEARCH AND EVALUATION IN HUMAN SERVICES 3

Advanced Studies
EDC 551 APPLICATION OF STUDENT DEVELOPMENT THEORY 2
EDC 555 ADMINISTRATION AND ORGANIZATION OF COLLEGE STUDENT PERSONNEL PROGRAMS 3
EDC 562 INTERVENTIONS IN COLLEGE STUDENT PERSONNEL 2

Supervised Practice¹
EDC 553 INTERNSHIP IN COLLEGE STUDENT PERSONNEL 6

Electives
EDC 574 INDEPENDENT STUDIES IN COUNSELING 1 - 3
EDC 602 COUNSELING SEMINARS 1 - 6

Scholarly Project²
EDC 569 SCHOLARLY PROJECT 3

¹Students may begin taking internships in their second semester. There are three internships, two semester hours each.
²Prerequisite: Final term standing

Master of Science in Community Counseling (EDC)

The 48 semester hour master's program in community counseling is a generalist curriculum that prepares students to pursue counseling licensure. In Ohio, licensure as a professional counselor requires a master's degree in counseling and 60 semester hours of graduate courses. Traditional counseling will be the focus of 40 of the hours, while 20 hours will emphasize clinical counseling with persons who have a diagnosed mental disorder. The master's degree includes all of the traditional coursework and some of the clinical requirements. The 12 semester hour post-master's sequence completes the requirement for clinical counseling coursework. Upon completing the 60 semester hour requirement and passing the required test by the Counseling and Social Work Board, the candidate receives the Professional Counseling License (PC). After completing two additional years of supervised experience, the counselor is licensed as a Professional Clinical Counselor (PCC).

<table>
<thead>
<tr>
<th>Community Counseling</th>
<th>Sem. Hrs.</th>
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<tbody>
<tr>
<td>Human Development</td>
<td>48</td>
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<tr>
<td>EDC 531</td>
<td>PERSONALITY AND HUMAN DEVELOPMENT ACROSS THE LIFESPAN 2</td>
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<tr>
<td>EDC 623</td>
<td>FOUNDATIONS IN ABNORMAL PSYCHOLOGY 3</td>
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<tr>
<td>Social &amp; Cultural Foundations</td>
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<tr>
<td>EDC 635</td>
<td>MARRIAGE AND FAMILY COUNSELING 3</td>
</tr>
<tr>
<td>EDC 673</td>
<td>COUNSELING MULTICULTURAL POPULATIONS 3</td>
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<tr>
<td>Foundations of Professional Responsibilities, Ethical, and Legal</td>
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<tr>
<td>EDC 544</td>
<td>PHILOSOPHICAL, PROFESSIONAL, ETHICAL &amp; LEGAL ASPECTS IN COUNSELING 2</td>
</tr>
<tr>
<td>Appraisal of the Individual</td>
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<tr>
<td>EDC 535</td>
<td>TEST INTERPRETATIONS AND CASE STUDIES 2</td>
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<tr>
<td>EDC 631</td>
<td>DIAGNOSIS OF EMOTIONAL AND MENTAL DISORDERS 3</td>
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<td>Lifestyle and Career Development</td>
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<tr>
<td>EDC 529</td>
<td>PSYCHOLOGY OF LIFESTYLE AND CAREER DECISION MAKING 2</td>
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<tr>
<td>Counseling Theory and Techniques</td>
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<tr>
<td>EDC 543</td>
<td>THEORIES AND TECHNIQUES OF COUNSELING 3</td>
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<tr>
<td>EDC 545</td>
<td>COUNSELING TECHNIQUES LAB 2 - 3</td>
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¹Students may begin taking internships in their second semester. There are three internships, two semester hours each.
²Prerequisite: Final term standing
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<tr>
<td>EDC 583</td>
<td>THEORIES AND TECHNIQUES OF GROUP COUNSELING</td>
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<tr>
<td>EDC 568</td>
<td>RESEARCH AND EVALUATION IN HUMAN SERVICES</td>
<td>3</td>
</tr>
<tr>
<td>EDT 660</td>
<td>INTRODUCTION TO EDUCATIONAL RESEARCH</td>
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<tr>
<td>EDC 584</td>
<td>PRACTICUM IN COUNSELING</td>
<td>2</td>
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<tr>
<td>EDC 598</td>
<td>INTERNSHIP IN COMMUNITY COUNSELING</td>
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<tr>
<td>EDC 700</td>
<td>SCHOLARLY PROJECT</td>
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<tr>
<td>EDC 523</td>
<td>DELINQUENTS AND JUVENILE COURT</td>
<td>1</td>
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<tr>
<td>EDC 574</td>
<td>INDEPENDENT STUDIES IN COUNSELING</td>
<td>1-3</td>
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<tr>
<td>EDC 602</td>
<td>COUNSELING SEMINARS</td>
<td>1-6</td>
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<td>EDC 605</td>
<td>PROFESSIONAL SEMINARS</td>
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<tr>
<td>EDC 523</td>
<td>DELINQUENTS AND JUVENILE COURT</td>
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<td>EDC 574</td>
<td>INDEPENDENT STUDIES IN COUNSELING</td>
<td>1-3</td>
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<td>1-2</td>
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<tr>
<td>Electives</td>
<td></td>
<td>4-5</td>
</tr>
<tr>
<td>EDC 523</td>
<td>DELINQUENTS AND JUVENILE COURT</td>
<td>1</td>
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<td>EDC 574</td>
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<td>1-3</td>
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<td>COUNSELING SEMINARS</td>
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<td>PROFESSIONAL SEMINARS</td>
<td>1-6</td>
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<tr>
<td>Electives</td>
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<td>EDC 523</td>
<td>DELINQUENTS AND JUVENILE COURT</td>
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<td>COUNSELING SEMINARS</td>
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<tr>
<td>EDC 605</td>
<td>PROFESSIONAL SEMINARS</td>
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Clinical Coursework for Professional Counseling Licensure

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>EDC 623</td>
<td>FOUNDATIONS IN ABNORMAL PSYCHOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>EDC 630</td>
<td>EVALUATION OF EMOTIONAL AND MENTAL CONDITION</td>
<td>3</td>
</tr>
<tr>
<td>EDC 631</td>
<td>DIAGNOSIS OF EMOTIONAL AND MENTAL DISORDERS</td>
<td>3</td>
</tr>
<tr>
<td>EDC 635</td>
<td>MARRIAGE AND FAMILY COUNSELING</td>
<td>3</td>
</tr>
<tr>
<td>EDC 681</td>
<td>INTEGRATIVE APPROACH TO CLINICAL COUNSELING</td>
<td>3</td>
</tr>
<tr>
<td>EDC 683</td>
<td>TREATMENT OF MENTAL AND EMOTIONAL DISORDERS</td>
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</tr>
<tr>
<td>EDC 695</td>
<td>COUNSELOR SUPERVISION</td>
<td>3</td>
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</tbody>
</table>

1Clinical counseling courses taken are part of the master's degree in community counseling.
2Prerequisite: EDC 531
3Prerequisite: EDC 523
4Prerequisite: EDC 543
5EDT 660 is required for students pursuing the Research Project option of the Scholarly Project. Students taking Research Project must also take EDT 661 which will fulfill two semester hours of electives.
6Prerequisite: EDC 545 & EDC 583
7Prerequisite: EDC 584
8Must be taken three times; 600 total clock hours.
9To fulfill the education requirements for the Professional Counseling (PC) license in addition to completing the master's degree requirements for the Community Counseling program students must also complete a 12 semester hour post-master's program in Clinical Counseling.
10Taken during Community Counseling program.
11Prerequisite: EDC 631
12Prerequisite: EDC 630
13Prerequisite: EDC 598
Master of Science in Higher Education Administration (EDC)

The master's program in higher education administration consists of eleven courses that integrate theory and research with practice. The program is designed to prepare students for a variety of academic and non-academic positions in post-secondary settings, industry, and government. The recently revised curriculum includes historical perspectives, law, finance, student issues, and organization and governance. Students complete a practicum and a culminating scholarly project. This program accommodates students holding full-time jobs.

<table>
<thead>
<tr>
<th>Higher Education Administration</th>
<th>Sem. Hrs.</th>
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<tbody>
<tr>
<td>Foundational Studies</td>
<td>34</td>
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<tr>
<td>EDC 554</td>
<td>INTRODUCTION TO HIGHER EDUCATION AND STUDENT AFFAIRS</td>
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<tr>
<td>EDT 672</td>
<td>HISTORY OF HIGHER EDUCATION IN THE UNITED STATES</td>
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<td>Professional Studies</td>
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<tr>
<td>EDC 550</td>
<td>STUDENT DEVELOPMENT THEORY</td>
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<td>EDC 557</td>
<td>STUDENT CULTURES IN THE UNIVERSITY ENVIRONMENT</td>
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<tr>
<td>EDC 560</td>
<td>LEADERSHIP IN COLLEGE AND UNIVERSITY ENVIRONMENT</td>
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<tr>
<td>EDC 568</td>
<td>RESEARCH AND EVALUATION IN HUMAN SERVICES</td>
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<tr>
<td>Advanced Studies</td>
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<td>EDC 556</td>
<td>ADMINISTRATION AND ORGANIZATION IN HIGHER EDUCATION</td>
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<td>EDC 561</td>
<td>PLANNING, FINANCE AND EVALUATION IN HIGHER EDUCATION</td>
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<td>EDC 563</td>
<td>LAW AND ETHICS IN HIGHER EDUCATION</td>
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<td>Supervised Practice^{2}</td>
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<td>EDC 564</td>
<td>PRACTICUM IN HIGHER EDUCATION</td>
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<td>INDEPENDENT STUDIES IN COUNSELING</td>
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<td>COUNSELING SEMINARS</td>
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<tr>
<td>EDC 569</td>
<td>SCHOLARLY PROJECT</td>
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</tbody>
</table>

^{1}Prerequisite: EDC 554
^{2}For those students in full-time positions in higher education. All others will complete 6 hours of internship.
^{3}Prerequisite: Final Term Standing

Master of Science in Human Development Services (EDC)

This master's degree program is designed for persons who do not hold a teaching license and who do not wish to pursue licensure as a counselor, but who are interested in enhancing their human service skills for employment in other settings. The program is appropriate for persons in the clergy, nursing, criminal justice and other related fields.

Note: This degree does not lead to obtaining Ohio's Professional Counseling license or Professional Clinical Counseling license. Students who intend to obtain either of these credentials must enroll in the 48-hour community counseling master's degree program and also complete the additional 12 hours in clinical coursework for professional counseling licensure.

<table>
<thead>
<tr>
<th>Human Development Services</th>
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<tbody>
<tr>
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<tr>
<td>EDC 531</td>
<td>PERSONALITY AND HUMAN DEVELOPMENT ACROSS THE LIFESPAN</td>
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<tr>
<td>EDC 568</td>
<td>RESEARCH AND EVALUATION IN HUMAN SERVICES</td>
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<tr>
<td>EDC 673</td>
<td>COUNSELING MULTICULTURAL POPULATIONS</td>
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<td>Human Development Services Core</td>
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<tr>
<td>EDC 525</td>
<td>INDEPENDENT RESEARCH</td>
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</table>
### Master of Science in School Counseling (EDC)

The school counseling degree provides preparation for teachers who desire to be school counselors. Prerequisites for school counselor licensure include: (1) a master's degree and two years of successful teaching experience under a standard teacher certificate or provisional or professional teacher license, and successful completion of internship consisting of six hundred contact hours in a school setting, OR (2) a master's degree in counseling, successful completion of an internship consisting of six hundred contact hours in a school setting, and a one-year induction under the supervision of a licensed school counselor. Upon completion of the master's degree, the Ohio Department of Education requires the PRAXIS specialty examination in school counseling. The degree program consists of a 21-23 semester hour foundation area, and a 21 semester hour core in school counseling and 4-6 hours of elective credits in counseling.

### General Requirements

1. 48 semester hours
2. 600 clock hour internship
3. Scholarly project
4. Comprehensive exam

**Note 1:** To become a licensed school counselor, a student must:

1. Be a certified teacher.
2. Have two years of successful teaching experience.
3. Have completed a minimum of 72 graduate semester hours in counseling courses which cover the eleven areas decreed by the State.
4. Have a master's degree.
5. Achieve a passing score on the State Department of Education exam.
6. Apply for School Licensure to the State Department of Education through the Office of the Dean, SOEAP.

**Note 2:** School counselors wishing to pursue the status of Professional Counselor (PC) should see an advisor in the Department of Counselor Education & Human Services.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EDC 529</td>
<td>PSYCHOLOGY OF LIFESTYLE AND CAREER DECISION MAKING</td>
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<td>EDC 543</td>
<td>THEORIES AND TECHNIQUES OF COUNSELING</td>
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<td>EDC 545</td>
<td>COUNSELING TECHNIQUES LAB</td>
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<td>EDC 593</td>
<td>THEORIES AND TECHNIQUES OF GROUP COUNSELING</td>
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<td>EDC 605</td>
<td>PROFESSIONAL SEMINARS</td>
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<td>EDC 635</td>
<td>MARRIAGE AND FAMILY COUNSELING</td>
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<td>EDC 523</td>
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<td>EDC 602</td>
<td>COUNSELING SEMINARS</td>
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**Sem. Hrs.:**

### School Counseling

#### I. Foundation Area

21-23

**A. Guidance & Counseling Foundations**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EDC 522</td>
<td>INTRODUCTION TO GUIDANCE AND COUNSELING</td>
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**B. Social & Cultural Foundations**

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<td>EDC 635</td>
<td>MARRIAGE AND FAMILY COUNSELING</td>
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<tr>
<td>EDC 673</td>
<td>COUNSELING MULTICULTURAL POPULATIONS</td>
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**C. Human Growth & Development**

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<tr>
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<tbody>
<tr>
<td>EDC 531</td>
<td>PERSONALITY AND HUMAN DEVELOPMENT ACROSS THE LIFESPAN</td>
<td>2</td>
</tr>
<tr>
<td>EDC 532</td>
<td>PSYCHOLOGY OF LEARNING DISABILITIES &amp; OTHER EXCEPTIONALITIES</td>
<td>3</td>
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</table>
D. Philosophy of Education

- - - EDC 544 PHILOSOPHICAL, PROFESSIONAL, ETHICAL & LEGAL ASPECTS IN PHILosophical Studies in Education (EDC 544) or EDT 502 HISTORY OF EDUCATION IN THE UNITED STATES (EDT 502) 2 - 3

or EDT 503 COUNSELING (EDC 544)

E. Appraisal of the Individual

EDC 535 TEST INTERPRETATIONS AND CASE STUDIES 2

F. Research & Program Evaluation

- - - EDC 568 RESEARCH AND EVALUATION IN HUMAN SERVICES (EDC 568) or EDT 660\textsuperscript{2} INTRODUCTION TO EDUCATIONAL RESEARCH (EDT 660) 3

II. School Counseling Core

A. Counseling Theories & Techniques

EDC 543 THEORIES AND TECHNIQUES OF COUNSELING 3

B. Group Dynamics, Processing & Counseling

EDC 583 THEORIES AND TECHNIQUES OF GROUP COUNSELING 3

C. Lifestyles and Career Development

EDC 529 PSYCHOLOGY OF LIFESTYLE AND CAREER DECISION MAKING 2

D. Pre-Practicum

EDC 545 COUNSELING TECHNIQUES LAB 2 - 3

E. Counseling Practicum\textsuperscript{3}

EDC 584\textsuperscript{4} PRACTICUM IN COUNSELING 2

F. Counseling Internship\textsuperscript{3}

EDC 599\textsuperscript{5} INTERNSHIP IN SCHOOL COUNSELING 2

G. Scholarly Project

EDC 700 SCHOLARLY PROJECT 3

Option A - Research Project "Scholarship with Inquiry" (Prereq: EDT 660 & EDT 661)

Option B - Project of Excellence "Scholarship with Counseling Competence" (Prereq: EDC 568 or EDT 660)

Option C - Transformative Project "Scholarship with Social Action Application" (Prereq: EDC 568 or EDT 660)

H. Comprehensive Seminar

EDC 573\textsuperscript{7} ORIENTATION TO THE SCHOOL PROCESS 1

EDC 600 CULMINATING SEMINAR 1 - 2

III. Electives

3-5

EDC 523 DELINQUENTS AND JUVENILE COURT 1

EDC 574 INDEPENDENT STUDIES IN COUNSELING 1 - 3

EDC 602 COUNSELING SEMINARS 1 - 6

EDC 605 PROFESSIONAL SEMINARS 1 - 6

\textsuperscript{1}Students certified in L.D. will take another counseling course.

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000466&p=-1&c=-1 7/10/2012
2EDT 660 is required for students pursuing Research Project option of the Scholarly Project. Students taking Research Project must also take EDT 661 which will fulfill two semester hours of electives.

3In addition to the 100 clock hours of direct/indirect service at an assigned practicum site, each student will meet three hours biweekly during the term for group supervision.

4Prerequisite: EDC 545 & EDC 583

5In addition to the 600 hours of direct service at an assigned internship site, each student will meet three hours biweekly for group supervision during the semester.

6Prerequisite: EDT 584

7Required for non-teachers

Master of Science in School Psychology (EDC)

The purpose of the NASP-approved school psychology program is to train school psychologists to assist educators and parents in problem-solving efforts to meet the educational and mental health needs of children and youth in Ohio schools. The program prepares school psychology practitioners to use assessment, consultation, and counseling skills in intervention-based and collaborative approaches requiring specialist-level training.

Program and licensure standards require completion of both the master's degree and specialist-level training.

General Requirements

School Psychology program (36 semester hours)

1. Successful completion of specified 36 semester hours
2. Successful completion of practica
3. Development, presentation, and approval of professional portfolio (Stage 1)

Ohio Licensure and Completion of Specialist-Level Training (34 semester hours; 70 semester hours with completion of School Psychology program)

1. Successful completion of specified 34 semester hours.
2. Successful completion of internship
3. Successful completion of thesis
4. Development, presentation and approval of professional portfolio (Stage 2)

Experience in Schools

If at the time of acceptance into the school psychology program applicants do not possess either of the prerequisites listed in the above paragraph, they must complete at least one year of experience (or its equivalent) as a substitute teacher, a special education tutor or teacher's aide, or volunteer in a K-12 classroom setting, for the equivalent of 70 days, prior to beginning their school psychology internship. Part-time or full-time graduate courses in the school psychology program may be taken while completing this employment or volunteer experience, during which graduate students will be gaining invaluable experience in schools upon which they will draw when they become school psychologists. This requirement is based on the perception that most of the time a school psychologist's colleague is a classroom teacher, and school psychologists need to be credible and resourceful in their collaboration with teachers.

A number of educational agencies in the Dayton area hire special education tutors, teacher aides, and substitute teachers, at hourly, daily, or yearly rates. Such employment offers financial support for living expenses and tuition payments, as well as excellent experience in preparation for the role of school psychologist. Information about such opportunities may be obtained from the school psychology program coordinator.

Additional Courses Required for Applicants without Teaching License

Applicants who are not licensed teachers must take two courses, EDC 539, "Administration & Organization of Pupil Personnel Services," and EDC 573, "Orientation to the School Process," in addition to the required courses.

Transfer Credits

Upon acceptance into the school psychology program, transcripts of past courses will be reviewed to determine the possible need to add or substitute courses. Such a review must result in a course plan totaling at least 70 semester hours, covering the program content areas. Students may transfer up to six semester hours of graduate credit taken in other programs, if such coursework has been completed within five years prior to acceptance into the school psychology program and the grade is "B" or better. An additional 6 credits may be transferred toward completion of the Ed.S. degree.

Residency
All students in the school psychology program must meet a residency requirement by enrolling in coursework on a full-time basis (nine or more credits) for at least two consecutive terms (e.g., fall and winter, or winter and summer).

Competency Test

To obtain the Ohio license in school psychology, students must take the PRAXIS II specialty area test #40 (school psychologist), administered six times each year by ETS, and achieve Ohio's passing score of 630. This test is normally taken in March during the internship year.

Internship

Students seeking Ohio school psychology licensure who wish to intern in Ohio will be required to sign a statement of intent to work in Ohio as a school psychologist for at least one year following internship. The State of Ohio limits the number of internships each year to approximately 100. Of this number, the University of Dayton receives at least seven internship slots per year. For students not intending to work in Ohio following internship, internship arrangements may be made in another state.

Financial Aid

A few graduate assistantships are awarded each year to full-time students. (Full time status requires registration for a minimum of six credits per term.) Graduate assistantships require 20 hours work per week and include tuition costs for 15 semester credits per academic year, and provide a $6400 stipend per year. Guaranteed student loans are available to students who register for at least three credit hours per term, if the student's financial ability meets the eligibility criteria. A financial aid information package may be obtained from the University's Financial Aid Office (937-229-4311). The granting of financial aid requires that the student first be admitted into a graduate program. A number of educational agencies in the Dayton area hire special education teacher aides, substitute teachers, and temporary teachers, at hourly, daily, or yearly rates. Such employment offers financial support for living expenses and tuition payments, as well as excellent experience in preparation for the role of school psychologist. Information about such opportunities may be obtained from school psychology program coordinator.

Accreditation

This program is approved by the National Association of School Psychologists (NASP) and by the Ohio Department of Education. In accordance with NASP standards, this program requires the equivalent of at least three years of full-time graduate study, including at least 60 graduate credit hours (specialist level), a residency of at least two consecutive full-time terms, and one academic year of supervised internship.

Investigation of Criminal Record

School psychology students should be aware that the State of Ohio requires a fingerprint check to determine the existence of a criminal record. Such checks will be conducted by the Ohio Bureau of Criminal Investigation (BCI) and the FBI (for persons who have not been Ohio residents for the past five years), during the summer prior to the internship year, in order to be granted the one-year temporary child study license required for internship.

School Psychology

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>EDC 510</td>
<td>CONSULTATION IN THE SCHOOLS</td>
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<td>EDC 511</td>
<td>SCHOOL PSYCHOLOGY PRACTICUM: CONSULTATION</td>
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<td>EDC 512</td>
<td>COGNITIVE ASSESSMENT FOR INTERVENTION</td>
<td>3</td>
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<td>EDC 513</td>
<td>SCHOOL PSYCHOLOGY PRACTICUM: COGNITIVE AFI</td>
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<td>ACADEMIC ASSESSMENT FOR INTERVENTION</td>
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<td>ACADEMIC AND BEHAVIORAL ASSESSMENT INSTRUMENTS</td>
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<td>SCHOOL PSYCHOLOGY PRACTICUM: SHADOWING</td>
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<td>STATISTICS</td>
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<td>EDC 538</td>
<td>CHILD &amp; ADOLESCENT PSYCHOPATHOLOGY</td>
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<td>EDC 541</td>
<td>CURRICULUM AND INSTRUCTION FOR DIVERSE LEARNERS</td>
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<td>RESEARCH AND EVALUATION IN HUMAN SERVICES</td>
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<td>ROLE AND FUNCTION OF THE SCHOOL PSYCHOLOGIST</td>
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**Ohio Licensure and Completion of Specialist-Level Training**

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<tr>
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<td>EDC 545</td>
<td>COUNSELING TECHNIQUES LAB</td>
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<td>EDC 571</td>
<td>BIOLOGICAL BASES OF BEHAVIOR</td>
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<td>EDC 583</td>
<td>THEORIES AND TECHNIQUES OF GROUP COUNSELING</td>
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<td>EDC 610</td>
<td>SOCIAL BEHAVIORAL ASSESSMENT FOR INTERVENTION</td>
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<td>EDC 611</td>
<td>SCHOOL PSYCHOLOGY PRACTICUM: SOCIAL/BEHAVIORAL AFI</td>
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<td>EDC 612</td>
<td>ASSESSMENT FOR INTERVENTION AND ACCOUNTABILITY</td>
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**Additional Courses**

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<tbody>
<tr>
<td>EDC 539</td>
<td>ADMINISTRATION &amp; ORGANIZATION OF PUPIL PERSONNEL SERVICES</td>
<td>2</td>
</tr>
<tr>
<td>EDC 573</td>
<td>ORIENTATION TO THE SCHOOL PROCESS</td>
<td>1</td>
</tr>
</tbody>
</table>

1Required for students who do not possess a valid Ohio teaching certificate:

Teacher as Child/Youth Development Specialist Program (EDC)

This program is designed to qualify elementary and secondary school teachers for the professional teaching license issued by the Ohio State Department of Education. Teachers are urged to seek approval from their professional development committee as they pursue their graduate studies.

Note: This degree does not lead to obtainment of Ohio's School Counseling license. Students who intend on obtaining this licensure must enroll in the 48 semester hour school counseling master's degree program.

### Teacher as Child/Youth Development Specialist Program

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDC 522</td>
<td>INTRODUCTION TO GUIDANCE AND COUNSELING</td>
<td>3</td>
</tr>
<tr>
<td>EDC 531</td>
<td>PERSONALITY AND HUMAN DEVELOPMENT ACROSS THE LIFESPAN</td>
<td>2</td>
</tr>
<tr>
<td>EDC 535</td>
<td>TEST INTERPRETATIONS AND CASE STUDIES</td>
<td>2</td>
</tr>
<tr>
<td>EDC 568</td>
<td>RESEARCH AND EVALUATION IN HUMAN SERVICES</td>
<td>3</td>
</tr>
<tr>
<td>EDC 673</td>
<td>COUNSELING MULTICULTURAL POPULATIONS</td>
<td>3</td>
</tr>
<tr>
<td>EDC 544</td>
<td>PHILosophical, PROfessional, ETHical &amp; LEGAL ASPECTS IN COUNSELING (EDC 544)</td>
<td>2 - 3</td>
</tr>
<tr>
<td>EDT 502 or</td>
<td></td>
<td></td>
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<tr>
<td>EDT 503</td>
<td>PHILosophical STUDIES IN EDUCATION (EDT 502)</td>
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<tr>
<td>EDT 503</td>
<td>HISTORY OF EDUCATION IN THE UNITED STATES (EDT 503)</td>
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**Child/Youth Development Specialist Core**

<table>
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<tbody>
<tr>
<td>EDC 529</td>
<td>PSYCHOLOGY OF LIFESTYLE AND CAREER DECISION MAKING</td>
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<td>Course Code</td>
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<td>Sem. Hrs.</td>
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<tr>
<td>EDC 532</td>
<td>PSYCHOLOGY OF LEARNING DISABILITIES &amp; OTHER</td>
<td>3</td>
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<tr>
<td></td>
<td>EXCEPTIONALITIES</td>
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<tr>
<td>EDC 543</td>
<td>THEORIES AND TECHNIQUES OF COUNSELING</td>
<td>3</td>
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<tr>
<td>EDC 545</td>
<td>COUNSELING TECHNIQUES LAB</td>
<td>2-3</td>
</tr>
<tr>
<td>EDC 583</td>
<td>THEORIES AND TECHNIQUES OF GROUP COUNSELING</td>
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**Electives**

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<tr>
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<tbody>
<tr>
<td>EDC 523</td>
<td>DELINQUENTS AND JUVENILE COURT</td>
<td>1</td>
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<tr>
<td>EDC 574</td>
<td>INDEPENDENT STUDIES IN COUNSELING</td>
<td>1-3</td>
</tr>
<tr>
<td>EDC 602</td>
<td>COUNSELING SEMINARS</td>
<td>1-6</td>
</tr>
<tr>
<td>EDC 605</td>
<td>PROFESSIONAL SEMINARS</td>
<td>1-6</td>
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</table>

1 Students certified in L.D. will take another counseling course.

**Courses (Collapse All Courses)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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<tbody>
<tr>
<td>EDC 510</td>
<td>CONSULTATION IN THE SCHOOLS</td>
<td>3</td>
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</table>

The role of the school psychologist as a consultant in a school setting is examined with emphasis on acquiring effective consultation skills. A school-based, problem-solving model is presented that requires development of appropriate consultant skills. (Practicum is EDC 511)

| EDC 511 | SCHOOL PSYCHOLOGY PRACTICUM: CONSULTATION   | 1         |
|         | Practicum for EDC 510.                      |           |

| EDC 512 | COGNITIVE ASSESSMENT FOR INTERVENTION       | 3         |

Development of proficiency in administration, scoring, and interpreting intelligence tests to be used in conjunction with other assessment information for completing multifactored evaluations and developing interventions for assisting children and youth, birth through age 21. (Practicum is EDC 513)

| EDC 513 | SCHOOL PSYCHOLOGY PRACTICUM: COGNITIVE AFI  | 1         |
|         | Practicum for EDC 512.                      |           |

| EDC 514 | ACADEMIC ASSESSMENT FOR INTERVENTION        | 3         |

This course provides students with the knowledge and skills necessary for the effective evaluation of the academic strengths and needs of children and youth. The school psychology student will be exposed to the requirements for completing non-discriminatory, multi-factored assessments and intervention-based assessment. The student will learn specific diagnostic and prescriptive techniques that lead to remediation and intervention as well as classification. (Practicum is EDC 515)

| EDC 515 | SCHOOL PSYCHOLOGY PRACTICUM: ACADEMIC AFI   | 1         |
|         | Practicum for EDC 514.                      |           |

| EDC 516 | ACADEMIC AND BEHAVIORAL ASSESSMENT INSTRUMENTS | 3         |

School psychology graduate students learn to administer, score and interpret academic and behavioral instruments. The instruments are limited to those that can be used with pre-school to 12th grade children and adolescents. (Practicum is EDC 517)

| EDC 517 | SCHOOL PSYCHOLOGY PRACTICUM: SHADOWING      | 1         |
|         | Practicum for EDC 516.                      |           |

| EDC 522 | INTRODUCTION TO GUIDANCE AND COUNSELING     | 3         |

This course is designed to assist graduate students in building skills and developing an understanding relative to the guidance and counseling role of human service practitioners. Essentially, this role consists of assisting children, youth, and adults from diverse backgrounds in reaching their maximum academic and personal development within various educational and community settings.

| EDC 523 | DELINQUENTS AND JUVENILE COURT              | 1         |
This course examines (1) the juvenile court system, (2) underlying ideologies and current debates concerning treatment and/or punishment decisions, and (3) children and families at risk of juvenile court involvement.

EDC 524  EDUCATIONAL AND OCCUPATIONAL INFORMATION
Selection, utilization, and evaluation of educational and occupational information materials; familiarization with standard labor market data, current requirements for admission into college, and available sources of placement information.

EDC 525  INDEPENDENT RESEARCH
COMMUNITY RESOURCES: Designed to enable the graduate student to acquire the skills and knowledge needed to develop, organize, and utilize a working resource file of local and national organizations and agencies (medical, pastoral, social welfare, mental, educational, industrial, labor, commercial, governmental, and recreational).

EDC 528  CAREER EDUCATION
Assistance for teachers, counselors, administrators, and social agency personnel in improving their career education functions through a coordinated and concentrated effort of occupational guidance integrated within the total curriculum.

EDC 529  PSYCHOLOGY OF LIFESTYLE AND CAREER DECISION MAKING
Focuses on theories, strategies, information, assessment, and resources to be used in the career counseling of children, youth, and adults.

EDC 531  PERSONALITY AND HUMAN DEVELOPMENT ACROSS THE LIFESPAN
Individual growth and development across the lifespan with emphasis on the dynamic of personal behavior. This course emphasizes the integrating theme that cognitive structure is an important director of human behavior, and that the understanding of personality requires that we understand the role of cognitive structure personality. While this cognitive perspective is emphasized, the course covers a wide range of concerns to the student of personality across the lifespan. It discusses a representative selection of personality theories, personality structure, development, dynamics, maladaptive behavior, and personality change.

EDC 532  PSYCHOLOGY OF LEARNING DISABILITIES & OTHER EXCEPTIONALITIES
Designed to provide an overview of the range of handicapping conditions for which educational program standards have been developed. Emphasis is given to the cognitive and affective impact upon the individual and family.

EDC 535  TEST INTERPRETATIONS AND CASE STUDIES
Understanding of the individual through the appraisal techniques of individual and group testing and case study. Tests include a wide range of educational and psychological instruments. Individual differences influenced by elements such as ethnic, cultural, and gender factors are considered.

EDC 537  STATISTICS
This course provides an introduction to descriptive and inferential statistics and to SPSS. Much of the course learning activities are computer and Web based.

EDC 538  CHILD & ADOLESCENT PSYCHOPATHOLOGY
This course provides an overview of the normal and abnormal development of child and adolescent personality. The use of the DSM-IV is emphasized, and distinctions between disorders and special education disabilities are made. Each of the several aspects of child and adolescent psychopathologies are examined and prevention approaches are introduced.

EDC 539  ADMINISTRATION & ORGANIZATION OF PUPIL PERSONNEL SERVICES
The effective planning, developing, and administering a totally balanced and coordinated program of pupil services.

EDC 541  CURRICULUM AND INSTRUCTION FOR DIVERSE LEARNERS
This course provides students with the foundation knowledge necessary for understanding the diverse learning needs of children and adolescents with handicapping conditions and of children and adolescents who are gifted and talented. Topics include types of handicapping conditions, gifted and talented, instructional settings, curriculum and instructional methods, and classroom management techniques.

EDC 543 THEORIES AND TECHNIQUES OF COUNSELING
Through analysis of varied theoretical models, skills in counseling will be developed in an integrated approach for modifying the behavior or children, youth, and adults through individual and system change.

EDC 544 PHILOSOPHICAL, PROFESSIONAL, ETHICAL & LEGAL ASPECTS IN COUNSELING
Study of philosophical assumptions of the various theories of counseling and psychotherapy. Treatment of counseling ethics and professional practices; laws and court decisions pertaining to counseling.

EDC 545 COUNSELING TECHNIQUES LAB
Supervised experience in counseling. Both group and individualized instruction and supervision. 
Prerequisite(s): EDC 531 and EDC 543

EDC 550 STUDENT DEVELOPMENT THEORY
The study of basic theoretical perspectives underlying college student development and assessment of development to the practice of college student personnel.

EDC 551 APPLICATION OF STUDENT DEVELOPMENT THEORY
In-depth study and critique of selected student and adult development theories, assessment of students' development on those theories, and application to the practice of College Student Personnel.

EDC 553 INTERNSHIP IN COLLEGE STUDENT PERSONNEL
Participate as a professional to gain significant practical experience in a student affairs office under the supervision of a practicing professional. The student is required to take a total of six semester hours over three semesters. Each internship experience must be at a different site.

EDC 554 INTRODUCTION TO HIGHER EDUCATION AND STUDENT AFFAIRS
Comprehensive overview of all academic and non-academic facets of colleges and universities as listed in the Carnegie Classification, in terms of mission, personnel, positions, and procedures.

EDC 555 ADMINISTRATION AND ORGANIZATION OF COLLEGE STUDENT PERSONNEL PROGRAMS
This course deals with issues related to the administration of student personnel programs in colleges and universities and examines the organizational structures associated with the delivery of these programs in the context of current higher education administrative environments.

EDC 556 ADMINISTRATION AND ORGANIZATION IN HIGHER EDUCATION
This course deals with the administration of broad areas of colleges and universities by examining the organizational structure and culture associated with the delivery of programs and services. 
Prerequisite(s): EDC 554

EDC 557 STUDENT CULTURES IN THE UNIVERSITY ENVIRONMENT
In-depth study of college student cultures and their impact on the individual college student experience. Particular attention will be paid to understanding the student culture in student personnel work.

EDC 560 LEADERSHIP IN COLLEGE AND UNIVERSITY ENVIRONMENT
Study of the concepts, literature, and research in leadership and their relationship to the development and maintenance of the organization. Higher education and college student personnel examples will be emphasized.

EDC 561 PLANNING, FINANCE AND EVALUATION IN HIGHER EDUCATION
Study and analysis of the planning, methodologies, financial strategies, and evaluative systems for university systems and subsystems.

**Prerequisite(s):** EDC 554

**EDC 562 INTERVENTIONS IN COLLEGE STUDENT PERSONNEL**

Theories and practice of group interventions in student personnel settings; conceptualization and assessment of interventions appropriate to human and organizational student personnel settings. Course includes development of intervention skills.

**Prerequisite(s):** EDC 554

**EDC 563 LAW AND ETHICS IN HIGHER EDUCATION**

Through study and reflection in the fields of law and ethics, students are asked to consider the kinds of administrative actions that lead people and institutions into court and to develop alternative approaches and attitudes.

**Prerequisite(s):** EDC 554

**EDC 564 PRACTICUM IN HIGHER EDUCATION**

Supervised experience in higher education administration with faculty and on-site supervisor. Topics and requirements will vary with experience and placement area. Designed for students working in full-time positions in higher education settings.

**EDC 566 RESEARCH AND EVALUATION IN HUMAN SERVICES**

This course provides professionals in the public schools, higher education institutions, and community agencies with the basic quantitative and qualitative tools of inquiry and when to use them to answer research questions. Emphasis also includes critiquing research studies and applying research results to practice. College Student Personnel and Higher Education Administration students must be third term.

**EDC 569 SCHOLARLY PROJECT**

A culminating course in which students in their final term integrate, synthesize, and apply the academic work and professional experiences gathered during their program. Students will complete a project designed with the assistance of faculty and campus administrators and present it along with their peers in a supportive learning community. Taken toward the end of the program.

**Prerequisite(s):** EDC 568

**EDC 571 BIOLOGICAL BASES OF BEHAVIOR**

Survey of three biological bases of behavior, including neuropsychology, genetics, and psycho-pharmacology.

**EDC 572 ROLE AND FUNCTION OF THE SCHOOL PSYCHOLOGIST**

Topics of significance in the profession of school psychology, with emphasis on history and foundations of school psychology, legal and ethical issues, professional issues and standards, roles and functions of the school psychologist, and an overview of printed and technological resources in school psychology.

**EDC 573 ORIENTATION TO THE SCHOOL PROCESS**

Directed observation of and participation in the normal school process under supervision within the school. Required of all school psychology candidates who have neither a teaching certificate nor at least two years of successful full-time employment experience serving clients in a human service agency.

**EDC 574 INDEPENDENT STUDIES IN COUNSELING**

Independent study undertaken with permission of the department chair.

**EDC 580 GUIDANCE IN THE ELEMENTARY SCHOOL**

A course for teachers and counselors to discuss concepts and techniques of guidance within the framework of the elementary school. The emphasis is on today's child; child problem situations; theories for understanding child behavior; basic guidance services; roles and responsibilities of personnel; cross-cultural counseling; consulting with parents, teachers, and administrators; record analysis, observation; pupil-participating assessment techniques; and information dissemination and career education.

**EDC 581 TECHNIQUES OF CHILD COUNSELING**

This course focuses on practical counseling, consulting, and intervention techniques for the specific developmental, social, or behavior problems
children experience. The course will provide suggestions for counseling all children, including the exceptional and those who are experiencing special concerns resulting from societal problems.

EDC 583  THEORIES AND TECHNIQUES OF GROUP COUNSELING  3
Course content focuses on the stages, theories, strategies, and applications of the group counseling process.

EDC 584  PRACTICUM IN COUNSELING  2
Supervised practice and observation in group and individual counseling techniques.
Prerequisite(s): EDC 545 and EDC 583

EDC 584  INTERNSHIP IN SCHOOL PSYCHOLOGY  1 - 8
A job-related program for nine months under the immediate supervision of a certified school psychologist. The intern will receive a stipend, made available from the State of Ohio foundation funds.

EDC 598  INTERNSHIP IN COMMUNITY COUNSELING  2
Directed experience in professional functions within cooperating social and clinical agencies in the community. Must be taken three times.
Prerequisite(s): EDC 584 and permission of department chair

EDC 600  CULMINATING SEMINAR  1 - 2
This course prepares students to take a comprehensive examination covering the course content of their masters degree program. In addition for students who will seek certification as school counselors or licensure as professional counselors or professional clinical counselors, the course serves as a preparation for the competency exams related to these credentials.

EDC 602  COUNSELING SEMINARS  1 - 6
A series of specific courses designed to present topics of unique interest to students in a variety of professional areas. Areas often include state-of-the-art assessment and intervention methods presented by community experts.

EDC 605  PROFESSIONAL SEMINARS  1 - 6
Learner-oriented courses in which a group of students focus on a specific topic related to the professional, ethical, or practical applied aspects of clinical counseling as implemented in a clinical setting.

EDC 610  SOCIAL BEHAVIORAL ASSESSMENT FOR INTERVENTION  3
This course and its practicum (EDC 611) provide instruction and practice in the data-based, problem-solving, intervention-based assessment of the social and behavioral functioning of preschool children and of school-age children and adolescents. Course content includes various models and methods of assessment, sources of assessment data, and intervention planning.

EDC 611  SCHOOL PSYCHOLOGY PRACTICUM: SOCIAL/BEHAVIORAL
Practicum for EDC 610.

EDC 612  ASSESSMENT FOR INTERVENTION AND ACCOUNTABILITY  3
The focus of this course is accountability in the schools with emphases on legal bases, standards of practice, individual and group accountability, and program evaluation. In addition, the school psychology research project will be completed during this course. (Practicum is EDC 613)

EDC 613  SCHOOL PSYCHOLOGY PRACTICUM: ACCOUNTABILITY
Practicum for EDC 612.

EDC 615 CULMINATING SEMINAR

EDC 623 FOUNDATIONS IN ABNORMAL PSYCHOLOGY
Description of the specific aspects of personality theory and cultural and biological factors that lead to an understanding of abnormal behavior and psychopathology as it affects a wide range of individuals from children through the aged. The relevance of these concepts and theories to clinical counseling is explored. This course incorporates theory (quantitative) and group exercises (qualitative and performative knowledge).
Prerequisite(s): EDC 531

EDC 630 EVALUATION OF EMOTIONAL AND MENTAL CONDITION
Includes the use of assessment procedures in diagnosis, treatment planning, and outcome measurement. Methods of administering and interpreting individual and group standardized tests of mental ability interest and personality are emphasized.
Prerequisite(s): Completion of master's degree in Community Counseling

EDC 631 DIAGNOSIS OF EMOTIONAL AND MENTAL DISORDERS
Presentation of the mental status exam and other means of developing a diagnosis as described in the current edition of the "Diagnostic and Statistical Manual for Mental Disorders." Special problems including mental retardation, psychosexual disorders, substance abuse, and addiction are also considered. This course incorporates theory (quantitative knowledge) and case studies (qualitative and performative knowledge). The use of the diagnosis in developing treatment plans will be emphasized.
Prerequisite(s): EDC 623

EDC 635 MARRIAGE AND FAMILY COUNSELING
This course is designed to introduce students to systems theory, the dynamics of human relationships, theories and techniques of marital and family counseling, and professional and legal issues in marital and family counseling. Students will acquire skills and understanding relative to the role of the counselor in assisting families to develop new strategies, solve problems, and facilitate individual and family growth.

EDC 655 CAREER GUIDANCE INSTITUTE
Designed to assist counselors, teachers, and administrators implement an effective career guidance program and promote a positive working relationship between education and business and industry leaders.

EDC 673 COUNSELING MULTICULTURAL POPULATIONS
Designed to develop sensitivity and awareness in human diversity; introduce multicultural concepts, competencies, and research; and provide an experiential component.

EDC 681 INTEGRATIVE APPROACH TO CLINICAL COUNSELING
Assistance for the students in selecting that theory or those aspects of various theories of clinical counseling that best characterize their approach to clients. Emphasis is on the integration of theories with the counselor's personal characteristics and experience. This includes emphasis on self-reflection (qualitative knowledge), theory (quantitative knowledge), and counseling exercises (performative knowledge).
Prerequisite(s): Completion of master's degree in Community Counseling

EDC 683 TREATMENT OF MENTAL AND EMOTIONAL DISORDERS
Presentation of methods used in treatment and management of mental disorders including treatment planning, counseling techniques, record keeping, referral procedures, and use of psychotropic medication.
Prerequisite(s): Completion of master's degree in Community Counseling

EDC 690 INTERNSHIP IN CLINICAL COUNSELING
Supervised experience in a field placement setting that specializes in the evaluation and treatment of persons with emotional and mental disorders. Incorporates on-site experience with a self-reflection model and case presentations in a senior format (qualitative and quantitative knowledge).
Prerequisite(s): Completion of master's degree in Community Counseling
EDC 695 COUNSELOR SUPERVISION
Theories of counseling supervision practice standards, ethical and multicultural issues related to supervising counselor trainees and counselors in general.
Prerequisite(s): Completion of master's degree in Community Counseling

EDC 700 SCHOLARLY PROJECT
To familiarize the student with the scientific literature of the counseling profession in a more focused way and utilize their research of the literature in one of three specific alternatives: (1) Thesis - literature search and inquiry; (2) Project of Excellence - literature search and counseling competence; (3) Transformative project - literature search and social action application.

EDC 710 INTERNSHIP IN SCHOOL PSYCHOLOGY
A nine-month, 1200-hour field experience under the direct supervision of certified school psychologists as well as the supervision of university faculty.

EDC 711 INTERNSHIP IN SCHOOL PSYCHOLOGY
A nine-month, 1200-hour field experience under the direct supervision of certified school psychologists as well as the supervision of university faculty.

EDC 712 INTERNSHIP IN SCHOOL PSYCHOLOGY
A nine-month, 1200-hour field experience under the direct supervision of certified school psychologists as well as the supervision of university faculty.

EDC 800 THESIS
School of Education and Allied Professions
(EDA) Educational Leadership (Collapse Description)

Rev. Joseph Massucci, Chair of the Department

The primary mission of the Department of Educational Leadership is to prepare individuals to be educators and scholar-practitioners who will understand and be able to implement a leadership role. The department is committed to productive scholarship, effective teaching, disciplined inquiry, collaborative learning, and the acceptance, in an academic sense, of divergent views.

The Department of Educational Leadership is committed to providing quality instruction and support to individuals who (1) have demonstrated leadership potential within an educational setting and have expressed interest in pursuing a master's degree in educational leadership, or (2) hold a master's degree and wish to pursue a specific administrative licensure program, or (3) are interested in earning the Educational Specialist degree or the Ph.D., or (4) wish to improve their educational leadership knowledge and skills.

Advising

Upon acceptance into the program, the student will be assigned a faculty advisor who will be available to assist the student with information relative to their course of study.

Programs (Collapse All)

Program Name
Curriculum, Instruction, and Professional Development Licensure (CIPD) (EDA)

A total of 42 semester hours is required to obtain the curriculum, instruction, and professional development licensure. Students may earn this licensure by completing the educational leadership master's degree, or its equivalent, plus 12 additional semester hours of coursework as listed below.

<table>
<thead>
<tr>
<th>CIPD</th>
<th>Sem. Hrs.</th>
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<tr>
<td>EDA 710 CURRICULUM EVALUATION AND INSTRUCTION</td>
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<td>EDA 711 CURRICULUM DEVELOPMENT AND LEADERSHIP</td>
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<td>EDA 712 PROGRAM AND STAFF DEVELOPMENT</td>
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<tr>
<td>EDU 808 IDEAS THAT SHAPE AMERICAN EDUCATION</td>
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</table>

Educational Specialist in Educational Leadership (EDA)

Rev. Joseph Massucci, Program Director

The educational specialist degree is offered jointly by the Graduate Schools of the University of Dayton and Wright State University.

This post-master's educational specialist degree, Ed.S., program is designed to enhance individual capabilities for educational leadership for school administrators. The areas of staff/organizational development, program development and evaluation, law/finance/facilities, public relations, and research are included. Emphasis is given to preparing individuals for central office positions.

A planned program of study requires a minimum of 33 semester hours of graduate work beyond the master's degree. The program may be completed either at the University of Dayton or at Wright State University. Previous post-master's coursework may be transferred into the program if it supports the objectives of the overall program.
### Educational Leadership

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
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<td>EdS PROJECT SEMINAR</td>
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<td>EDA 812</td>
<td>PROGRAM AND STAFF DEVELOPMENT</td>
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<tr>
<td>EDA 818</td>
<td>THE SUPERINTENDENCY</td>
<td>3</td>
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<tr>
<td>EDA 833</td>
<td>INTERNSHIP III</td>
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<tr>
<td>EDA 850</td>
<td>SCHOOL IMPROVEMENT</td>
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<td>EDA 851</td>
<td>RESEARCH</td>
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<td>EDA 855</td>
<td>LEGAL ISSUES IN SCHOOL LEADERSHIP</td>
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<td>EDU 808</td>
<td>IDEAS THAT SHAPE AMERICAN EDUCATION</td>
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<td>EDA 810</td>
<td>CURRICULUM EVALUATION &amp; INSTRUCTION</td>
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<td>EDA 816</td>
<td>BUSINESS AFFAIRS AND PHYSICAL RESOURCES</td>
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<tr>
<td>EDA 854</td>
<td>ISSUES IN SCHOOL FINANCE AND ECONOMICS</td>
<td>3</td>
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<tr>
<td>EDA 856</td>
<td>CONTRACT ISSUES IN SCHOOL LEADERSHIP</td>
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<tr>
<td>EDA 857</td>
<td>DECISION MAKING</td>
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<tr>
<td>EDA 858</td>
<td>THE POLITICS OF EDUCATIONAL LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>EDA 859</td>
<td>THE LAW OF SPECIAL EDUCATION</td>
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**Electives**

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<tr>
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<td>BUSINESS AFFAIRS AND PHYSICAL RESOURCES</td>
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<td>EDA 854</td>
<td>ISSUES IN SCHOOL FINANCE AND ECONOMICS</td>
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1. EDA 859 may be substituted as a required course.
2. EDU 813 may be substituted as a required course.

*Master of Science in Educational Leadership (EDA)*

To earn a Master of Science in education degree in educational leadership, the student is required to complete a minimum of 30 semester hours and achieve a grade point average of 3.0 or better from the following courses.

The Department of Educational Leadership offers a three-summer program for educators who wish to pursue a master's degree in educational leadership with a concentration in Catholic school leadership. For further information on this program, contact the department office at (937) 229-3737.

### Educational Leadership

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDA 505</td>
<td>EDUCATIONAL LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>EDA 507</td>
<td>INTERNSHIP I</td>
<td>3</td>
</tr>
<tr>
<td>EDA 509</td>
<td>SUPERVISION &amp; PROFESSIONAL DEVELOPMENT</td>
<td>3</td>
</tr>
<tr>
<td>EDA 510</td>
<td>INSTRUCTIONAL LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>EDA 511</td>
<td>CURRICULUM</td>
<td>3</td>
</tr>
<tr>
<td>EDA 515</td>
<td>SCHOOL LAW</td>
<td>3</td>
</tr>
<tr>
<td>EDA 551</td>
<td>RESEARCH</td>
<td>3</td>
</tr>
<tr>
<td>EDA 555</td>
<td>COMMUNITY RELATIONS FOR SCHOOL LEADERS</td>
<td>3</td>
</tr>
<tr>
<td>EDA 556</td>
<td>LEADERShip IN DIVERSE COMMUNITIES</td>
<td>3</td>
</tr>
<tr>
<td>EDA 557</td>
<td>SCHOOL FINANCE</td>
<td>3</td>
</tr>
</tbody>
</table>

1. EDT 502 Philosophical Studies in Education or EDT 503 History of Education may substitute for EDA 505

*Ph.D. in Educational Leadership (EDA)*

A. William Place, Program Director

The Ph.D. program in educational leadership is designed for educators who are committed to providing leadership at elementary, secondary, and collegiate levels. The program seeks to prepare scholar-practitioners, leaders who:

1. value both speculative and practical knowledge and engage in continuous inquiry on professional concerns;

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000481&p=-1&c=-1 7/10/2012
2. deliberate with colleagues upon organizational purposes and the means for achieving them;
3. work selflessly with others; and
4. commit themselves to improving the quality of life within society.

The Ph.D. Program in Educational Leadership offers a choice of two different concentration areas:

- P-12 School Administration - The concentration in school administration is designed to prepare educators for the following types of positions: administrative roles in elementary and secondary education, educational researchers, consultants, or professor of school administration. Students pursuing this concentration may opt to take additional courses to meet the requirements for a principal's license and a superintendent's license.

Concentration Coordinator - Dr. Theodore Kowalski

- Higher Education - This specialization consists of a six-course sequence probing the important literature, concepts and practices in higher education. Using reflective inquiry to generate right questions, moral inquiry to ground decisions, and action inquiry to guide praxis, this program models an on-going transformative process.

Concentration Coordinator - Dr. Darla Twale

Coursework

Formal coursework in the program is organized around the concepts of research, foundations, and organizational behavior. Coursework in an academic field outside of education is also encouraged. Minimum requirements are listed below:

Research - 12 semester hours
Dissertation - 9 semester hours
Foundations - 6 semester hours
Organizational Principles and Issues - 6 semester hours
Program Concentration - 21 semester hours
Cognate - 9 semester hours
Total - 63 semester hours

Residency

Residency is completed during the first three consecutive terms (fall, winter, summer) following admission to the program; a minimum of six semester hours of coursework must be completed in each of these terms.

Qualifying Examination

In addition to completing course-work and residency requirements, students will successfully complete written and oral examinations based on the content of their coursework and dissertation research topics.

Principal Licensure (EDA)

A total of 45 semester hours is required to obtain principal licensure. Students may earn this licensure by completing the educational leadership master's degree, or its equivalent, plus 15 additional semester hours of coursework as listed below.

Students are also required to have a passing score on the Praxis II State exam (see department handbook for further information) and provide evidence of 27 months of satisfactory teaching experience under a standard teaching certificate, of which at least 18 months must be on the level for which the license is sought.

The Department of Educational Leadership offers a summer program for educators who wish to pursue principal licensure with a concentration in Catholic school leadership.

<table>
<thead>
<tr>
<th>Principal</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>EDA 607</td>
<td>INTERNSHIP II 3</td>
</tr>
<tr>
<td>EDA 610</td>
<td>CURRICULUM DEVELOPMENT 3</td>
</tr>
<tr>
<td>EDA 626</td>
<td>STAFF PERSONNEL 3</td>
</tr>
<tr>
<td>EDA 851</td>
<td>SCHOOL IMPROVEMENT 3</td>
</tr>
<tr>
<td>EDA 855</td>
<td>PRINCIPALSHIP 3</td>
</tr>
</tbody>
</table>

Staff Personnel Administration Licensure (EDA)
A total of 57 semester hours is required to obtain staff personnel administration licensure. Students may earn this licensure by completing the educational leadership master's degree and the Principal Licensure program, or their equivalent, plus 12 additional semester hours of coursework as listed below.

<table>
<thead>
<tr>
<th>Staff Personnel Administration</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDA 712 PROGRAM AND STAFF DEVELOPMENT</td>
<td>3</td>
</tr>
<tr>
<td>EDA 755 LEGAL ISSUES IN SCHOOL LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>EDA 756 CONTRACT ISSUES IN SCHOOL LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>EDC 583 THEORIES AND TECHNIQUES OF GROUP COUNSELING</td>
<td>3</td>
</tr>
</tbody>
</table>

Superintendent Licensure (EDA)

A total of 60 semester hours is required to obtain superintendent licensure. Students may earn this licensure by completing the educational leadership master's degree and the Principal Licensure program, or their equivalent, plus 15 additional semester hours from the coursework listed below.

Students are also required to provide evidence of 27 months of satisfactory experience in an administrative position under the appropriate administrative license.

<table>
<thead>
<tr>
<th>Superintendent</th>
<th>Sem. Hrs.</th>
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<tbody>
<tr>
<td>EDA 718 THE SUPERINTENDENCY</td>
<td>3</td>
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</tbody>
</table>

Select four courses from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDA 716</td>
<td>BUSINESS AFFAIRS AND PHYSICAL RESOURCES</td>
<td>3</td>
</tr>
<tr>
<td>EDA 754</td>
<td>ISSUES IN SCHOOL FINANCE AND ECONOMICS</td>
<td>3</td>
</tr>
<tr>
<td>EDA 755</td>
<td>LEGAL ISSUES IN SCHOOL LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>EDA 757</td>
<td>DECISION MAKING</td>
<td>3</td>
</tr>
<tr>
<td>EDA 758</td>
<td>THE POLITICS OF EDUCATIONAL LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>EDA 759</td>
<td>THE LAW OF SPECIAL EDUCATION</td>
<td>3</td>
</tr>
</tbody>
</table>

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>EDA 505</td>
<td>EDUCATIONAL LEADERSHIP</td>
<td>3</td>
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</table>

The focus of this course is leadership within schools and the role of the educational leader as scholar/practitioner emphasizing excellence in the educational organization through the effective integration of theory and practice.

<table>
<thead>
<tr>
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<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>EDA 507</td>
<td>INTERNSHIP I</td>
<td>3</td>
</tr>
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</table>

This course provides opportunities for the student to experience administrative responsibilities. Emphasis is placed on practicing the skills learned in the master's program, receiving feedback on efforts, and relating practice to theory.

Prerequisite(s): EDA 551

<table>
<thead>
<tr>
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<th>Title</th>
<th>Sem. Hrs.</th>
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<tbody>
<tr>
<td>EDA 509</td>
<td>SUPERVISION &amp; PROFESSIONAL DEVELOPMENT</td>
<td>3</td>
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</table>

This course in the theory and practice of supervision is designed to explore essential concepts and skills necessary in providing leadership in the area of formative and summative evaluation for the improvement of teaching and learning. Emphasis will be placed on concepts and means of the scholar-practitioner providing leadership in the supervisory task areas and building learning communities through critical reflection.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>EDA 510</td>
<td>INSTRUCTIONAL LEADERSHIP</td>
<td>3</td>
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</table>

The course focus is on developing knowledge, skills, attitudes, and values essential in helping others to expand/refine their instructional effectiveness. Emphasis is placed on helping teachers use alternating models of instruction, diagnosing learner needs, prescribing appropriate learner
instructional strategies, and accommodating learner needs based upon the concept of diversity.

EDA 511 CURRICULUM
The focus of this course is on the development of an understanding of the history, purposes, and practices of the school curriculum. Within the course, emphasis is placed on helping students personally integrate the scholarly and practical dimensions and on demonstrating that integration.

EDA 515 SCHOOL LAW
This course addresses legal issues pertinent to teacher, administrator, and student legal rights and responsibilities in the school building. The legal process, structures of the law, legislation/litigation, and practices to avoid legal infringements are addressed.

EDA 540 INSTRUCTIONAL STRATEGIES
Contemporary research on teaching in physical education, sport instruction, and an in-depth study of Mosston’s Spectrum of Teaching Styles serve as the primary foci of this course.

EDA 551 RESEARCH
This course will equip school leaders with the tools of research. Emphasis will be placed on becoming frequent and knowledgeable users of research on schools, developing skills in critiquing research, and applying the tools of research to address issues that face school leaders. This course is a prerequisite for EDA 507.

EDA 555 COMMUNITY RELATIONS FOR SCHOOL LEADERS
This course is designed to assist school administrators in refining their communication skills and political understanding. Provisions are made for the development of guidelines, techniques, and practices that facilitate wholesome relationships between school and community.

EDA 556 LEADERSHIP IN DIVERSE COMMUNITIES
This course will promote understanding of differences in race, gender, social class, religious affiliation, and sexual orientation and the implications of these differences for leadership in the school setting. Emphasis will be on promoting understanding and managing diversity within schools as learning organizations.

EDA 557 SCHOOL FINANCE
This course addresses topics such as equity, adequacy, efficiency in school funding; local, state, and federal funding sources; funding methods; and budgeting emphasizing features unique to Ohio.

EDA 607 INTERNSHIP II
The internship is intended to provide the participant an opportunity to relate the coursework, research, simulation, and independent study in which he/she has engaged to actual problems encountered in administering the elementary or secondary school building/program.

EDA 610 CURRICULUM DEVELOPMENT
This course emphasizes the application of leadership principles to the process of curriculum development, and extends the student's knowledge base in the area of curriculum. The major focus is on the concerns and needs for curriculum development for the building principal.

EDA 626 STAFF PERSONNEL
This course emphasizes the systematic selection, evaluation, assignment and development of both professional and classified school personnel. Scholar-practitioners participating in this class will develop an understanding of the associated task areas.

EDA 651 SCHOOL IMPROVEMENT
A major focus is placed on school improvement processes and visioning the kind of schooling needed by children in the 21st Century. This course emphasizes the development of the fundamental concepts, stages/processes, and procedures concerning the school improvement change process as it applies to individual school settings. Focus will be upon change models, processes and skills, the place of strategic planning.
change, and using organizational development precepts to help individual school buildings grow and develop.

EDA 655 PRINCIPALSHIP
This course centers on the application of leadership and management principles to the elementary, middle, and secondary school settings. Emphases include developing vision and mission statements, reflecting on the leadership role of the principal, and reviewing the process for the daily administration of the total school program.

EDA 710 CURRICULUM EVALUATION AND INSTRUCTION
This course is designed to refine participant understanding of the realms of meaning, characteristics of effective programs, research findings on effective instruction, and curriculum management.

EDA 711 CURRICULUM DEVELOPMENT AND LEADERSHIP
The major focus of the course will be how an educational leader at the district level designs and implements curriculum based upon philosophical, psychological, and historical underpinnings of curriculum theory. A recurring focus in the course is the relationship of practice and scholarship and practice and theory as the educational leader creates a learning community.

EDA 712 PROGRAM AND STAFF DEVELOPMENT
This course is designed to strengthen student competence with program development and evaluation processes. Major emphasis is focused on staff development planning, program implementation, and program assessment.

EDA 712 PROGRAM AND STAFF DEVELOPMENT
See previously listed course description.

EDA 716 BUSINESS AFFAIRS AND PHYSICAL RESOURCES
The student examines the fiscal operation of school districts from a business affairs point of view, as well as the proper use of the school district's physical resources. Energy conservation, facilities for the handicapped, and construction of new facilities are discussed.

EDA 718 THE SUPERINTENDENCY
This course addresses the duties and responsibilities of central office administrators, especially those of the superintendent. Emphasis is placed on board of education relations, communication, and an analysis of the political structures within which the superintendent operates.

EDA 754 ISSUES IN SCHOOL FINANCE AND ECONOMICS
This course emphasizes the complexities pervasive in the world of public school finance. It is topic focused and designed to promote thoughtful decision making by school administrators with respect to school fiscal matters. Topics vary from term to term.

EDA 755 LEGAL ISSUES IN SCHOOL LEADERSHIP
This course addresses the statutes and judicial decisions which relate to schools and the responsibilities of boards of education, teachers, and administrators. Emphasis is placed on understanding the legal framework as it relates to providing quality education.

EDA 755 LEGAL ISSUES IN SCHOOL LEADERSHIP
See previously listed course description.

EDA 756 CONTRACT ISSUES IN SCHOOL LEADERSHIP
This course provides students with a history of the development of collective bargaining, the procedures and techniques of collective bargaining and contract management, and the role and responsibilities of administrators in carrying out these functions.

EDA 757 DECISION MAKING
The course's primary purpose is to have students develop an understanding of the art and science of decision making in the contexts of personal philosophy, the professional knowledge base, and practice.

EDA 758 THE POLITICS OF EDUCATIONAL LEADERSHIP
In this course practicing administrators will study the politics of education at all levels of the complex U.S. educational system. The micropolitics of the school site will also be studied, as will the political momentum behind educational trends. The effect of the political web of education on policymaking and administration will be analyzed. The goal of excellence in education for every child will be emphasized.

EDA 759  THE LAW OF SPECIAL EDUCATION
A review of pertinent legislation and litigation and litigation impacting on the rights of parents, students, and teachers involved in the process of providing a free appropriate public education for children with disabilities. Emphasis is placed on how teachers can, through an understanding of the law, facilitate active parent participation in the developmental progress of students. Teachers' specific responsibilities are described in relation to current requirements for development of appropriate educational programs.

EDA 807  EdS PROJECT SEMINAR
Completion of the research project is an integral part of this degree program. Students earn three semester hours of credit for the completion of their research project. This project will relate to the individual's coursework, interest, and work responsibilities.

EDA 810  CURRICULUM EVALUATION & INSTRUCTION
See EDA 710.

EDA 811  CURRICULUM DEVELOPMENT AND LEADERSHIP
See EDA 711.

EDA 812  PROGRAM AND STAFF DEVELOPMENT
See EDA 712.

EDA 816  BUSINESS AFFAIRS AND PHYSICAL RESOURCES
See EDA 716.

EDA 818  THE SUPERINTENDENCY
See EDA 718.

EDA 833  INTERNSHIP III
This experience is intended to provide the participant with an opportunity to relate the coursework, research, simulation, and independent study in which he/she has engaged to actual problems encountered in administration.

EDA 850  SCHOOL IMPROVEMENT
See EDA 651.

EDA 851  RESEARCH
This course is designed to provide practical application and issues in research as they relate to the educational leader. The objective of the course is the development of a proposal to conduct a research project which the student will finish prior to completion of the Educational Specialist degree program.

EDA 854  ISSUES IN SCHOOL FINANCE AND ECONOMICS
See EDA 754.

EDA 855  LEGAL ISSUES IN SCHOOL LEADERSHIP
See EDA 755.

EDA 856  CONTRACT ISSUES IN SCHOOL LEADERSHIP
See EDA 756.

EDA 857  DECISION MAKING
See EDA 757.

EDA 858  THE POLITICS OF EDUCATIONAL LEADERSHIP
See EDA 758.

EDA 859  THE LAW OF SPECIAL EDUCATION
See EDA 759.

EDU 801 INQUIRY, THEORY, AND QUALITATIVE RESEARCH
This course emphasizes the design of studies and the issues faced by researchers using qualitative methods. Focus is on field work methods in educational settings, specifically observation, interviewing, collecting written documents, using questionnaires, and data reduction and analysis. Also offered as EDU 901.

EDU 802 INTRODUCTION TO QUANTITATIVE RESEARCH AND STATISTICS
Course is designed to provide an introduction to the methods and techniques used in quantitative research methodology. No previous research or statistical background is assumed. Also offered as EDU 902.

EDU 808 IDEAS THAT SHAPE AMERICAN EDUCATION
Provides students the historical bases for policy decisions. The primary expectation is that students learn to use the history of education as a foundation for policy making. Also offered as EDU 908.

EDU 810 HUMANITIES IN EDUCATIONAL LEADERSHIP
In this doctoral seminar, students analyze humanities texts pertinent to the development of educational leaders. Particular attention is given to the function of narrative in moral inquiry and development.

EDU 811 INTELLECTUAL ISSUES IN THE DISCIPLINES
Prospective leaders will become familiar with intellectual issues in the realms of meaning so that they may lead their school faculties in examining the curricular implications of these issues. Also offered as EDU 911.

EDU 812 CULTURE OF THE SCHOOLS
Examination of the school culture and an analysis of how social, political, and environmental influences affect student behavior and teacher and administrator practices. Also offered as EDU 912.

EDU 813 HISTORY OF EDUCATIONAL ADMINISTRATION
A historical introduction to the development of educational administration as a profession; emphasis is placed on development of the knowledge base and its applicability to leaders who choose to be scholar-practitioners. Also offered as EDU 913.

EDU 821 ORGANIZATIONAL THEORY
Development of organizational concepts that will help educational leaders become skilled organizational diagnosticians. Emphasis will be centered upon organizational behavior and how the leader can use the theories and research of the field in dealing with problems involving people. Also offered as EDU 921.

EDU 841 HISTORY, PHILOSOPHY, AND CURRICULUM OF HIGHER EDUCATION
This course examines the evolution of higher education in the United States from the colonial era to the present. Particular attention is given to the purpose(s) and curriculum of higher education as they evolved in American society. Also offered as EDU 941.

EDU 842 STUDENT CHOICE IN HIGHER EDUCATION
This course examines the factors that influence student choice in higher education, including decisions about attending college, which college to attend, program of study, persistence, and graduate education. The ways in which student choice research can inform the development and refinement of enrollment management, student support services, and academic program development will also be analyzed and discussed. Also offered as EDU 942.

EDU 843 CRITICAL REFLECTION IN HIGHER EDUCATION LEADERSHIP
This course examines the convergence between the literature on reflective practice, leadership theory, and leadership in higher education. Particular attention is given to the role of critical reflection in improving the practice of leadership in higher education. Also offered as EDU 943.

EDU 844 BUILDING LEARNING COMMUNITIES IN HIGHER EDUCATION
This course examines the literature on governance in higher education, financial management in higher education, and the use of action inquiry methods. Also offered as EDU 944.

EDU 845  PUBLIC POLICY IN HIGHER EDUCATION  3
This course examines the literature on public policy, public finance of higher education, and critical social issues in higher education. It will explore the role of government agencies in the funding and regulation of financial and social issues in higher education. Also offered as EDU 945.

EDU 846  LEGAL ISSUES IN HIGHER EDUCATION  3
This course examines the literature on the law and higher education. It will provide a perspective on what active higher education administrators need to know about legal issues. Also offered as EDU 946.

EDU 848  THE PROFESSORATE  3
This course explores the historical development and cultural foundations of the faculty role, especially the socialization process, values, work styles, career patterns, and the labor market. Research on the issues that impact faculty at all types of academic institutions is discussed. Also offered as EDU 947.

EDU 870  PHILOSOPHY OF EDUCATION SEMINAR  2
Study of classic and contemporary philosophical texts that address educational leadership issues from the perspective of a particular philosophical tradition, focus, or field.

EDU 890  CATHOLIC PHILOSOPHY OF EDUCATION SEMINAR  2
Study of classic and contemporary philosophical texts that address educational issues from the perspective of the Catholic intellectual tradition.

EDU 901  INQUIRY, THEORY, AND QUALITATIVE RESEARCH  3
This course emphasizes the design of studies and the issues faced by researchers using qualitative methods. Focus is on field work methods in educational settings, specifically observation, interviewing, collecting written documents, using questionnaires, and data reduction and analysis. Also offered as EDU 801.

EDU 902  INTRODUCTION TO QUANTITATIVE RESEARCH AND STATISTICS  3
Course is designed to provide an introduction to the methods and techniques used in quantitative research methodology. No previous research or statistical background is assumed. Also offered as EDU 802.

EDU 903  STATISTICS AND ADVANCED RESEARCH  3
Course is designed to extend the focus of EDU 902 with particular emphasis on experimental design methodology and the use of computer programs in analyzing research data.

EDU 904  DISSERTATION  9
Course is designed to provide each Ph.D. candidate the opportunity to pursue, with faculty guidance and support, inquiry on a topic of personal significance which also promises to add to the knowledge base of the profession. 
Prerequisite(s): successful completion of comprehensive examination

EDU 905  CAPSTONE RESEARCH IN EDUCATIONAL LEADERSHIP  3
This is a seminar for doctoral students to learn about the dissertation process, committee member roles, and how all these factor into dissertation development and defense. Selected topics and the research questions must be approved by the student's chair. Students will produce a draft, Introduction, Review of Literature, and Method sections of their dissertation in preparation for presentation to their committee.

EDU 908  IDEAS THAT SHAPE AMERICAN EDUCATION  3
Provides students the historical bases for policy decisions. The primary expectation is that students learn to use the history of education as a foundation for policy making. Also offered as EDU 808.

EDU 911  INTELLECTUAL ISSUES IN THE DISCIPLINES  3
Prospective leaders will become familiar with intellectual issues in the realms of meaning so that they may lead their school faculties in examining the curricular implications of these issues. Also offered as EDU 811.

EDU 912 CULTURE OF THE SCHOOLS
Examination of the school culture and an analysis of how social, political, and environmental influences affect student behavior and teacher and administrator practices. Also offered as EDU 812.

EDU 913 HISTORY OF EDUCATIONAL ADMINISTRATION
A historical introduction to the development of educational administration as a profession; emphasis is placed on development of the knowledge base and its applicability to leaders who choose to be scholar-practitioners. Also offered as EDU 813.

EDU 914 ETHICS IN EDUCATIONAL LEADERSHIP
In this doctoral seminar, students carefully examine the moral dimension of decision-making in educational leadership. Particular attention is given to the development of a model for the articulation of moral views and its application to case situations.

EDU 919 INDEPENDENT STUDY
By permission of the program director only.

EDU 921 ORGANIZATIONAL THEORY
Development of organizational concepts that will help educational leaders become skilled organizational diagnosticians. Emphasis will be centered upon organizational behavior and how the leader can use the theories and research of the field in dealing with problems involving people. Also offered as EDU 821.

EDU 922 ORGANIZATIONAL CHANGE AND DEVELOPMENT
Development of the fundamental concepts and procedures relative to effective planning. Applications of these concepts will also be made to program development and evaluation.

EDU 941 HISTORY, PHILOSOPHY, AND CURRICULUM OF HIGHER EDUCATION
This course examines the evolution of higher education in the United States from the colonial era to the present. Particular attention is given to the purpose(s) and curriculum of higher education as they evolved in American society. Also offered as EDU 841.

EDU 942 STUDENT CHOICE IN HIGHER EDUCATION
This course examines the factors that influence student choice in higher education, including decisions about attending college, which college to attend, program of study, persistence, and graduate education. The ways in which student choice research can inform the development and refinement of enrollment management, student support services, and academic program development will also be analyzed and discussed. Also offered as EDU 842.

EDU 943 CRITICAL REFLECTION IN HIGHER EDUCATION LEADERSHIP
This course examines the convergence between the literature on reflective practice, leadership theory, and leadership in higher education. Particular attention is given to the role of critical reflection in improving the practice of leadership in higher education. Also offered as EDU 843.

EDU 944 BUILDING LEARNING COMMUNITIES IN HIGHER EDUCATION
This course examines the literature on governance in higher education, financial management in higher education, and the use of action inquiry methods. Also offered as EDU 844.

EDU 945 PUBLIC POLICY IN HIGHER EDUCATION
This course examines the literature on public policy, public finance of higher education, and critical social issues in higher education. It will explore the role of government agencies in the funding and regulation of financial and social issues in higher education. Also offered as EDU 845.

EDU 946 LEGAL ISSUES IN HIGHER EDUCATION

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000481&p=-1&c=-1 7/10/2012
This course examines the literature on the law and higher education. It will provide a perspective on what active higher education administrators need to know about legal issues. Also offered as EDU 846.

EDU 947 THE PROFESSORIATE
This course explores the historical development and cultural foundations of the faculty role especially the socialization process, values, work styles, career patterns, and the labor market. Research on the issues that impact faculty at all types of academic institutions is discussed. Also offered as EDU 847.

EDU 990 CATHOLIC EDUCATION
AN ANALYSIS OF CHURCH DOCUMENTS AND COMMENTARIES: Study of the development of the history, principles, and issues of Catholic social teaching.

EDU 991 CATHOLIC SCHOOL
HISTORY AND FUTURE: Study of the history of the United States Catholic schools, elementary through university, within the political, social, economic, and religious context.

EDU 993 EFFECTIVE CATHOLIC SCHOOLS
Study of the application of leadership theory and behavior in the Catholic school setting.
School of Engineering
(ECE) Electrical and Computer Engineering

Partha P. Banerjee, Chair of the Department

Programs

Program Name

Doctorate of Engineering in Electrical and Computer Engineering (ECE)

See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Doctorate of Philosophy in Electrical and Computer Engineering (ECE)

See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Master of Science in Electrical and Computer Engineering (ECE)

The program of study leading to the Master of Science in electrical engineering must include a minimum of 30 semester hours of credit consisting of the following.

1. At least nine semester hours in electrical engineering core courses approved by the advisor/advisory committee, to be selected from:
   - ECE 501 Contemporary Digital Systems
   - ECE 503 Random Processes
   - ECE 506 Microelectronic Devices
   - ECE 507 Electromagnetic Fields I
   - ECE 509 Analysis of Linear Systems

2. At least nine semester hours in a concentration area such as telecommunications, signals & systems, and digital systems, or as approved by the advisor/advisory committee.

3. At least six semester hours of selected technical electives. Selected courses must be approved by the advisor.

4. Six semester hours on an approved thesis or six hours of additional electrical engineering coursework. Students receiving 50% assistantship/stipend over one academic year or more will be required to pursue the thesis option.

See also Master's Degree Requirements in section X, School of Engineering in General Information.

Courses

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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<tr>
<td>ECE 501</td>
<td>CONTEMPORARY DIGITAL SYSTEMS</td>
<td>3</td>
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<td></td>
<td>Introduction to sequential logic; state machines; high-performance digital systems: theory and application of modern design; alternative implementation forms and introduction to HDL; productivity, recurring and non-recurring costs, flexibility, and testability; software drivers; hardware/software integration. <strong>Prerequisite(s):</strong> ECE 215 or equivalent</td>
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</tr>
<tr>
<td>ECE 503</td>
<td>RANDOM PROCESSES</td>
<td>3</td>
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<tr>
<td></td>
<td>An introduction to random variables and processes as applied to system theory, communications, signal processing and controls. Topics include probability, random variables and processes, autocorrelation, power spectral</td>
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</tbody>
</table>
density and linear system theory with random inputs. Applications in filtering and estimation.

**Prerequisite(s):** ECE 202 and ECE 211 or equivalent

**ECE 506 MICROELECTRONIC DEVICES**

Introduction to the theory of solid state devices; energy band theory; bulk properties of semiconductors; p-n junction, bipolar junction transistor, metal-oxide semiconductor (MOS), MOS capacitor, MOS field-effect transistor-theory, devices, modeling and applications.

**Prerequisite(s):** ECE 301 or equivalent

**ECE 507 ELECTROMAGNETIC FIELDS I**

Fundamental concepts, wave equation and its solutions; wave propagation, reflection and transmission; potential theory; construction of solutions; various electromagnetic theorems: concept of source, uniqueness, equivalence, induction and reciprocity theorems.

**Prerequisite(s):** ECE 333 or equivalent

**ECE 509 ANALYSIS OF LINEAR SYSTEMS**

Signals, systems, orthogonal decomposition, Fourier analysis, Laplace transforms, Z-transforms, state variables, and their application to the analysis of linear systems.

**ECE 510 MICROWAVE CIRCUITS FOR COMMUNICATION**

Microwave transmission, planar transmission lines, microwave components and filters. Microwave tubes, microwave communication, radar systems, and electronic support measures.

**Prerequisite(s):** ECE 507

**ECE 511 ANTENNAS**

Fundamental principles of antennas; analysis and synthesis of arrays; resonant antennas; broadband and frequency independent antennas; aperture and reflector antennas; applications to radar and communication systems.

**Prerequisite(s):** ECE 442 or equivalent

**ECE 516 ELECTROMAGNETIC COMPATIBILITY**

Fundamental principles of electromagnetic compatibility (EMC) including non-ideal behavior of components; radiated emissions and susceptibility; crosstalk; shielding and grounding; electrostatic discharge; system design for EMC.

**Prerequisite(s):** ECE 333 and ECE 511

**ECE 518 ELECTROMAGNETIC FIELDS II**


**Prerequisite(s):** ECE 507

**ECE 521 DIGITAL COMMUNICATIONS I**

Fundamentals of digital transmission of information over noisy channels; modulation schemes for binary and Mary digital transmission; optimum receivers; coherent and noncoherent detection; signal design; intersymbol interference; error control coding; the Viterbi algorithm; channel capacity and Shannon limits on reliable transmission.

**Prerequisite(s):** ECE 503

**ECE 522 DIGITAL COMMUNICATIONS II**

Fundamentals of source coding and compression, Shannon’s theorem, Huffman coding, linear predictive coding; system synchronization; equalization techniques; multiplexing and multiple access systems; spread-spectrum systems and their applications: pseudo-noise, direct sequence systems, frequency hopping, jamming; encryption and decryption systems.

**Prerequisite(s):** ECE 503

**ECE 531 MICROELECTRONICS SYSTEMS**

Introduction to the design and application of engineering micro-electronics; bipolar and MOS device theory and processing technology; CMOS logic and circuitry; design principles fundamental to chip design and fabrication; case studies employing introduction to HDL.

**Prerequisite(s):** ECE 302
ECE 533  COMPUTER DESIGN
Design considerations of the computer; register transfer operations; hardware implementation of arithmetic processors and ALU; instruction set format and design and its effect on the internal microengine; hardware and micro-programmed control design; comparative architectures.
Prerequisite(s): ECE 501 or equivalent

ECE 536  MICROPROCESSOR APPLICATIONS
Project studies, applications of microprocessors in practical implementations; logic implementation using software; memory mapped I/O problems and interrupt structure implementation; use of assembler and/or cross assemblers; study of alternate microprocessor families including industrial controllers.
Prerequisite(s): ECE 314 or equivalent and ECE 501

ECE 537  ADVANCED ENGINEERING SOFTWARE
Concepts, implementation, and current practice in the utilization of programming capabilities contained in operating systems. Introduction to operating system calls. A practical approach emphasizing theory and principles together with case studies and implementations in engineering applications of modern operating systems.
Prerequisite(s): C programming experience

ECE 538  OBJECT-ORIENTED PROGRAMMING APPLICATIONS
A semi-formal approach to the engineering applications of object-oriented programming. Application of the concepts of classes, inheritance, polymorphism in engineering problems. Introduction to the use of class libraries. Effective integration of the concepts of application programmer interfaces, language features and class libraries.
Prerequisite(s): C programming experience

ECE 545  AUTOMATIC CONTROL
Prerequisite(s): ECE 509

ECE 546  INSTRUMENTATION DESIGN

ECE 561  DIGITAL SIGNAL PROCESSING
A study of one-dimensional digital signal processing, including a review of continuous system analysis and sampling. Topics include z-transform techniques, digital filter design and analysis, and fast Fourier transform processing techniques.
Prerequisite(s): ECE 509

ECE 563  IMAGE PROCESSING
An introduction to image processing including the human visual system, image formats, two-dimensional transforms, image restoration, and image reconstruction.
Prerequisite(s): ECE 561

ECE 572  LINEAR SYSTEMS AND FOURIER OPTICS
Mathematical techniques pertaining to linear systems theory; Fresnel and Fraunhoffer diffraction; Fourier transform properties of lenses; frequency analysis of optical systems, spatial filtering, applications such as optical information processing and holography.
Prerequisite(s): Acceptance into the ECE graduate program or permission of the department chair

ECE 573  ELECTRO-OPTICAL DEVICES & SYSTEMS
Solid-state theory of optoelectronic devices; photomitters; photodetectors; solar cells; detection and noise; displays; electro-optic, magneto-optic, and acousto-optic modulators; integration and application of electro-optical
components in electro-optical systems of various types.

**Prerequisite(s):** ECE 507 or permission of the department chair

**ECE 574 GUIDED-WAVE OPTICS**

Light propagation in slab and cylindrical waveguides; signal degradation in optical fibers; optical sources, detectors, and receivers; coupling; transmission link analysis; fiber fabrication; fiber sensor and communication systems.

**Prerequisite(s):** ECE 507 or permission of the department chair

**ECE 575 ELECTRO-OPTICS SENSORS**

Optical sensors, including amplitude, phase, wavelength, polarization and modal interference based sensors. Photoelasticity effects in stressed optical materials. Quadrature point stabilization, linearity, dynamic range and sensitivity. Modulation and demodulation by both passive and active means. General sensor characteristics. Optical sources and detectors, optical signal-to-noise ratio analysis and general sensor characteristics. Fiber optic sensors and smart skin/structure technology.

**Prerequisite(s):** ECE 507 or permission of the department chair

**ECE 577L ELECTRO-OPTICS LABORATORY**

Experimentation with E-O systems emphasizing areas such as display technology, surveillance systems and components, and other disciplines in which electronic and optical elements are arranged to interact synergistically.

**ECE 595 SPECIAL PROBLEMS IN ELECTRICAL ENGINEERING**

Particular assignments to be arranged and approved by the department chair.

**ECE 599 THESIS**

**ECE 603 APPLIED OPTIMAL ESTIMATION**

Random processes and state-space analysis. Applied optimal estimation with emphasis on Kalman and Weiner filtering.

**Prerequisite(s):** ECE 503, ECE 545 or equivalent

**ECE 611 ADVANCED ANTENNA THEORY**

Advanced topics in antennas including advanced arrays, antenna temperature, synthetic apertures, aperture antennas, microwave traveling wave antennas.

**Prerequisite(s):** ECE 507 and ECE 511

**ECE 612 METHODS IN RADAR CROSS SECTION**

Solution of problems in radar cross section analysis and prediction. RCS of simple shapes and complex shapes. Reflection and transmission; impedance boundary condition, stratified media. RCS of antennas. Application of the physical theory of diffraction and the geometrical theory of diffraction to scattering problems.

**Prerequisite(s):** ECE 507 and ECE 511

**ECE 615 COMPUTATIONAL ELECTROMAGNETICS**

This course deals with both the differential equation and integral equation based methods to solve Maxwell's equations for complex bodies. Methods studied include the Moment Method, Finite Element Method, and Finite Difference Time Domain Method. The course also deals with asymptotic techniques leading to the formulation of the GTD and PTD.

**Prerequisite(s):** ECE 507 and ECE 518

**ECE 632 CONTEMPORARY MICROELECTRONICS DESIGN**

CMOS analog circuit design (oscillators, amplifiers, op-amps), mixed signal design (data converters), introduction to microelectron-mechanical system (MEMS) and wireless communications systems design, advanced VLSI digital design projects, seminar topics covering contemporary designs and techniques.

**Prerequisite(s):** ECE 531

**ECE 636 ADVANCED COMPUTER ARCHITECTURE**

Comparative evaluation of advanced and experimental computer structures. Investigation of optical, multiprocessor, array, various hybrid and neural
network architectures. This is an advanced seminar class using current computer design and experimental literature.

**Prerequisite(s):** ECE 536

**ECE 637** CONCURRENT PROCESSING


**Prerequisite(s):** ECE 537 and ECE 636 or equivalent

**ECE 641** NONLINEAR CONTROL

A study of the major techniques of nonlinear system analysis including phase plane analysis, describing function analysis and Lyapunov Stability Theory. Application of the analytical techniques to control system design including feedback linearization, sliding mode control and an introduction to adaptive control.

**Prerequisite(s):** ECE 509 and ECE 545

**ECE 642** OPTIMAL CONTROL AND ESTIMATION


**Prerequisite(s):** ECE 503 and ECE 545

**ECE 661** STATISTICAL SIGNAL PROCESSING

This course studies discrete methods of linear estimation theory. Topics include random vectors, linear transformations, linear estimation theory, optimal filtering, least squares techniques, linear prediction, and spectrum estimation.

**Prerequisite(s):** ECE 561

**ECE 662** ADAPTIVE SIGNAL PROCESSING

An overview of the theory, design, and implementation of adaptive signal processors. This includes discussions of various gradient search techniques, filter structures, and applications. An introduction to neural networks is also included.

**Prerequisite(s):** ECE 661

**ECE 663** STATISTICAL PATTERN RECOGNITION

This course provides a comprehensive treatment of the statistical pattern recognition problem. The mathematical models describing these problems and the mathematical tools necessary for solving them are covered in detail.

**Prerequisite(s):** ECE 661

**ECE 674** INTEGRATED OPTICS

Asymmetric dielectric slab wave-guides; cylindrical dielectric wave-guides; multi-layer waveguides; dispersion, shifting and flattening; mode coupling and loss mechanisms; selected nonlinear waveguiding effects; integrated optical devices.

**Prerequisite(s):** ECE 574

**ECE 676** QUANTUM ELECTRONICS

Principles of the quantum theory of electron and photon processes; interaction of electromagnetic radiation and matter; applications to solid state and semiconductor laser systems.

**Prerequisite(s):** ECE 506, or EOP 506/ECE 573 or equivalent

**ECE 690** SELECTED READINGS IN ELECTRICAL ENGINEERING

Directed readings in electrical engineering areas to be arranged and approved by the chair of the student's doctoral advisory committee and the department chair.

**ECE 695** SPECIAL PROBLEMS IN ELECTRICAL ENGINEERING

Special topics in electrical engineering not covered in regular courses. Course sections arranged and approved by the chair of the student's doctoral advisory committee and the department chair.

**ECE 698** D.E. DISSERTATION

1 - 15
An original investigation as applied to electrical engineering practice. Results must be of sufficient importance to merit publication.

ECE 699 Ph.D. DISSERTATION

Original research in electrical engineering which makes a definite contribution to technical knowledge. Results must be of sufficient importance to merit publication.
School of Engineering

(EOP) Electro-Optics  

Joseph W. Haus, Program Director

The interdisciplinary programs of study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in electro-optics are administered by the School of Engineering with the cooperative support of the College of Arts and Sciences.

Programs

Doctorate of Philosophy in Electro-Optics (EOP)

The program of study in electro-optics leading to a Ph.D. degree must include a minimum of 90 semester hours beyond the bachelor's degree consisting of the following:

2. Twelve semester hours of approved graduate mathematics courses.
3. Twelve semester hours of approved 600-level electro-optics courses.

See also the Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the director of the electro-optics program.

Master of Science in Electro-Optics (EOP)

The program of study in electro-optics leading to a M.S. degree must include a minimum of 30 semester hours consisting of the following:

1. Twenty-one semester hours of core courses in electro-optics: EOP 501, EOP 502, EOP 505, EOP 506, EOP 513, EOP 514, EOP 541L, EOP 542L and EOP 543L.
2. Three semester hours of a technical elective.
3. Six semester hours of thesis work in the case of a thesis option or six semester hours of approved technical electives in the case of a non-thesis option.

While all students are expected to write a thesis, students supported by an assistantship are required to write a thesis. A request for thesis waiver is to be made at the start of the program of study. The procedure for this request is available from the electro-optics office. Students who have received a waiver of the thesis requirement must take an examination given by a three-person advisory committee just prior to their anticipated graduation date. The examination will be centered around an oral presentation on a topic mutually agreed to by the student and the advisory committee. At the discretion of the advisory committee, a written report may also be required. This committee and the topic must be selected before the last semester of study. The examination may be repeated once, but not in the same academic term.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the director of the electro-optics program.

Courses

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<tr>
<td>EOP 501</td>
<td>GEOMETRIC OPTICS</td>
<td>3</td>
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</table>
Wavefronts and rays; Fermat's principle; Gaussian optics of axially symmetrical systems; aperture stops; pupils and field lenses; Lagrange invariant; angular and visual magnification; optical systems; plane mirrors and prisms; aberration theory; Introduction to computer ray tracing.

**Prerequisite(s):** Acceptance into the graduate Electro-Optics program or permission of the program director.

**EOP 502**  
**OPTICAL RADIATION AND MATTER**  
Maxwell's equations; electromagnetic waves; interaction of radiation with atomic electrons; molecular and lattice vibration; study of phenomena related to the interaction of optical radiation with matter; polarization; crystal optics; nonlinear dielectric effects.

**Prerequisite(s):** EOP 502 or a working knowledge of Maxwell's Equations, and physical optics, or permission of the course instructor or program director.

**EOP 505**  
**INTRODUCTION TO LASERS**  
Laser theory; coherence; Gaussian beams; optical resonators; properties of atomic and molecular radiation; laser oscillation and amplification; methods of excitation of lasers; characteristics of common lasers; laser applications.

**Prerequisite(s):** EOP 502 or permission of instructor.

**EOP 506**  
**ELECTRO-OPTICAL DEVICES AND SYSTEMS**  
Solid state theory of optoelectronic devices; photoemitters; photodetectors; solar cells; detection and noise; displays; electro-optic, magneto-optic, and acousto-optic modulators; integration and application of electro-optical components in electro-optical systems of various types.

**Prerequisite(s):** EOP 502 or permission of instructor.

**EOP 513**  
**LINEAR SYSTEMS AND FOURIER OPTICS**  
Mathematical techniques pertaining to linear systems theory; Fresnel and Fraunhofer diffraction; Fourier transform properties of lenses; frequency analysis of optical systems, spatial filtering, application such as optical information processing and holography.

**Prerequisite(s):** Acceptance into the graduate EO program or permission of the program director.

**EOP 514**  
**GUIDED WAVE OPTICS**  
Light propagation in slab and cylindrical wave guides; signal degradation in optical fibers; optical sources, detectors, and receivers; coupling; transmission link analysis; fiber fabrication and cabling; fiber sensor system.

**Prerequisite(s):** EOP 502 or permission of the program director.

**EOP 523**  
**TOPICS IN MODERN OPTICS**  
Infrared systems, including radiometry, blackbody and graybody sources, detectors, materials, and optics. Thin-film optical coatings. Polarization of light using Mueller matrices and Stokes vectors. Optical measurements and instruments based on polarization. Fast Fourier Transform (FFT) and its applications to optics.

**Prerequisite(s):** EOP 506 and EOP 513, or permission of the program director.

**EOP 524**  
**OPTICAL COMPUTING SYSTEMS**  
Arithmetic and recognition using analog optics; number representations; modified signed-digit and residue arithmetic; logic minimization; Fredkin and threshold logic; combinational and sequential arithmetic units; shadowcasting and symbolic substitution; matrix processing; optical computing devices.

**Prerequisite(s):** EOP 513, and completion of a course in computer systems or permission of the program director.

**EOP 531**  
**NEURAL NETWORKS**  
Nature and capabilities of Neural Networks; connectionism, self-organization and adaptation; relations to fuzzy systems and genetic algorithms; backpropagation, adaptive resonance, associative memory, radial basis function, simulated annealing, and optically implementable neural networks.

**Prerequisite(s):** MTH 302 or equivalent or permission of the program director.

**EOP 534**  
**ELECTRO-OPTIC SENSORS**
Optical sensors including amplitude, phase, wavelength, polarization, and modal interference based sensors. Photoelasticity effects in stressed optical materials. Quadrature point stabilization, linearity, dynamic range and sensitivity. Modulation and demodulation by both passive and active means. General sensor characteristics. Optical sources and detectors, optical signal-to-noise ratio analysis and general sensor characteristics. Fiber optic sensors and smart skin/structure technology.

**Prerequisite(s):** EOP 514 or permission of the program director

**EOP 541L GEOMETRIC AND PHYSICAL OPTICS LABORATORY**

Geometric optics; characterization of optical elements; diffraction; interference; birefringence and polarization.

**Prerequisite(s):** EOP 501 or permission of the program director

**EOP 542L ELECTRO-OPTIC SYSTEMS LABORATORY**

Fiber optic principles and systems: numerical aperture, loss, dispersion, single and multimode fibers, communications and sensing systems. Project oriented investigations of electro-fiber-optic systems and devices in general: sources, detectors, image processing, sensor instrumentation and integration, electro-optic component, display technology, nonlinear optical devices and systems.

**Prerequisite(s):** EOP 514 or permission of the program director

**EOP 543L ADVANCED ELECTRO-OPTICS LABORATORY**

Project-oriented investigations of laser characterization, interferometry, holography, optical pattern recognition and spectroscopy. Emphasis is on the applications of optics, electronics, and computer data acquisition and analysis to measurement problems.

**Prerequisite(s):** EOP 541L or permission of the program director

**EOP 595 SPECIAL PROBLEMS IN ELECTRO-OPTICS**

Particular assignments to be arranged and approved by the director of the program.

**EOP 599 THESIS**

**EOP 601 OPTICAL DESIGN**

Chromatic aberrations: doublet lens; telephoto, wide-angle, and normal lenses; triplet lens design and variations; optimization methods and computer lens design; optical transfer functions; telescopes and microscopes; two-mirror telescope design: aspheric surfaces; prism and folded optical systems, rangefinders; gratings and holographic optical elements; anamorphic optical systems; zoom systems.

**Prerequisite(s):** EOP 501

**EOP 603 INTERFEROMETRY**

Two-beam interference: wavefront division, amplitude division, localization of fringes, and interferometers; coherence; multiple-beam interference; Fabry-Perot interference and fringes of equal chromatic order; length measurements.

**Prerequisite(s):** EOP 513

**EOP 604 INTEGRATED OPTICS**

Review of electromagnetic principles; dielectric slab waveguides; cylindrical dielectric waveguides; dispersion, shifting and flattening; mode coupling and loss mechanism; selected nonlinear waveguiding effects; integrated optical devices.

**Prerequisite(s):** EOP 514

**EOP 621 STATISTICAL OPTICS**

Optical phenomena and techniques requiring statistical methods for practical understanding and application; relevant statistical techniques for the analysis of image processing systems and the design of laser radar systems; engineering applications of statistical techniques.

**Prerequisite(s):** completion of the core courses of the graduate Electro-Optics program or by permission of the program director

**EOP 622 TECHNIQUES OF OPTICAL PROCESSING**

Techniques and applications of optical image and signal processing; coherent optics; matched filters; computer-generated holograms; spatial light
modulators; incoherent optical processing; modulators for signal processing. 
**Prerequisite(s):** EOP 513 or permission of the program director

**EOP 624 NONLINEAR OPTICS**
3
Introduction and overview nonlinear optical interactions, classical and harmonic oscillator model, symmetry properties of nonlinear susceptibility tensor, coupled-mode formalism, sum- and difference-frequency generation, parametric oscillators, four-wave mixing, phase conjugation, optical solutions, stimulated Brillouin and Raman scattering, photorefractive effect, and resonant nonlinearities. 
**Prerequisite(s):** EOP 502 or equivalent

**EOP 625 LASER PROBE TECHNIQUES**
3
Applications of optical phenomena and lasers to non-intrusive measurements; absorption and emission spectroscopies; laser-induced fluorescence spectroscopy; high-sensitivity detection methods using lasers; spontaneous and coherent Raman spectroscopies; Rayleigh and Mie scattering techniques; laser Doppler techniques; gas flow and combustion diagnostics and other applications of laser spectroscopy and light scattering. 
**Prerequisite(s):** EOP 505 or permission of the program director

**EOP 626 QUANTUM ELECTRONICS**
3
Principles of the quantum theory of electron and photon processes; interaction of electromagnetic radiation and matter; applications to solid state and semiconductor laser systems. 
**Prerequisite(s):** ELE 506 or EOP 506/ELE 573, or equivalent

**EOP 690 SELECTED READINGS IN ELECTRO-OPTICS**
1 - 3
Directed readings in electro-optics areas to be arranged and approved by the chair of the student's advisory committee and the program director.

**EOP 695 SPECIAL PROBLEMS IN ELECTRO-OPTICS**
1 - 3
Special topics in electro-optics not covered in regular courses. Course sections arranged and approved by the chair of the student's advisory committee and program director.

**EOP 699 PH.D. DISSERTATION**
1 - 15
Original research in electro-optics which makes a definite contribution to technical knowledge. Results must be of sufficient importance to merit publication.
School of Engineering

(EGR) Engineering

Donald L. Moon, Program Director and Associate Dean, Graduate Engineering Programs and Research

The Master of Science in engineering allows flexibility for general or specialized program construction according to the needs of the individual student in conformance with the requirements of the School of Engineering and the University of Dayton.

Programs

Program Name

- Master of Science in Engineering (EGR)

The program of study leading to the Master of Science in engineering must include a minimum of 33 semester hours of the following:

1. Fifteen semester hours in a major area.
2. Fifteen semester hours of electives.
3. Three semester hours of research on an approved project.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the director of the Master of Engineering program.
School of Engineering
(ENM) Engineering Management

Edward F. Mykytka, Chair of the Department of Engineering Management & Systems

The program of study leading to the Master of Science in engineering management is designed to prepare the practicing engineer to manage engineering activities in industry, government, business, and the military. Graduates should be able to model, analyze, and make the difficult decisions required of engineering leaders, after learning course methodologies in statistics, operations research and simulation, and practicing these methodologies by using data and current analytical tools to solve real-world problems.

Programs

Program Name

Master of Science in Engineering Management (ENM)

The program includes a minimum of 36 semester hours consisting of the following:

1. Eighteen semester hours of core courses in engineering management:
   - ENM 505, 521, 522, 582, 555 or 572, and 590.
2. Nine semester hours of specialized engineering electives approved by the advisor. This requirement may be satisfied with nine semester hours of courses in any field of engineering, including selected engineering management specialization courses.
3. Nine semester hours of supporting electives approved by the advisor, to include MSC 500 and MSC 501 or equivalent courses. Students with documented and equivalent knowledge of the subjects may, with the approval of the advisor and the chair, substitute other electives for the MSC 500-501 requirement.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

The selected engineering management specialization courses are: ENM 515, 523, 535, 541, 555, 556, 560, 561, 565, 572, 575, 577, 579, and 585. (ENM 555 or 572 may be taken as specialized electives only if not used to satisfy the core course requirements.)

The specialized and supporting electives within the program of study allows concentrations in areas such as six sigma quality, manufacturing, artificial intelligence, reliability, operations research, and simulation.

Courses

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<tr>
<td>ENM 505</td>
<td>MANAGEMENT OF ENGINEERING SYSTEMS</td>
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<tr>
<td>ENM 515</td>
<td>HUMAN FACTORS ENGINEERING</td>
<td>3</td>
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This course is an introduction to the functions and tools of engineering management and the systems engineering process. Topics include the roles of engineering managers and the relationships of engineering activities to the total enterprise. Emphasis is on quantitative methods for engineering system design, project management, and economic analysis.

Introduction to the human factors criteria that should be considered in the design of man-machine systems, work situations, and man's physical environment.
ENM 517 LEGAL ASPECTS OF ENGINEERING
An introductory course to provide the engineer with some insight into the areas of law that will impact an engineer's professional practice. Special emphasis is given to the area of Contract Law due to the important and pervasive interaction that it has with engineering design and project work. Systems of law, legal reasoning, and the court systems are introduced. Product liability and business relationships are discussed. Courtroom experience is achieved through interaction with the UD Law School and local judges with participation in mock trials.

ENM 521 DETERMINISTIC OPERATIONS RESEARCH
Introduction to deterministic methods for optimization, with a focus on mathematical programming (linear, nonlinear, and integer programming) and network methods. 
**Prerequisite(s):** Three semesters of calculus

ENM 522 PROBABLISTIC OPERATIONS RESEARCH
Introduction to probabilistic methods for modeling and analyzing the performance of complex systems. Topics include Markov chains, queueing, forecasting, discrete event simulation, and inventory modeling.
**Prerequisite(s):** MSC 500 or equivalent

ENM 523 NONLINEAR OPTIMIZATION
This course concentrates on methods and engineering/management science applications of nonlinear optimization. Both single- and multi-variable methods as well as unconstrained and constrained problems are addressed. The text blends theoretical results such as the Kuhn-Tucker conditions and numerical search techniques such as conjugate directions with applications.

ENM 530 COST AND ECONOMIC ANALYSIS FOR ENGINEERS
Principles and methods of economic analysis of engineering activities, including the time value of money. Short- and long-term investments, comparison of alternatives, depreciation analysis, replacement analysis, and minimum cost models are covered in detail.

ENM 535 INTRODUCTION TO DECISION MAKING
Introduction to rational decision-making with applications in the analysis and design of engineering and management systems. Topics explored are decision-making under uncertainty and risk as well as under certainty, group decision-making, and multiple-criteria decision-making. 
**Prerequisite(s):** MSC 500 or equivalent

ENM 539 INTRODUCTION TO APPLIED PROGRAM MANAGEMENT
A graduate course for corporate and government managers that emphasizes the concepts, techniques and procedures used to manage programs or projects. The course provides a complete overview of the project management tools and methodologies used to plan, control and execute programs or projects. Course topics include project screening and selection; multiple-criteria methods for evaluation; work breakdown structures (WBS) and organization; configuration selection, management and control; project scheduling; project budgets; resource management; research and development projects; computer support for project management. 
**Prerequisite(s):** ENM 505 or equivalent experience

ENM 541 PRODUCTION ENGINEERING
Study of the integration of man, machine, and material in producing a marketable product. The use of engineering techniques to design, develop, and implement the production system are covered. Topics include break-even analysis, learnign curve theory, forecasting, resource balancing, inventory and production control, facility layout and location, job sequencing and scheduling, and assembly line balancing. Modern production techniques such as just-in-time (JIT), MRP systems flexible manufacturing, and computer-integrated manufacturing are discussed. 
**Prerequisite(s):** ENM 521 or permission of the instructor

ENM 555 SYSTEM DYNAMICS I
Introduction to the methodology for modeling the dynamics of complex engineering, business, and socioeconomic systems. These models are used to study the effect of organizational policies and design in higher-order, multiple-loop, nonlinear feedback systems.
University of Dayton - the Bulletin - Engineering Management

ENM 556  SYSTEM DYNAMICS II
Continuation of ENM 555 with emphasis on the study of large-scale corporate, urban, educational, and ecological systems.
Prerequisite(s): ENM 555 or equivalent

ENM 560  QUALITY ASSURANCE
Introduction to the fundamental concepts and methods of modern approaches to quality assurance, with emphasis on statistical methods for process control, process capability analysis, and sampling inspection. The course introduces relevant methods of experimental design and current issues in quality improvement.
Prerequisite(s): MSC 501 or equivalent

ENM 561  DESIGN AND ANALYSIS OF EXPERIMENTS
This course introduces advanced topics in experimental design and analysis, including full and fractional factorial designs, response surface analysis, multiple and partial regression, and correlation.
Prerequisite(s): MSC 501 or equivalent

ENM 565  RELIABILITY ENGINEERING I
An introduction to reliability engineering concepts and methodology. The reliability, maintainability, and availability of components and multi-component systems are analyzed. Topics include exponential, Weibull, lognormal and normal failure laws, static reliability, hazard rate functions, state dependent failure rate models, redundancy, censoring, empirical models, curve fitting to failure data, and reliability growth testing.
Prerequisite(s): MSC 501 or equivalent

ENM 566  RELIABILITY ENGINEERING II
Continuation of ENM 565 with emphasis on the design of systems to meet specified reliability, availability, and maintainability requirements.
Prerequisite(s): ENM 565 or equivalent

ENM 572  SYSTEM SIMULATION
An introduction to stochastic simulation. Topics covered include the generation of random numbers and random variables; analysis of input data; the computer modeling of real systems; the strategies, tactics, and experimentation used in performing a simulation study; and the statistical analysis of simulation output.
Prerequisite(s): MSC 501 and ENM 555 or MSC 552 or equivalent

ENM 575  INTRODUCTION TO ARTIFICIAL INTELLIGENCE
Introduction to the methods of artificial intelligence with an emphasis on engineering design and analysis. Topics include logical and probabilistic reasoning, pattern matching, knowledge representation, search, rule-based systems, natural language processing, and computer vision. Concepts and applications are illustrated with Lisp programs.

ENM 577  INTRODUCTION TO EXPERT SYSTEMS
Introduction to the development and application of rule-based systems using an integrated environment of commands, rules, databases, spreadsheets, text processing, and forms. Topics include knowledge representation, inference, search, ID3 algorithm, and logic, along with suitable applications and subsequent implementations.

ENM 579  SELECTED TOPICS IN ARTIFICIAL INTELLIGENCE
Special topics include engineering applications using neural net architecture, object-oriented programming, genetic algorithm and advanced search methods illustrated in Common Lisp and a rule-based environment.
Prerequisite(s): ENM 575 and ENM 577 or permission of the instructor

ENM 582  ORGANIZATIONAL DEVELOPMENT IN AN ENGINEERING ENVIRONMENT
This course covers organizational design and the interpersonal and group skills needed by the engineering manager. Emphasis is placed on establishing good work environments through communication, trust, high morale, satisfaction, and productive group activity. Special topics covered include TQM implementation, high performing teams, and other current issues.

ENM 585  ORGANIZATIONAL SYSTEMS
Introduction to organizational theory and practice with emphasis on the
design of organizational structures for the effective integration of production,
research and development, and engineering activities. Special topics include
high performing systems, the technical ad-hoc committee, matrix
organization, and project management and other current issues.

ENM 590  CASE STUDIES IN ENGINEERING MANAGEMENT  3
This capstone course emphasizes the completion of an engineering
management project or study under the direction of a faculty advisor. A well-
written report is required.

Prerequisite(s): Completion of the Engineering Management core courses or equivalent

ENM 595  SPECIAL PROBLEMS IN ENGINEERING MANAGEMENT  3
This course covers special assignments in engineering management as
arranged and approved by the advisor and the program director.
School of Engineering
(EGM) Engineering Mechanics  (Collapse Description)
Fred K. Bogner, Chair of the Department

Programs

Program Name
Master of Science in Engineering Mechanics (EGM)

The program of study for the degree of Master of Science in engineering mechanics requires a minimum of 33 semester hours of credit consisting of the following:

1. Twelve required semester hours in engineering mechanics: EGM 500, 503, 533, and 546.
2. Nine elective semester hours in engineering mechanics.
4. Six semester hours of research on an approved project or thesis. Thesis or project research may be replaced by nine semester hours of additional coursework only with the approval of both the advisor and the program director.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the advisor.

Courses  (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGM 500</td>
<td>INTRODUCTION TO NUMERICAL METHODS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Numerical analysis topics include the solution of systems of linear and nonlinear algebraic equations; matrix eigenvalue problems; ordinary differential equations; optimization techniques; numerical integration and interpolation. Engineering applications presented. Computer programming required.</td>
<td></td>
</tr>
<tr>
<td>EGM 502</td>
<td>ADVANCED ENGINEERING ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Detailed analysis of engineering problems using laws of nature, fundamental engineering principles, mathematics, computers, and practical experience to construct, resolve, and test analytic models of physical events. Emphasis is on the use of the professional engineering approach which includes formulation of the problem, assumptions, plan or method of attack, solving the problem, and checking and generalizing results.</td>
<td></td>
</tr>
<tr>
<td>EGM 503</td>
<td>INTRODUCTION TO CONTINUUM MECHANICS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Tensors, calculus of variations, Lagrangian and Eulerian descriptions of motion. General equations of continuum mechanics, constitutive equations of mechanics, thermodynamics of continua. Specialization to cases of solid and fluid mechanics. Prerequisite(s): EGM 303 or EGM 330</td>
<td></td>
</tr>
<tr>
<td>EGM 504</td>
<td>FUNDAMENTALS OF FLUID MECHANICS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>An advanced course in fluid mechanics with emphasis on the derivation of conservation equations and the application of constitutive theory, Navier-Stokes equations. Ideal fluid approximation. Exact and approximate solutions to classical viscous and inviscid problems. Compressible and incompressible flows. Corequisite(s): EGM 503</td>
<td></td>
</tr>
</tbody>
</table>
EGM 506  MECHANICAL BEHAVIOR OF MATERIALS
Description of the state of stress and strain in materials, plastic deformation, fatigue, fracture, creep, and rupture.
Prerequisite(s): EGM 303, EGM 330, or consent of instructor

EGM 511  EXPERIMENTAL STRESS ANALYSIS
A study of the experimental analysis of stress as an aid to design for strength and economy with emphasis on electrical strain gages. Also, photoelasticity, brittle coatings, analogies, structural similitude. Two hours lecture and one three-hour laboratory period per week.

EGM 519  ANALYTIC DYNAMICS
Dynamical analysis of a system of particles and rigid bodies; Lagrangian and Hamiltonian formulation of equations of motion; classical integrals of motion; stability analysis of linear and nonlinear systems.
Prerequisite(s): MTH 219 and EGM 220 or equivalent

EGM 531  THEORY OF LINEAR VISCOELASTICITY
Principles of viscoelasticity; Kelvin and Maxwell models of viscoelastic materials; creep and relaxation phenomena; application of hereditary integral and complex compliance; correspondence principle wave propagation and vibrational response.
Prerequisite(s): MTH 219 and EGM 303 or EGM 330

EGM 533  THEORY OF ELASTICITY
Three-dimensional stress and strain at a point; equations of elasticity in Cartesian and curvilinear coordinates; methods of formulation of equations for solution, plane stress and plane strain; energy formulations; numerical solution procedures.
Prerequisite(s): EGM 303 or EGM 330
Corequisite(s): EGM 503

EGM 534  THEORY OF PLATES AND SHELLS
Theory of plates; small and large displacement theories of thin plates; shear deformation; buckling; sandwich plate theory. Thin shell theory; theory of surfaces; thin shell equations in orthogonal curvilinear coordinates; bending, membrane, and shallow shell theories.
Prerequisite(s): EGM 533

EGM 536  RANDOM VIBRATIONS
Introduction to probability distribution; characterization of random vibrations; harmonic analysis; auto- and cross-correlation and spectral density; coherence; response to single and multiple loadings; Fast Fourier Transform (FFT); applications in vibrations, vehicle dynamics, fatigue, etc.
Prerequisite(s): Computer programming and MEE 319

EGM 538  INTRODUCTION TO AEROELASTICITY
Prerequisite(s): AEE 501 or equivalent

EGM 539  THEORY OF PLASTICITY
Fundamentals of plasticity theory including elastic, viscoelastic, and elastic-plastic constitutive models; plastic deformation on the macroscopic and microscopic levels; stress-strain relations in the plastic regime; strain hardening; limit analysis; numerical procedures.
Prerequisite(s): EGM 503 or 533

EGM 540  COMPOSITE DESIGN
Prerequisite(s): EGM 303 or EGM 330

EGM 541  EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS
Introduction to the mechanical response of fiber-reinforced composite materials with emphasis on the development of experimental methodology. Analytical topics include stress-strain behavior of anisotropic materials, laminate mechanics, and strength analysis. Theoretical models are applied to the analysis of experimental techniques used for characterizing composite materials.
materials. Lectures are supplemented by laboratory sessions in which characterization tests are performed on contemporary composite materials.

**Prerequisite(s):** EGM 303 or EGM 330

**EGM 543  ANALYTICAL MECHANICS OF COMPOSITE MATERIALS**

Analytical models are developed for predicting the mechanical and thermal behavior of fiber-reinforced composite materials as a function of constituent material properties. Both continuous and discontinuous fiber-reinforced systems are considered. Specific topics include basic mechanics of anisotropic materials, micro-mechanics and lamination theory, free edge effects, and failure criteria.

**Prerequisite(s):** EGM 303 or EGM 330

**EGM 544  MECHANICS OF COMPOSITE STRUCTURES**

Comprehensive treatment of laminated beams, plates, and sandwich structures. Effect of heterogeneity and anisotropy on bending under lateral loads, buckling, and free vibration are emphasized. Shear deformation and other higher-order theories and their range of parametric application are also considered.

**Prerequisite(s):** EGM 543 or consent of instructor

**EGM 545  COMPUTATIONAL METHODS FOR DESIGN**

Modeling of mechanical systems and structures, analysis by analytical and numerical methods, development of mechanical design criteria and principles of optimum design and analysis, use of the digital computer as an aid in the design of mechanical elements.

**Prerequisite(s):** Computer programming

**EGM 546  FINITE ELEMENT ANALYSIS I**

Fundamental development of the Finite Element Method (FEM) and solution of field problems and comprehensive structural problems. Variational principles and weak-forms; finite element discretization; shape functions; finite elements for field problems; bar, beam, plate, and shell elements; isoparametric finite elements; stiffness, nodal force, and mass matrices; matrix assembly procedures; computer coding techniques; modeling decisions; program output interpretation. Course emphasis on a thorough understanding of FEM theory and modeling techniques.

**Prerequisite(s):** EGM 503 or EGM 533

**EGM 547  FINITE ELEMENT ANALYSIS II**

Advanced topics: heat transfer; transient dynamics; nonlinear analysis; substructuring and static condensation; effects of inexact numerical integration and element incompatibility; patch test; frontal solution techniques; selected topics from the recent literature.

**Prerequisite(s):** EGM 546

**EGM 548  ENERGY METHODS IN SOLID MECHANICS**

Development of fundamental energy principles; virtual displacements, strain energy, Castiglano's theorems, minimum potential energy principles. Applications to engineering problems; redundant structures, buckling, static and dynamic analysis.

**Prerequisite(s):** EGM 503 or EGM 533

**EGM 549  THEORY OF ELASTIC STABILITY**

Introduction to stability theory; buckling of plates and shells; influence of initial imperfections; nonlinear analysis; numerical solution methods.

**Prerequisite(s):** EGM 533

**EGM 552  BOUNDARY LAYERS THEORY**

Development of the Prandtl boundary layer approximation in two and three dimensions for both compressible and incompressible flow. Exact and approximate solutions for laminar flows. Unsteady boundary layers. Linear stability theory and transition to turbulence. Empirical and semi-empirical methods for turbulent boundary layers. Higher order boundary layer theory.

**Prerequisite(s):** EGM 504 or equivalent

**EGM 553  COMPRESSIBLE FLOW**

Fundamental equations of compressible flow. Introduction to flow in two and three dimensions. Two-dimensional supersonic flow, small perturbation theory, method of characteristics, oblique shock theory. Introduction to unsteady one-dimensional motion and shock tube theory. Method of surface...
singularities.

Prerequisite(s): EGM 503

EGM 570 FRACTURE MECHANICS
3
Application of the principles of fracture mechanics to problems associated with fatigue and fracture in engineering structures. This course will cover the development of models that apply to a range of materials, geometries and loading conditions.

Prerequisite(s): EGM 506 or consent of instructor

EGM 575 FRACTURE AND FATIGUE OF METALS AND ALLOYS I
3
This course will cover the effects of microstructure on the fracture and fatigue behavior of engineering metals and alloys with a special emphasis on static and dynamic brittle and ductile failures and crack initiation. Alloy fracture resistance, fracture toughness, and methods to improve fracture behavior will be discussed in detail. Various analytical techniques in the failure analysis of structural components will be presented.

Prerequisite(s): MAT 501, MAT 506 or consent of instructor

EGM 576 FRACTURE AND FATIGUE OF METALS AND ALLOYS II
3
This course will cover the areas of the effects of microstructure on fatigue crack propagation on fracture and fatigue. This includes fatigue life prediction, damage tolerance approach to component design and microstructural and structural synthesis for optimum behavior. Specific material-related aspects of fatigue mechanisms, fracture mechanics approach, and failure analysis will also be covered.

Prerequisite(s): MAT 575 or equivalent

EGM 590 SELECTED READINGS IN ENGINEERING MECHANICS
1-3
Directed readings in a designated area, arranged and approved by the student's faculty advisor and the department chair. May be repeated.

EGM 595 SPECIAL PROBLEMS IN ENGINEERING MECHANICS
1-6
Special topics arranged and approved by the student's faculty advisor and the department chair.

EGM 598 PROJECT
1-6

EGM 599 THESIS
1-6

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College of Arts and Sciences

(ENG) English

Brian P. Conniff, Chair of the Department
Faiiza W. Shereen, Graduate Program Director

The English graduate program leading to the Master of Arts degree allows students to concentrate in one of the following track options: 1) English and American literature; 2) writing; 3) teaching.

The program accommodates both full-time and part-time students, allows them to achieve different goals, and prepares them for a wide variety of careers. The English and American literature track serves prospective Ph.D. students in literature and students generally seeking greater literary understanding or research skills; the writing track prepares students who go on to doctoral programs in rhetoric, composition, and writing as well as those seeking careers in professional, business, technical, or creative writing; the teaching track provides students with advanced work in the content area for teachers of English.

Assistantships

Graduate assistantships are offered to qualified students in the M.A. program. The assistantship is essentially an apprenticeship in teaching, and assistants gain experience in a traditional first-year composition curriculum using the writing process for basic expository, argumentative, and research essays. Competent assistants making satisfactory progress toward the degree normally renew their assistantships for a second year.

Programs

Program Name

Master of Arts in English (ENG)

Normally 30 semester hours are required. Every student both in the literary track and in the teaching track who has attained a grade point average of at least 3.00, after completing 12 hours of graduate work, will take a Diagnostic Examination. This examination will be reviewed by a faculty committee consisting of the candidate's advisor, the graduate program director, and another member of the graduate faculty or staff. On the basis of the Diagnostic Examination or the completed Diagnostic Writing Assignment as well as other materials pertaining to the student's graduate performance, the evaluating committee will make recommendations to the department chair about the candidate's graduate program. Among these recommendations will be the total number of hours that the candidate needs to complete the degree. Exceptionally well-prepared students may earn the master's degree in fewer than 30 hours; students with deficiencies may be required to take up to 36 semester hours of graduate study.

ENG 601, Research and Bibliography, is required of applicants for the degree. ENG 588, Studies in Criticism, is required of each student in the literature track who has not taken a satisfactory undergraduate course in literary criticism and theory. ENG 596, Composition Theory, is required of each applicant in the writing track. EDT 500, Models of Teaching, and EDT 609, Issues, Trends and Research in Reading, are required of each student in the teaching track. All students must take at least 12 hours of 600-level courses (including ENG 601). Students in the teaching track are required to take two of these 600-level courses in literature or composition pedagogy (ENG 621, ENG 625 or the equivalent). Graduate assistants are required to take the one-credit course, ENG 590, Teaching of College English, during each year of their assistantship.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>ENG 505</td>
<td>CREATIVE WRITING</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Supervised practice in various literary forms. Both group discussions and individual conferences and critiques. Permission of chair required.</td>
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<tr>
<td>ENG 507</td>
<td>STUDIES IN WRITING</td>
<td>1-6</td>
</tr>
<tr>
<td></td>
<td>Special topics in composition, argumentation, technical writing, report writing, and the like.</td>
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<tr>
<td>ENG 514</td>
<td>MEDIEVAL ENGLISH LITERATURE</td>
<td>3</td>
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<tr>
<td></td>
<td>A study of the dominant types in the literature of England from the beginning to 1500.</td>
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<tr>
<td>ENG 515</td>
<td>CHAUCER</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of the life, the times, and language of Chaucer. The main concentration is on The Canterbury Tales as rendered in Middle English.</td>
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<tr>
<td>ENG 522</td>
<td>EARLY RENAISSANCE LITERATURE</td>
<td>3</td>
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<tr>
<td></td>
<td>A survey of the literature of the sixteenth century from Thomas More to Sidney and Spenser.</td>
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<tr>
<td>ENG 524</td>
<td>SHAKESPEARE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of significant aspects of Shakespeare's plays and poems.</td>
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<tr>
<td>ENG 532</td>
<td>LATER RENAISSANCE LITERATURE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A survey of the literature of the early seventeenth century from Bacon, Johnson, and Donne to Marvell, exclusive of Milton.</td>
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<tr>
<td>ENG 536</td>
<td>STUDIES IN DRAMA TO 1642</td>
<td>3</td>
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<tr>
<td></td>
<td>Studies in English drama from the beginning to the closing of the theatres.</td>
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<tr>
<td>ENG 538</td>
<td>MILTON</td>
<td>3</td>
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<tr>
<td></td>
<td>A study of the major and minor poems and selected prose of Milton.</td>
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<tr>
<td>ENG 542</td>
<td>STUDIES IN NEO-CLASSICAL LITERATURE</td>
<td>3</td>
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<tr>
<td></td>
<td>Studies in literature from Dryden to Johnson.</td>
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<tr>
<td>ENG 552</td>
<td>ENGLISH ROMANTICISM</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of the major poets and critics of the Romantic Age.</td>
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<tr>
<td>ENG 556</td>
<td>STUDIES IN NINETEENTH-CENTURY LITERATURE</td>
<td>3</td>
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<tr>
<td></td>
<td>A study of the literature in England in the nineteenth century.</td>
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<tr>
<td>ENG 560</td>
<td>TWENTIETH-CENTURY BRITISH LITERATURE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A consideration of significant developments in modern British literature.</td>
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<tr>
<td>ENG 572</td>
<td>AMERICAN ROMANTICISM</td>
<td>3</td>
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<tr>
<td></td>
<td>A study of significant developments in American literature of the mid-nineteenth century.</td>
<td></td>
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<tr>
<td>ENG 576</td>
<td>MAJOR AMERICAN WRITERS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>An intensive comparative study of two or three American writers.</td>
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<tr>
<td>ENG 580</td>
<td>AMERICAN REALISM AND NATURALISM</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of representative writers from the post-Civil War period in American literature.</td>
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<tr>
<td>ENG 584</td>
<td>STUDIES IN TWENTIETH-CENTURY AMERICAN LITERATURE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of significant developments in American literature of the twentieth century.</td>
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<tr>
<td>ENG 585</td>
<td>HISTORY OF RHETORIC</td>
<td>3</td>
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<tr>
<td></td>
<td>A history of rhetoric from the classical to the modern age.</td>
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<tr>
<td>Course</td>
<td>Title</td>
<td>Credits</td>
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<tr>
<td>ENG 587</td>
<td>CONTEMPORARY RHETORIC</td>
<td>3</td>
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<tr>
<td></td>
<td>An examination of one or more contemporary forms of argumentation and their application in writing.</td>
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<tr>
<td>ENG 588</td>
<td>STUDIES IN CRITICISM</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A treatment of significant topics in theoretical and/or practical criticism.</td>
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<tr>
<td>ENG 590</td>
<td>TEACHING OF COLLEGE ENGLISH</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Discussion, instruction, and practice in the methods of teaching composition and literature. Required of and open only to graduate assistants.</td>
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<tr>
<td>ENG 591</td>
<td>STUDIES IN LITERATURE</td>
<td>1-6</td>
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<tr>
<td></td>
<td>An analysis of selected literary problems or areas.</td>
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<tr>
<td>ENG 592</td>
<td>HISTORY OF ENGLISH</td>
<td>3</td>
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<tr>
<td></td>
<td>A study of stages in the development of the English language and of influences shaping its development from the beginning to the present time.</td>
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<tr>
<td>ENG 594</td>
<td>THE STRUCTURE OF ENGLISH</td>
<td>3</td>
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<tr>
<td></td>
<td>Studies in the grammatical structure of modern English in the light of historical development. Traditional and modern linguistic points of view are considered.</td>
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<tr>
<td>ENG 596</td>
<td>COMPOSITION THEORY</td>
<td>3</td>
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<tr>
<td></td>
<td>Study of the principal current theories of composition, with application to the teaching and evaluating of writing.</td>
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<tr>
<td>ENG 599</td>
<td>THESIS</td>
<td>3-6</td>
</tr>
<tr>
<td>ENG 601</td>
<td>RESEARCH AND BIBLIOGRAPHY</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>An introduction to the methods and tools of literary scholarship. Required of all degree applicants.</td>
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<tr>
<td>ENG 605</td>
<td>STUDIES IN AN AUTHOR</td>
<td>3</td>
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<tr>
<td></td>
<td>A consideration of the body of an author's work and its relationship to the life of the author.</td>
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<tr>
<td>ENG 609</td>
<td>STUDIES IN A GENRE OR MODE</td>
<td>3</td>
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<tr>
<td></td>
<td>An intensive analysis of a significant literary form or mode.</td>
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<tr>
<td>ENG 613</td>
<td>STUDIES IN A LITERARY MOVEMENT</td>
<td>3</td>
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<tr>
<td></td>
<td>An analysis of a significant literary school, group, or movement.</td>
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<tr>
<td>ENG 621</td>
<td>STUDIES IN THE TEACHING OF LITERATURE</td>
<td>3</td>
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<tr>
<td></td>
<td>An exploration of ways to teach literature more effectively for particular students.</td>
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<tr>
<td>ENG 625</td>
<td>STUDIES IN THE TEACHING OF COMPOSITION</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>An exploration of ways to teach writing more effectively for particular groups of students.</td>
<td></td>
</tr>
<tr>
<td>ENG 627</td>
<td>PROFESSIONAL WRITING</td>
<td>1-3</td>
</tr>
<tr>
<td></td>
<td>Analysis of and practice in professional writing in different contexts, for example, proposal writing, evaluative report writing, and editing skills.</td>
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</tr>
<tr>
<td>ENG 629</td>
<td>WRITING NON-FICTION</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Study of and practice in the writing of non-fiction texts, such as essays, biography, letters, diaries, travel accounts, sermons.</td>
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</tbody>
</table>
College of Arts and Sciences

(GEO) Geology (Collapse Description)

Dr. Don Pair, Chair of the Department

* There is not a graduate program in geology at this time. The course listed below supports other graduate programs.

Courses (Expand All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 501</td>
<td>GEOLOGY, LANDSCAPE, AND ENVIRONMENT OF THE MIAMI VALLEY</td>
<td>3</td>
</tr>
</tbody>
</table>

Investigation of the geologic processes and history of the landscape of the Miami Valley; assessment of the impact of human activity on the environment. Examination of the significance of local events as a reflection of global events and global change. This is primarily a field-based course for both teachers of science and those with no science teaching experience.
School of Education and Allied Professions (HSS) Health and Sport Science

Lloyd L. Laubach, Chair of the Department

The Department of Health and Sport Science offers a Master of Science in both physical education and exercise science. The Master of Science in physical education is a flexible, personalized program providing the student with advanced training in physical education. These special capabilities enable the student to become a professional leader in the field of physical education. The Master of Science in education with a concentration in exercise science is designed to prepare individuals for careers in exercise science, corporate fitness, wellness, or personal training as well as for doctoral study in the exercise sciences. It has a scientific base which includes a mandatory research project that must be submitted to a peer-reviewed journal for publication prior to graduation. Graduates will be prepared for the American College of Sports Medicine or National Strength and Conditioning Association certification exams.

Advising

The coordinator of the graduate program within the department will act as the student's academic advisor. A personalized program will be planned with the student during the first term of enrollment in an effort to meet the student's professional and personal goals and needs. The coordinator will also counsel the student on the purpose and requirements of graduate work, selection of courses, and the options available within the department.

Candidacy

The most important consideration in the admission of students to candidacy is the quality of their graduate work to date. Evidence of the ability to meet all the graduation requirements must be given. The applicant who is deemed unqualified at this point will be advised to discontinue the program.

A student should apply for admission to candidacy after completion of six semester hours of graduate work, including at least HSS 555, Survey of Research Processes and Design in Sport Science and HSS 560, Evaluation and Applied Statistics in Sport Science. Application is made by filing an official candidacy form with the Department of Health and Sport Science.

Successful completion of a written comprehensive examination or research project is required for graduation. If the student chooses to write a thesis/research project, the comprehensive examination requirement is waived. The comprehensive examination, four hours in length, will cover the student's area of concentration. The comprehensive examination may be taken during the student's last term of coursework or upon completion of the coursework in the area of concentration. It is given once during each of the three regular terms. It is the student's responsibility to make formal application one month in advance for the examination. Examination dates will be posted at the beginning of each term. If a student fails the examination the first time, a second opportunity will be given. Failure the second time leads to dismissal from the program.

Programs (Collapse All)

Program Name
Master of Science in Exercise Science (EXS)

A minimum of 30 semester hours is required. Students must achieve an average of at least B (3.0) in all work undertaken to qualify for graduation. Students who receive grades of C or less in two courses will be dismissed from the program.
HSS 555  SURVEY OF RESEARCH PROCESSES AND DESIGN IN SPORT SCIENCE  3
HSS 560  EVALUATION AND APPLIED STATISTICS IN SPORT SCIENCE  3
- - - EDU 901  INQUIRY, THEORY, AND QUALITATIVE RESEARCH (EDU 901)  3
or HSS 563  ADVANCED STATISTICS IN SPORT SCIENCE (HSS 563)

Educational Component (select two courses from)
EDA 540  INSTRUCTIONAL STRATEGIES  3
EDT 500  MODELS OF TEACHING  3
HSS 548  SAFETY AND LAW IN THE SPORT SCIENCES  2
HSS 556  ISSUES IN SPORT SCIENCE (SEMINAR)  2

Area of Concentration: Exercise Science  15
HSS 531  NUTRITION FOR EXERCISE/SPORT  3
HSS 535  EXERCISE ECG  3
HSS 537  BIOMECHANICS  3
HSS 550  PHYSIOLOGICAL RESPONSES TO EXERCISE  3
HSS 551  LABORATORY TECHNIQUES FOR THE SPORT SCIENCE PRACTITIONER  2
HSS 591  RESEARCH MANUSCRIPT  1-4

Other Elective  3

Master of Science in Physical Education (EDP)

A minimum of 30 semester hours is required. Students must achieve an average of at least B (3.0) in all work undertaken to qualify for graduation. Students who receive grades of C or less in two courses will be dismissed from the program.

Physical Education  30
EDT 500  MODELS OF TEACHING  3
EDT 508  THEORIES OF LEARNING AND HUMAN DEVELOPMENT  3
HSS 555  SURVEY OF RESEARCH PROCESSES AND DESIGN IN SPORT SCIENCE  3
HSS 560  EVALUATION AND APPLIED STATISTICS IN SPORT SCIENCE  3

Options  1-4
HSS 591  RESEARCH MANUSCRIPT  1-4
or Additional coursework in HSS  3

Physical Education Electives from Subcategories (see below)  15

Subcategories¹
I. Curriculum and Instruction  6
EDA 540²  INSTRUCTIONAL STRATEGIES  3
HSS 523  CURRICULUM DEVELOPMENT IN PHYSICAL EDUCATION  3
HSS 547  ADMINISTRATION OF INTERSCHOLASTIC AND INTRAMURAL ATHLETICS  2
HSS 548  SAFETY AND LAW IN THE SPORT SCIENCES  2
HSS 556  ISSUES IN SPORT SCIENCE (SEMINAR)  2
HSS 561  ANALYSIS-SUPERVISION OF PHYSICAL EDUCATION  3
HSS 575  INDIVIDUAL STUDIES IN SPORT SCIENCE  1-6
HSS 582  INTERNSHIP IN SPORT SCIENCE  1-3

II. Scientific Basis  6
HSS 531²  NUTRITION FOR EXERCISE/SPORT  3
HSS 537  BIOMECHANICS  3
HSS 550  PHYSIOLOGICAL RESPONSES TO EXERCISE  3
HSS 551  LABORATORY TECHNIQUES FOR THE SPORT SCIENCE PRACTITIONER  2
Students must take a minimum of two courses from each of the two subcategories and must select one of the subcategories as an area of interest. A minimum of three courses is required in area of interest.

### Required Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSS 510</td>
<td>HISTORY OF SPORT AND PHYSICAL ACTIVITY</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Study of the development of sport and physical education from early cultures to the present time. Emphasis on the United States.</td>
<td></td>
</tr>
<tr>
<td>HSS 518</td>
<td>STUDENT TEACHING</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Course consists of teaching physical education under supervision in elementary, middle, or high school.</td>
<td></td>
</tr>
<tr>
<td>HSS 523</td>
<td>CURRICULUM DEVELOPMENT IN PHYSICAL EDUCATION</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Principles and procedures for curriculum construction and revision; criteria for selecting activities and judging outcomes; the place of sport science within the total curriculum.</td>
<td></td>
</tr>
<tr>
<td>HSS 531</td>
<td>NUTRITION FOR EXERCISE/SPORT</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Investigates the latest research trends in the nutritional assessment of the athlete. Topics will pertain to dietary needs, fluid replenishment, pre-game meals, and &quot;fad&quot; diets for the athlete.</td>
<td></td>
</tr>
<tr>
<td>HSS 535</td>
<td>EXERCISE ECG</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Comprehensive coverage of the electrophysiology of the heart; the form-to-function relationship between the heart as an organ and the functioning of the intact human being in health, illness and aging; the mechanisms of selected anti-arrhythmic drugs and their ramifications for individuals at rest and exercise; the collection and interpretation of electrocardiography (ECG) tracings; and understanding the current literature relating to ECG topics and ability to design and complete an ECG study that includes pre and post tests and an exercise invention.</td>
<td></td>
</tr>
<tr>
<td>HSS 537</td>
<td>BIOMECHANICS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Investigations of physical principles operative in the performance of physical education activities with attempts to analyze for methods of greater effectiveness and improved performance.</td>
<td></td>
</tr>
<tr>
<td>HSS 547</td>
<td>ADMINISTRATION OF INTERSCHOLASTIC AND INTRAMURAL ATHLETICS</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Organization of high school athletic and intramural programs, staff, program, budget, health and safety, and other phases of administration.</td>
<td></td>
</tr>
<tr>
<td>HSS 548</td>
<td>SAFETY AND LAW IN THE SPORT SCIENCES</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Study of basic safety measures to prevent injuries and avoid legal suits. Investigation of the fundamental principles involved in the legal aspects of sports in contemporary society. Analysis of specific court cases dealing with negligence in physical education and sport.</td>
<td></td>
</tr>
<tr>
<td>HSS 550</td>
<td>PHYSIOLOGICAL RESPONSES TO EXERCISE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A study of the physiological changes that occur during exercise and training.</td>
<td></td>
</tr>
<tr>
<td>HSS 551</td>
<td>LABORATORY TECHNIQUES FOR THE SPORT SCIENCE PRACTITIONER</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>The practical application of selected sport science tests and measurements. Emphasis will be placed on human performance (strength, cardiovascular, flexibility, and body composition) testing.</td>
<td></td>
</tr>
<tr>
<td>HSS 555</td>
<td>SURVEY OF RESEARCH PROCESSES AND DESIGN IN SPORT SCIENCE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>This course is designed to develop an understanding of the nature of the general field of sport science research. It emphasizes the application of various research processes and design, learning by doing, and learning</td>
<td></td>
</tr>
</tbody>
</table>
through example. Intended for use by individuals who have minimal knowledge of statistics.

<table>
<thead>
<tr>
<th>Course Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>HSS 556</td>
<td>ISSUES IN SPORT SCIENCE (SEMINAR)</td>
<td>2</td>
</tr>
<tr>
<td>HSS 560</td>
<td>EVALUATION AND APPLIED STATISTICS IN SPORT SCIENCE</td>
<td>3</td>
</tr>
<tr>
<td>HSS 561</td>
<td>ANALYSIS-SUPervision of PHYSICAL EDUCATION</td>
<td>3</td>
</tr>
<tr>
<td>HSS 563</td>
<td>ADVANCED STATISTICS IN SPORT SCIENCE</td>
<td>3</td>
</tr>
<tr>
<td>HSS 575</td>
<td>INDIVIDUAL STUDIES IN SPORT SCIENCE</td>
<td>1-6</td>
</tr>
<tr>
<td>HSS 582</td>
<td>INTERNSHIP IN SPORT SCIENCE</td>
<td>1-3</td>
</tr>
<tr>
<td>HSS 591</td>
<td>RESEARCH MANUSCRIPT</td>
<td>1-4</td>
</tr>
</tbody>
</table>

A seminar to investigate and report on a specific issue in sport science.

Application of descriptive and inferential statistics to sport science tests and measurements. Quantitative analysis of selected physical fitness, motor performance, and body composition data.

The use of systematic observation methodology in supervision and the study of both classic and contemporary research on the analysis of physical education and sport instruction serve as the primary foci of this course.

The theory and hands-on applications of various social science statistical analyses to include: independent and dependent groups t-test, analysis of variance and covariance, multiple regression and non-parametric analyses. Students will use selected statistical software packages to execute real-world analyses problems.

Individual investigations of a problem in sport science. Students may not register for HSS 575 without having completed HSS 555 and HSS 560.

A job-related experience under the immediate supervision of personnel from a local sport science agency.

The development, planning, execution, analysis and manuscript completion of a research thesis in the sport sciences. The specific research question will be the student's choice with concurrence from his/her project advisor. Submission of the written product to a peer-reviewed research journal of at least national distribution is required before graduation. Students will also complete a successful oral defense of the thesis before the predesignated thesis team of at least three graduate faculty members from the School of Education, two of which are from the Health & Sport Science Department.
School of Engineering

(MSC) Management Science

Edward F. Mykytka, Chair of the Department of Engineering Management & Systems

The program of study leading to the Master of Science in management science is an interdisciplinary program administered by the School of Engineering, with the cooperative support of the College of Arts and Sciences, the School of Business Administration, and the School of Education and Allied Professions. Applications are invited from college graduates in all fields of study - business, education, engineering, liberal arts, physical sciences, and social sciences. The applicant whose preparation does not include at least three semesters of analytic geometry and calculus and computer competency will be expected to complete appropriate prerequisite courses prior to admission to the program.

The management scientist is the manager or staff specialist who is trained in the quantitative methodologies of operations research, systems analysis, and the decision sciences. The student is proficient in problem solving and decision-making, system modeling and optimization and the application of probability and statistical theory to management problems. The student must also be familiar with a variety of other topics, such as quality control, inventory planning and control, reliability and maintainability, and system simulation.

The objective of this program is to develop quantitative management skills and capabilities appropriate to each student's needs and objectives. The program emphasizes the practical application of management science techniques in our modern society.

Programs

Program Name

- Master of Science in Management Science (MSC)

The program of study must include a minimum of 36 semester hours consisting of the following:

1. Eighteen semester hours of courses in management science. These courses should provide depth in both deterministic and stochastic methods and will normally include MSC 521, 522, 535, 555 or 572, and two MSC courses from the selected management science specialization list.
2. Nine semester hours in a cognate field appropriate to the student's objectives, as approved by the advisor. Approved fields of study for the cognate field include applied mathematics, artificial intelligence, business administration, computer science, educational administration, engineering, human factors, manufacturing, public administration, or additional in-depth MSC courses.
3. Nine semester hours of supporting electives approved by the advisor, to include MSC 500 and MSC 501 or equivalent courses. Students with documented and equivalent knowledge of the subjects may, with the approval of the advisor and the chair, substitute other electives for the MSC 500-501 requirement.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

The selected management science specialization courses are: MSC 523, 541, 542, 555, 566, 560, 561, 565, 566 or 572. (MSC 555 or 572 may be taken as specialized electives only if not used to satisfy the core course requirements.)

Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
</table>

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000490&p=1000000522&c=-1 7/10/2012
MSC 500  PROBABILISTIC METHODS I
Advanced methods of engineering analysis for engineering managers and management scientists. Methods of operational calculus, probability modeling, and statistical analysis as applied to problems of analysis and design in engineering systems and management science.

MSC 501  PROBABILISTIC METHODS II
Continuation of MSC 500 with emphasis on teaching methods of linear algebra and inferential and experimental statistics as applied to problems of analysis and design in engineering systems and management science.

Prerequisite(s): MSC 500 or equivalent

MSC 521  DETERMINISTIC OPERATIONS RESEARCH
This introductory course covers deterministic methods for optimization, with a focus on mathematical programming (linear, nonlinear, and integer programming) and network methods.

Prerequisite(s): Three semesters of calculus

MSC 522  PROBABILISTIC OPERATIONS RESEARCH
This introductory course covers probabilistic methods for modeling and analyzing the performance of complex systems. Topics include Markov chains, queueing, forecasting, discrete event simulation, and inventory modeling.

Prerequisite(s): MSC 500 or equivalent

MSC 523  NONLINEAR OPTIMIZATION
This course concentrates on methods and engineering/management science applications of nonlinear optimization. Both single- and multi-variable methods as well as unconstrained and constrained problems are addressed. The course blends theoretical results such as the Kuhn-Tucker conditions and numerical search techniques such as conjugate directions with applications.

MSC 526  LINEAR AND INTEGER OPTIMIZATION
This course covers advanced topics in linear and integer programming with application to real-world problems. Topics include the revised simplex method, the dual-simplex method, interior point algorithms, duality and sensitivity analysis, decomposition principle, and goal and integer programming.

Prerequisite(s): MSC 521 or equivalent

MSC 527  ADVANCED TOPICS IN OPTIMIZATION
This course emphasizes advanced topics in nonlinear or linear optimization with application to the solution of real-world problems. Topics reflect the state of the art in mathematical programming and optimization.

Prerequisite(s): MSC 521 and consent of the instructor

MSC 535  APPLIED OPERATIONS RESEARCH/MANAGEMENT SCIENCE
This is a capstone course focused on the "art" rather than the "science" of problem solving in management science and operations research. Emphasis is placed on the techniques of problem solving and model building, examination of unique problem cases, and a course project requiring modeling, data collection, and analysis.

Prerequisite(s): Completion of the Management Science core courses or equivalent

MSC 539  INTRODUCTION TO APPLIED PROGRAM MANAGEMENT
A graduate course for corporate and government managers that emphasizes the concepts, techniques and procedures used to manage programs or projects. The course provides a complete overview of the project management tools and methodologies used to plan, control and execute programs or projects. Course topics include project screening and selection; multiple-criteria methods for evaluation; work breakdown structures and organization; configuration selection, management and control; project scheduling; project budgets; resource management; research and development projects; computer support for project management.

Prerequisite(s): ENM 505 or equivalent experience

MSC 541  PRODUCTION ENGINEERING
The study of the integration of man, machine, and material in producing a marketable product. The use of engineering techniques to design, develop,
and implement the production system are covered. Topics include break-even analysis, learning curve theory, forecasting, resource balancing, inventory and production control, facility layout and location, job sequencing and scheduling, and assembly line balancing. Modern production techniques such as just-in-time, MRP systems, flexible manufacturing, and computer integrated manufacturing are discussed.

**Prerequisite(s):** MSC 521 or permission of the instructor

**MSC 542 INVENTORY THEORY AND APPLICATION**

In-depth coverage of inventory theory including both deterministic and stochastic models. Topics include EOQ models, quantity discounting, constrained inventory, the fixed reorder point model, the fixed review model, repairable inventory systems, and dynamic inventory/production models. Also discussed are system backorder and availability models. Both public and private sector applications are covered.

**Prerequisite(s):** MSC 501, 521, 522 or equivalent

**MSC 544 FORECASTING AND TIME SERIES ANALYSIS**

Concentration on statistical techniques for modeling and predicting discrete time-series phenomena, with emphasis on understanding and applying forecasting tools in analysis and management settings. Both classical smoothing methods and the Box-Jenkins methodology for model identification, estimation, and prediction are presented.

**Prerequisite(s):** MSC 501 or equivalent

**MSC 546 QUEUING THEORY AND APPLICATION**

Emphasis on application of queuing theory to engineering problems. Machine interference, mathematical queuing models, marketing models, servicing problems, Monte Carlo techniques, and computer simulation models are covered.

**Prerequisite(s):** MSC 501, 522 or equivalent

**MSC 555 SYSTEM DYNAMICS I**

Introduction to the methodology for modeling the dynamics of complex engineering, business, and socioeconomic systems. These models are used to study the effect of organizational policies and design in higher-order, multiple-loop, and nonlinear feedback systems.

**MSC 556 SYSTEM DYNAMICS II**

Continuation of MSC 555 with emphasis on the study of large-scale corporate, urban, educational, and ecological systems.

**Prerequisite(s):** MSC 555 or equivalent

**MSC 560 QUALITY ASSURANCE**

Introduction to the fundamental concepts and methods of modern approaches to quality assurance, with emphasis on statistical methods for process control, process capability analysis, and sampling inspection. The course introduces relevant methods of experimental design and current issues in quality improvement.

**Prerequisite(s):** MSC 501 or equivalent

**MSC 561 DESIGN AND ANALYSIS OF EXPERIMENTS**

Introduction to advanced topics in experimental design and analysis, including full and fractional factorial designs, response surface analysis, multiple and partial regression, and correlation.

**Prerequisite(s):** MSC 501 or equivalent

**MSC 565 RELIABILITY ENGINEERING I**

An introduction to reliability engineering concepts and methodology. The reliability, maintainability, and availability of components and multi-component systems are analyzed. Topics include exponential, Weibull, lognormal and normal failure laws, static reliability, hazard rate functions, state dependent failure rate models, redundancy, censoring, empirical models, curve fitting to failure data, and reliability growth testing.

**Prerequisite(s):** MSC 501 or equivalent

**MSC 566 RELIABILITY ENGINEERING II**

Continuation of MSC 565, with emphasis on the design of systems to meet specified reliability, availability, and maintainability requirements.

**Prerequisite(s):** MSC 565 or equivalent

**MSC 572 SYSTEM SIMULATION**
An introduction to stochastic simulation. Topics covered include the generation of random numbers and random variables; analysis of input data; computer modeling of real systems; strategies, tactics, and experimentation involved in performing a simulation study; and the statistical analysis of simulation output. 

**Prerequisite(s):** MSC 501, MSC 522 or equivalent

**MSC 577**  
**INTRODUCTION TO EXPERT SYSTEMS**  
Introduction to the development and application of rule-based systems using an integrated environment of commands, rules, databases, spreadsheets, text processing, and forms. Topics include knowledge representation, inference, search, ID3 algorithm, and logic along with suitable applications and their subsequent implementation.

**MSC 579**  
**SELECTED TOPICS IN ARTIFICIAL INTELLIGENCE**  
Special topics include engineering applications using neural net architecture, object-oriented programming, genetic algorithm and advanced search methods illustrated in Common Lisp and a rule-based environment. 

**Prerequisite(s):** MSC 575 and MSC 577 or permission of the instructor

**MSC 595**  
**CURRENT PROBLEMS**  
Topics of current interest in specialized areas of Management Science.

**MSC 599**  
**THESIS**  
1 - 6
School of Engineering  
(MAT) Materials Engineering  
Daniel Eylon, Director of the Program

Programs  
Program Name  
Doctorate of Engineering in Materials Engineering (MAT)  
See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Doctorate of Philosophy in Materials Engineering (MAT)  
See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Master of Science in Materials Engineering (MAT)  
The program of study leading to the Master of Science in materials engineering must include a minimum of 30 semester hours consisting of the following:  
1. Twelve semester hours in the major field.  
2. Twelve semester hours of approved electives from current course offerings which best suit the student's requirements.  
3. Six semester hours of research on a materials engineering project or thesis. Upon the request of the student and with the approval of the advisor and the program director, this may be replaced by six semester hours of additional coursework.  
See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the advisor.

Courses  
Code  
MAT 501  PRINCIPLES OF MATERIALS I  
Structure of engineering materials from electronic to atomic and crystallographic considerations. Includes: atomic structure and interatomic bonding, imperfections, diffusion, mechanical properties, strengthening mechanisms, failure, phase diagrams, phase transformations and processing.  
Prerequisite(s): College chemistry, physics and MTH 219

MAT 502  PRINCIPLES OF MATERIALS II  
Structure, behavior, and processing of metal alloys, ceramics, polymers, and composites to include: mechanical behavior, corrosion, electrical, magnetic, and optical properties.  
Prerequisite(s): MAT 501 or equivalent

MAT 503  X-RAY CRYSTALLOGRAPHY  
Broad coverage of fundamental crystallography, the interaction of x-rays with matter, and the x-ray scattering techniques used to study materials.  
Prerequisite(s): College chemistry and physics
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 504</td>
<td>TECHNIQUES OF MATERIALS ANALYSIS</td>
<td>3</td>
<td>Fundamentals and applications of the traditional analytical methods such as x-ray analysis, electron microprobe, and scanning microscopy. Techniques such as NMR, atomic absorption, Raman, Mossbauer, and field ion microscopy will be covered. Emphasis on applicability. <strong>Prerequisite(s):</strong> MAT 501 or consent of instructor</td>
</tr>
<tr>
<td>MAT 505</td>
<td>THERMODYNAMICS OF SOLIDS</td>
<td>3</td>
<td>Laws of thermodynamics, auxiliary functions, thermodynamic relations, phase transitions, thermodynamic equilibrium, thermodynamic properties of solid solutions, surfaces and interfaces. <strong>Prerequisite(s):</strong> MAT 501 or consent of instructor</td>
</tr>
<tr>
<td>MAT 506</td>
<td>MECHANICAL BEHAVIOR OF MATERIALS</td>
<td>3</td>
<td>Description of the state of stress and strain in materials, plastic deformation, fatigue, fracture, creep, and rupture. <strong>Prerequisite(s):</strong> EGM 303, EGM 330 or consent of instructor</td>
</tr>
<tr>
<td>MAT 507</td>
<td>INTRODUCTION TO CERAMIC MATERIALS</td>
<td>3</td>
<td>Ceramics are defined as inorganic nonmetallic materials which are employed in all facets of our daily lives. This course reviews the fundamentals associated with modern ceramic technology. The scope of ceramic materials from traditional to advanced systems are identified and studied and the associated industries are reviewed. The chemistry of ceramics are studied to provide a fundamental basis for understanding modern ceramic technology. In addition to studying the different types of ceramic systems the processing technologies employed for ceramic products are reviewed. The properties of ceramics and the associated methods for measuring these properties are studied. The final phase of the course reviews the concepts for designing with ceramic materials and the range of applications for modern ceramics. <strong>Prerequisite(s):</strong> MAT 501</td>
</tr>
<tr>
<td>MAT 508</td>
<td>PRINCIPLES OF MATERIAL SELECTION</td>
<td>3</td>
<td>Basic scientific and practical consideration involved in the intelligent selection of materials for specific applications. Impact of new developments in materials technology and analytical techniques. <strong>Prerequisite(s):</strong> MAT 501 or consent of instructor</td>
</tr>
<tr>
<td>MAT 509</td>
<td>INTRODUCTION TO POLYMER SCIENCE</td>
<td>3</td>
<td>Technical overview of the nature of synthetic macromolecules, including the formation of polymers and their structure, structure-property relationships, polymer characterization and processing, and applications of polymers. <strong>Prerequisite(s):</strong> College chemistry and physics</td>
</tr>
<tr>
<td>MAT 510</td>
<td>PHYSICAL PROPERTIES OF POLYMERS</td>
<td>3</td>
<td>Survey of high performance thermoset resins with focus on structural applications. The survey will include types of thermosets, chemistry, processing, properties, cost, suppliers, and applications. Characterization techniques and typical properties will also be reviewed. The course will also involve a fundamental discussion or cross-linked polymer structure-processing-property relationships, the glassy state, rubber elasticity, time-temperature superposition, and cure kinetics. <strong>Prerequisite(s):</strong> MAT 509, general and organic chemistry, differential equations or consent of instructor</td>
</tr>
<tr>
<td>MAT 511</td>
<td>PRINCIPLES OF CORROSION</td>
<td>3</td>
<td>Application of electrochemical principles, corrosion reactions, passivation, cathodic and anodic protection, stress corrosion, and high-temperature oxidation. <strong>Prerequisite(s):</strong> MAT 501</td>
</tr>
<tr>
<td>MAT 512</td>
<td>ENGINEERING MAGNETIC MATERIALS</td>
<td>3</td>
<td>Basics of magnetics, covering magnetic phenomena, spontaneous magnetization, and technical magnetization, will be introduced and technically important soft magnetic materials and permanent magnet materials will be described. Recent advances in magnetic materials, including magnetic materials with nanostructure, high-temperature magnetic materials, and giant magnetoresistance materials, will be emphasized. <strong>Prerequisite(s):</strong> College physics and MAT 501 or consent of instructor</td>
</tr>
<tr>
<td>MAT 513</td>
<td>ADVANCED MAGNETIC MATERIALS</td>
<td>3</td>
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</tbody>
</table>
A more detailed description of magnetics and magnetic materials, including spontaneous magnetization, domain structure, magnetic anisotropy, energies involved in magnetic materials, technical magnetization, Fe, Fe-Si, Fe-Ni, Fe-Co, Fe-Al, soft ferrites, amorphous soft magnetic materials, nanocrystalline soft magnetic materials, Afinico, Fe-Cr-Co, hard ferrites, SmCo5, Sm2Co17, Nd2Fe14B, Sm-Fe-N, nanocomposite permanent magnet materials and coercivity mechanisms.

**Prerequisite(s):** MAT 512

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 514</td>
<td>APPLIED SUPERCONDUCTIVITY - AN INTRODUCTION</td>
<td>3</td>
<td>Consent of instructor</td>
</tr>
<tr>
<td>MAT 515</td>
<td>STATISTICAL THERMO-DYNAMICS</td>
<td>3</td>
<td>MEE 301, MTH 219</td>
</tr>
<tr>
<td>MAT 516</td>
<td>SOLIDIFICATION OF METALS</td>
<td>3</td>
<td>MAT 501 or consent of instructor</td>
</tr>
<tr>
<td>MAT 517</td>
<td>PHASE DIAGRAMS</td>
<td>3</td>
<td>MAT 501</td>
</tr>
<tr>
<td>MAT 518</td>
<td>DIFFUSION IN SOLIDS</td>
<td>3</td>
<td>MAT 501, MAT 505</td>
</tr>
<tr>
<td>MAT 519</td>
<td>PHASE TRANSFORMATION</td>
<td>3</td>
<td>MAT 501</td>
</tr>
<tr>
<td>MAT 520</td>
<td>POWDER METALLURGY</td>
<td>3</td>
<td>MAT 501</td>
</tr>
<tr>
<td>MAT 521</td>
<td>NONDESTRUCTIVE EVALUATION</td>
<td>3</td>
<td>Consent of instructor</td>
</tr>
<tr>
<td>MAT 525</td>
<td>DESIGN OF MACROMOLECULAR SYSTEMS</td>
<td>3</td>
<td>CHM 314, MAT 510</td>
</tr>
<tr>
<td>MAT 526</td>
<td>POLYMER ENGINEERING</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
processing through proper material selection.

**Prerequisite(s):** MEE 308, MEE 410, MAT 510

MAT 527  METHODS OF POLYMER ANALYSIS

Modern laboratory techniques used in preparation and characterization of polymers; experimental investigations of polymer structure-property relations; measurement of molecular weight averages and distributions, thermal and mechanical properties, viscoelastic properties; transitions and crystallinity.

**Prerequisite(s):** MAT 509, MAT 510

MAT 530  INTRODUCTION TO ANALYTICAL ELECTRON MICROSCOPY

Introduction to the use of analytical transmission electron microscopy applied to the study of materials. The following techniques and principles will be covered: design and operation of the AEM, image formation, crystallography and the reciprocal space construction, selected area diffraction, convergent beam electron diffraction, energy dispersive X-ray microanalysis, and electron energy loss spectroscopy.

**Prerequisite(s):** College physics

MAT 535  HIGH-TEMPERATURE MATERIALS

This course will provide the student with the basic material behavior concepts that control high-temperature properties of metals and alloys. Special emphasis will be given to creep behavior of metals which will include a comprehensive study of relationships between microstructure and high-temperature creep deformation of pure metals, single-phase alloys, multi-phase alloys, and dispersion-strengthened materials. In addition, the properties and applications of high-temperature materials will be discussed, especially those alloys used in the aerospace industry, such as titanium and nickel-based alloys.

**Prerequisite(s):** MAT 501 or equivalent

MAT 539  THEORY OF PLASTICITY

Fundamentals of plasticity theory including elastic, viscoelastic, and elastic-plastic constitutive models: plastic deformation on the macroscopic and microscopic levels; stress-strain relations in the plastic regime; strain hardening; limit analysis; numerical procedures.

**Prerequisite(s):** EGM 503 or 533

MAT 540  COMPOSITE DESIGN


**Prerequisite(s):** EGM 303 or EGM 330

MAT 541  EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS

Introduction to the mechanical response of fiber-reinforced composite materials with emphasis on the development of experimental methodology. Analytical topics include stress-strain behavior of anisotropic materials, laminate mechanics, and strength analysis. Theoretical models are applied to the analysis of experimental techniques used for characterizing composite materials. Lectures are supplemented by laboratory sessions in which characterization tests are performed on contemporary composite materials.

**Prerequisite(s):** EGM 303 or EGM 330

MAT 542  ADVANCED COMPOSITES

Materials and processing. Comprehensive introduction to advanced fiber reinforced polymeric matrix composites. Constituent materials and composite processing will be emphasized with special emphasis placed on structure-property relationships, the role of matrix in composite processing, mechanical behavior and laminate processing. Specific topics will include starting materials, material forms, processing, quality assurance, test methods, and mechanical behavior.

**Prerequisite(s):** MAT 501, MAT 509, or consent of the instructor

MAT 543  ANALYTICAL MECHANICS OF COMPOSITE MATERIALS

Analytical models are developed for predicting the mechanical and thermal behavior of fiber-reinforced composite materials as a function of constituent material properties. Both continuous and discontinuous fiber-reinforced systems are considered. Specific topics include basic mechanics of anisotropic materials, micro-mechanics and lamination theory, free-edge effects, and failure criteria.

**Prerequisite(s):** EGM 303 or EGM 330
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 544</td>
<td>MECHANICS OF COMPOSITE STRUCTURES</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Comprehensive treatment of laminated beams, plates, and sandwich structures. Effect of heterogeneity and anisotropy on bending under lateral loads, buckling, and free vibration are emphasized. Shear deformation and other higher-order theories and their range of parametric applications also considered.</td>
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<td></td>
<td><strong>Prerequisite(s):</strong> MAT 543 or consent of instructor</td>
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<tr>
<td>MAT 550</td>
<td>MATERIALS ENGINEERING PROJECT</td>
<td>1-6</td>
</tr>
<tr>
<td></td>
<td>Student participation in a materials engineering project under the direction of a project advisor. The student prepares a satisfactory written report, as determined by the project advisor, and presents an open seminar on the subject of the project.</td>
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<tr>
<td>MAT 560</td>
<td>DYNAMIC BEHAVIOR OF MATERIALS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction to impact phenomena, characteristics of elastic stress waves in bars, elastic-plastic stress waves in bars and plates, introduction to shock waves, material characterization at high strain rates, experimental techniques, and material models for ductile and brittle solids, impact on ductile, brittle, and composite materials, computer codes for impact simulation.</td>
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</tr>
<tr>
<td>MAT 562</td>
<td>SHOCK WAVES AND PENETRATION MECHANICS</td>
<td>3</td>
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<tr>
<td></td>
<td>Shock waves in ductile, brittle, and composite materials, penetration mechanics of projectiles in metals, composites, and brittle materials, analytical and computational modelling.</td>
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<tr>
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<td><strong>Prerequisite(s):</strong> MAT 560</td>
<td></td>
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<tr>
<td>MAT 570</td>
<td>FRACTURE MECHANICS</td>
<td>3</td>
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<tr>
<td></td>
<td>Application of the principles of fracture mechanics to problems associated with fatigue and fracture in engineering structures. The course will cover the development of models that apply to a range of materials, geometries, and loading conditions.</td>
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<tr>
<td></td>
<td><strong>Prerequisite(s):</strong> MAT 506 or consent of instructor</td>
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<tr>
<td>MAT 575</td>
<td>FRACTURE AND FATIGUE OF METALS AND ALLOYS I</td>
<td>3</td>
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<td></td>
<td>This course will cover the effects of microstructure on the fracture and fatigue behavior of engineering metals and alloys with a special emphasis on static and dynamic brittle and ductile failures and crack initiation. Alloy fracture resistance, fracture toughness, and methods to improve fracture behavior will be discussed in detail. Various analytical techniques in the failure analysis of structural components will be presented.</td>
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<td></td>
<td><strong>Prerequisite(s):</strong> MAT 501, MAT 506 or consent of instructor</td>
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<tr>
<td>MAT 576</td>
<td>FRACTURE AND FATIGUE OF METALS AND ALLOYS II</td>
<td>3</td>
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<td></td>
<td>This course will cover the areas of the effects of microstructure on fatigue crack propagation on fracture and fatigue. This will include fatigue life prediction, damage tolerance approach to component design, and microstructural and structural synthesis for optimum behavior. Specific material-related aspects of fatigue mechanisms, fracture mechanics approach, and failure analysis will also be covered.</td>
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<td></td>
<td><strong>Prerequisite(s):</strong> MAT 575 or equivalent</td>
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<tr>
<td>MAT 577</td>
<td>LIGHT STRUCTURAL METALS</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Prerequisite(s):</strong> MAT 501 and MAT 502</td>
<td></td>
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<tr>
<td>MAT 589</td>
<td>GRADUATE SEMINAR SERIES</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Graduate seminars on various current material topics presented by guest speakers.</td>
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</tr>
<tr>
<td>MAT 590</td>
<td>SELECTED READINGS IN MATERIALS ENGINEERING</td>
<td>1-3</td>
</tr>
<tr>
<td></td>
<td>Directed readings in selected areas of materials engineering arranged and approved by the student's advisor and the program director.</td>
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</tr>
<tr>
<td>MAT 595</td>
<td>SPECIAL PROBLEMS IN MATERIALS ENGINEERING</td>
<td>1-3</td>
</tr>
<tr>
<td></td>
<td>Special assignments arranged by the materials engineering faculty.</td>
<td></td>
</tr>
</tbody>
</table>
MAT 599 THESIS

MAT 601 SURFACE CHEMISTRY OF SOLIDS
The nature of solid surfaces as determined by the techniques of x-ray photoelectron and Auger electron spectroscopy, secondary ion mass spectrometry, and ion scattering spectroscopy.
Prerequisite(s): MAT 501 or consent of instructor

MAT 602 ELECTRONIC PROPERTIES OF MATERIALS
An introduction to quantum mechanics, the electronic properties of isolated atoms, and the evolution of these properties in the formation of condensed matter. Topics covered include an introduction to quantum mechanics, the hydrogen atom, the periodic table, free electron theory of metals, band theory of solids, semiconductors, dielectric materials, magnetic materials, lasers, and optoelectronics.
Prerequisite(s): College physics, calculus and differential equations

MAT 603 MATERIALS SCIENCE OF THIN FILMS
An introduction to the basic physics of film formation processes including physical vapor deposition and chemical vapor deposition, film properties, and applications. Nucleation theory, film interdiffusion and reaction, metallurgical and protective coatings, electrical, magnetic, and optical properties of thin films. Emphasis on applicability.
Prerequisite(s): College physics, fundamental physical and chemical properties of materials

MAT 604 NANOSTRUCTURED MATERIALS
A graduate-level course covering the fundamental physics, properties, and applications of nanostructured materials. Includes carbon nanotubes, nanostructured ceramics, metals, and semiconductor materials.
Prerequisite(s): College physics, fundamental physical and chemical properties of materials

MAT 605 INTRODUCTION TO CARBON NANO TECHNOLOGY
A graduate-level course covering the fundamental and applied aspects of Carbon Nanoscale Science and Technology. The course has three goals: (1) an overview of the current development in carbon science and technology (2) an introduction to the surface science as a means to understand the surface interaction at molecular scale, and (3) to provide some explicit links between macro, micro, and nano scale technologies. Some of the medical field, structural and friction application will be addressed. This course is aimed at both science and engineering students.

MAT 690 SELECTED READINGS IN MATERIALS ENGINEERING
Directed readings in materials engineering area arranged and approved by the chair of the student's advisory committee and the program director. May be repeated.

MAT 695 SPECIAL PROBLEMS IN MATERIALS ENGINEERING
Special assignments in materials engineering subject matter arranged and approved by the student's doctoral advisory committee and the program director. May be repeated.

MAT 698 D.E. DISSERTATION
An original investigation as applied to materials engineering practice. Results must be of sufficient importance to merit publication.

MAT 699 Ph.D. DISSERTATION
An original research effort which makes a definite contribution to technical knowledge. Results must be of sufficient importance to merit publication.
College of Arts and Sciences

(MTH) Mathematics

Paul W. Eloe, Chair of the Department
Muhammad N. Islam, Graduate Program Director

The Department of Mathematics offers a Master of Science in applied mathematics. This program is interdisciplinary in nature. A plan of study may include up to a four-course concentration in computer science, engineering, or business for students with appropriate backgrounds. The primary objective of the program in applied mathematics is to train students to do professional work in the applications of mathematics. The program provides a background in mathematical, numerical, and statistical analyses and students will gain valuable experience in modeling and computation. Students will have the opportunity to work on a semester or year-long project known as the Mathematics Clinic project.

The program strives to offer an individualized plan of study that meets the needs and career goals of the student. This is achieved by offering a core of courses blending analysis, linear algebra, modeling, and numerical analysis in the Department of Mathematics. The student, with departmental approval, will select a four-course concentration. The Mathematics Clinic project, the capstone requirement, is a research project in which the student applies mathematical, numerical, or statistical modeling methods to a problem related to the student's four-course concentration. The Mathematics Clinic project can be a team project and can involve faculty members from several departments.

An individualized degree program consists of courses satisfying the five core areas, an area of concentration, and electives. The program is approved by the student's committee and program director, and is intended to satisfy the specific needs and interests of the individual. Any core course that is already part of the student's academic background may be replaced with an elective consistent with the other requirements of the program.

To satisfy the requirement of an area of concentration, a student will be required to take 12 semester hours of 500-level coursework in the selected area of concentration. Examples of areas of concentration include (but are not limited to):

1. Differential Systems. Advanced and Partial Differential Equations (MTH 531 and MTH 535) plus six additional hours of mathematics courses approved by the committee.
2. Engineering Systems. Continuum Mechanics and Theory of Elasticity (EGM 503 and EGM 533) plus six additional hours of engineering courses (of a mathematical nature) approved by the committee.
3. Computational Systems. Numerical Analysis (MTH 555 and MTH 556) plus six additional hours of computer science courses approved by the committee.

Assistantships

Financial assistance is available to qualified students through graduate teaching assistantships. A graduate assistant receives a stipend, tuition remission, and health benefits. Most graduate assistants require two years to complete the requirements for a master's degree.

Facilities

Departmental PCs, the MATHSCI Computer Learning Environment, and the University of Dayton's mainframe computer are available for student use in conjunction with projects or coursework.

Programs

Program Name

Master of Science in Mathematics (MTH)
<table>
<thead>
<tr>
<th>Mathematics</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 404 or 525 COMPLEX VARIABLES (MTH 404)</td>
<td>3</td>
</tr>
<tr>
<td>MTH 430 COMPLEX VARIABLES I (MTH 525)</td>
<td>3</td>
</tr>
<tr>
<td>MTH 531 or 535 ADVANCED DIFFERENTIAL EQUATIONS (MTH 531)</td>
<td>3</td>
</tr>
<tr>
<td>MTH 514 PARTIAL DIFFERENTIAL EQUATIONS (MTH 535)</td>
<td>3</td>
</tr>
<tr>
<td>MTH 547 MATHEMATICS CLINIC</td>
<td>3</td>
</tr>
<tr>
<td>MTH 555 or 556 NUMERICAL ANALYSIS I (MTH 555)</td>
<td>3</td>
</tr>
<tr>
<td>MTH 556 NUMERICAL ANALYSIS II (MTH 556)</td>
<td>3</td>
</tr>
<tr>
<td>MTH 565 LINEAR ALGEBRA</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics Electives (see below)</td>
<td>15</td>
</tr>
</tbody>
</table>

**Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 506</td>
<td>CALCULUS CONCEPTS FOR MIDDLE SCHOOL TEACHERS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 519</td>
<td>STATISTICAL INFERENCE</td>
<td>3</td>
</tr>
<tr>
<td>MTH 520</td>
<td>STATISTICAL INFERENCE</td>
<td>3</td>
</tr>
<tr>
<td>MTH 521</td>
<td>REAL VARIABLES</td>
<td>3</td>
</tr>
<tr>
<td>MTH 522</td>
<td>REAL VARIABLES</td>
<td>3</td>
</tr>
<tr>
<td>MTH 525</td>
<td>COMPLEX VARIABLES I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 526</td>
<td>COMPLEX VARIABLES II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 532</td>
<td>DIFFERENCE EQUATIONS AND APPLICATIONS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 540</td>
<td>MATHEMATICAL MODELING</td>
<td>3</td>
</tr>
<tr>
<td>MTH 541</td>
<td>MATHEMATICS CLINIC</td>
<td>3</td>
</tr>
<tr>
<td>MTH 543</td>
<td>LINEAR MODELS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 545</td>
<td>SPECIAL FUNCTIONS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 547</td>
<td>STATISTICS FOR EXPERIMENTERS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 551</td>
<td>METHODS OF MATHEMATICAL PHYSICS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 552</td>
<td>METHODS OF APPLIED MATHEMATICS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 561</td>
<td>MODERN ALGEBRA I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 562</td>
<td>MODERN ALGEBRA II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 571</td>
<td>TOPOLOGY I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 572</td>
<td>TOPOLOGY II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 573</td>
<td>FUNCTIONAL ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 575</td>
<td>DIFFERENTIAL GEOMETRY</td>
<td>3</td>
</tr>
<tr>
<td>MTH 582</td>
<td>VECTOR AND TENSOR ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 583</td>
<td>DISCRETE AND CONTINUOUS FOURIER ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 590</td>
<td>TOPICS IN MATHEMATICS</td>
<td>3</td>
</tr>
<tr>
<td>MTH 598</td>
<td>THESIS</td>
<td>3-6</td>
</tr>
</tbody>
</table>

1At most, 6 hours of approved 400-level courses may be part of the student's program.

**Courses (Collapse All Courses)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 404</td>
<td>COMPLEX VARIABLES</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Functions of a complex variable, conformal mapping, integration in the complex plane. Laurent series and residue theory.</td>
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<tr>
<td></td>
<td><strong>Prerequisite(s):</strong> MTH 219.</td>
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<tr>
<td>MTH 430</td>
<td>REAL ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Continuation of MTH 330. Topics include the theory of convergence of sequences and series of functions in the context of metric spaces, uniform continuity, uniform convergence, and integration.</td>
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<tr>
<td></td>
<td><strong>Prerequisite(s):</strong> MTH 330.</td>
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<tr>
<td>MTH 506</td>
<td>CALCULUS CONCEPTS FOR MIDDLE SCHOOL TEACHERS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Presentation of selected topics intended to increase the content background for teachers of middle school mathematics. Enrollment is limited to current teachers of middle school mathematics who have Elementary or Secondary Certification, but who wish to qualify for Ohio's new Middle Childhood Licensure in Mathematics. Credits earned in this course do not apply toward a graduate degree in mathematics.</td>
<td></td>
</tr>
<tr>
<td>MTH 519</td>
<td>STATISTICAL INFERENCE</td>
<td>3</td>
</tr>
</tbody>
</table>
Sample spaces, Borel fields, random variables, distribution theory, characteristic functions, exponential families, minimax and Bayes' procedures, sufficiency, efficiency, Rao-Blackwell theorem, Neyman-Pearson lemma, uniformly most powerful tests, multi-variate normal distributions.

MTH 520  STATISTICAL INFERENCE
Sample spaces, Borel fields, random variables, distribution theory, characteristic functions, exponential families, minimax and Bayes' procedures, sufficiency, efficiency, Rao-Blackwell theorem, Neyman-Pearson lemma, uniformly most powerful tests, multi-variate normal distributions.

MTH 521  REAL VARIABLES

MTH 522  REAL VARIABLES

MTH 525  COMPLEX VARIABLES I
Analytic functions, integration on paths, the general Cauchy theorem. Singularities, residues, inverse functions and other applications of the Cauchy theory.

MTH 526  COMPLEX VARIABLES II
Infinite products, entire functions, the Riemann mapping theorem and other topics as time permits. 
Prerequisite(s): MTH 525 or equivalent

MTH 531  ADVANCED DIFFERENTIAL EQUATIONS
Existence and uniqueness theorems, linear equations and systems, self-adjoint systems, boundary value problems and basic nonlinear techniques. 
Prerequisite(s): MTH 503 or equivalent

MTH 532  DIFFERENCE EQUATIONS AND APPLICATIONS
The calculus of finite differences, first order equations, linear equations and systems, $z$-transform, stability, boundary value problems for nonlinear equations, Green's function, control theory and applications.

MTH 535  PARTIAL DIFFERENTIAL EQUATIONS
Classification of partial differential equations; methods of solution for the wave equation, Laplace's equation, and the heat equation; applications.
Prerequisite(s): MTH 503 or equivalent

MTH 540  MATHEMATICAL MODELING
An introduction to the use of mathematical techniques and results in constructing and modifying models designed to describe and/or predict behavior of real-world situations. 
Prerequisite(s): permission of the instructor

MTH 541  MATHEMATICS CLINIC
Student teams will be responsible for developing or modifying and testing a mathematical model designed for a particular purpose. Faculty guidance will be provided. May be repeated once for a maximum of 6 credit hours. 
Prerequisite(s): permission of the chair or program director

MTH 543  LINEAR MODELS
Least square techniques, lack of fit and pure error, correlation, matrix methods, $F$ test, weighted least squares, examination of residuals, multiple regression, transformations and dummy variables, model building, ridge regression, stepwise regression, multiple regression applied to analysis of variance problems. 
Prerequisite(s): MTH 368 or equivalent
MTH 545  SPECIAL FUNCTIONS
The special functions arising from solutions of boundary value problems which are encountered in engineering and the physical sciences. Hypergeometric functions, Bessel functions, Legendre polynomials.
Prerequisite(s): MTH 403 or equivalent

MTH 547  STATISTICS FOR EXPERIMENTERS
Covers those areas of design of experiments and analysis of quantitative data that are useful to anyone engaged in experimental work. Designed experiments using replication and blocking. Use of transformations. Applications of full and fractional factorial designs. Experimental design for developing quality into products using Taguchi methods.
Prerequisite(s): MTH 367 or equivalent

MTH 547  METHODS OF MATHEMATICAL PHYSICS
Linear transformations and matrix theory, linear integral equations, calculus of variations, eigenvalue problems.
Prerequisite(s): MTH 403 or equivalent

MTH 551  METHODS OF APPLIED MATHEMATICS
Dimensional analysis and scaling, regular and singular perturbation methods with boundary layer analysis, the stability and bifurcation of equilibrium solutions, other asymptotic methods.
Prerequisite(s): MTH 403 or equivalent

MTH 555  NUMERICAL ANALYSIS I
Solutions of nonlinear equations, Newton's methods, fixed point methods, solutions of linear equations, LU decomposition, iterative improvement, QR decomposition, SV decomposition.
Prerequisite(s): CPS 132 or 150 or equivalent, MTH 302 or equivalent

MTH 556  NUMERICAL ANALYSIS II
Interpolating functions, numerical differentiation, numerical integration including Gaussian quadrature, numerical solutions of differential equations.
Prerequisite(s): CPS 132 or 150 or equivalent, MTH 219 or equivalent

MTH 561  MODERN ALGEBRA I
Groups, rings, integral domains and fields; extensions of rings and fields; polynomial rings and factorization theory in integral domains; modules and ideals.

MTH 562  MODERN ALGEBRA II
Finite and infinite field extensions, algebraic closure, constructible numbers and solvability by use of radicals, Galois theory, and selected advanced topics.
Prerequisite(s): MTH 561

MTH 565  LINEAR ALGEBRA
Vector spaces, linear transformations and matrices; determinants, inner product spaces, invariant direct-sum decomposition and the Jordan canonical form.

MTH 571  TOPOLOGY I
An axiomatic treatment of the concept of a topological space; bases and subbases; connectedness, compactness; continuity, homeomorphisms, separation axioms and countability axioms; convergence in topological spaces.

MTH 572  TOPOLOGY II
Compactification theory, para-compactness and metrizability theorems, uniform spaces, function spaces, and other advanced topics of current interest.
Prerequisite(s): MTH 571 or equivalent

MTH 573  FUNCTIONAL ANALYSIS
The study of linear metric spaces with emphasis on Banach and Hilbert spaces. The Hahn-Banach theorem, the Banach fixed point theorem, and their consequences. Approximations and other selected advanced topics.
MTH 575  DIFFERENTIAL GEOMETRY
Vector and tensor algebra; covariant differentiation. An introduction to the classical theory of curves and surfaces treated by means of vector and tensor analysis.

MTH 582  VECTOR AND TENSOR ANALYSIS
The differential and integral calculus of scalar and vector fields with emphasis on properties invariant under transformations to curvilinear coordinate systems. An introduction to tensor analysis via Cartesian tensors and then more general tensors. Derivation of the divergence, gradient, and curl in generalized coordinates.
Prerequisite(s): MTH 218 and MTH 302 or equivalent

MTH 583  DISCRETE AND CONTINUOUS FOURIER ANALYSIS
Fourier representations of complex-valued functions, rules for finding Fourier transforms, mathematical operators associated with Fourier analysis, fast algorithms, wavelet analysis, selected applications.
Prerequisite(s): MTH 302 or equivalent, and MTH 219 or 319 or equivalent

MTH 590  TOPICS IN MATHEMATICS
This course, given upon appropriate occasions, deals with specialized material not covered in the regular courses. May be taken more than once as topics change.
Prerequisite(s): consent of advisor

MTH 598  THESIS
3 - 6
School of Engineering
(MEE) Mechanical Engineering
Kevin Hallinan, Chair of the Department

Programs
Program Name

Doctorate of Engineering in Mechanical Engineering (MEE)

See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Doctorate of Philosophy in Mechanical Engineering (MEE)

See Doctoral Degree Requirements in section X, School of Engineering in General Information and consult with the department chair.

Master of Science in Mechanical Engineering (MEE)

For the Master of Science in mechanical engineering, major areas of concentration are materials, thermo-fluids, solid mechanics, and design and manufacturing (practice oriented). Each program of study leading to this degree must include a minimum of 30 semester hours approved by the student's advisor, and consisting of the following:

1. Twelve semester hours in mechanical engineering courses to be selected from one of the following areas of concentration.


   Solid Mechanics-MEE 503, 519, 533, 534, 535, 536, 538, 539, 543, 544, 545, 546, 547, 548, 549, 570, 575.

   Practice Oriented Design and Manufacturing-MEE 503, 506, 520, 521, 522, 523, 527, 533, 534, 535, 536, 537, 538, 539, 540, 545, 546, 547, 551, 570, 572, 574, 575, 577, 579, 582, 585, 587.

2. Six semester hours of research on a mechanical engineering project or thesis. Both a written document and an oral presentation are required. Upon the request of the student and with the approval of the advisor and department chair, this requirement may be replaced by six semester hours of additional coursework. A maximum of six semester hours may be taken in MEE 550, 590, 595, and 599 courses.

3. Three semester hours of mathematics approved by the student's advisor.

4. Up to nine semester hours of electives, to be chosen from current course offerings which best suit the student's requirements and approved by the student's advisor.

See also Master's Degree Requirements in section X, School of Engineering in General Information and consult with the advisor.

Courses

Code Title Sem. Hrs.

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000492&p=-1&c=-1 7/10/2012
MEE 500  ADVANCED ENGINEERING ANALYSIS  3
Detailed analysis of engineering problems using laws of nature, fundamental
engineering principles, mathematics, computers, and practical experience to
construct, resolve, and test analytic models of physical events. Emphasis is
on the use of the professional engineering approach which includes
formulation of the problem, assumptions, plan or method of attack, solving
the problem, checking and generalizing the results.

MEE 501  PRINCIPLES OF MATERIALS I  3
Structure of engineering materials from electronic to atomic and
crystallographic considerations. Includes atomic structure and interatomic
bonding, imperfections, diffusion, mechanical properties, strengthening
mechanisms, failure, phase diagrams, phase transformations and
processing.
Prerequisite(s): College chemistry, physics and MTH 219

MEE 502  PRINCIPLES OF MATERIALS II  3
Structure, behavior and processing of metal alloys, ceramics, polymers, and
composites to include: mechanical behavior, corrosion, electrical, magnetic,
and optical properties.
Prerequisite(s): MEE 501 or equivalent

MEE 503  INTRODUCTION TO CONTINUUM MECHANICS  3
Tensors, calculus of variations, Lagrangian and Eulerian descriptions of
motion. General equations of continuum mechanics, constitutive equations
of mechanics, thermodynamics of continua. Specialization to cases of solid
and fluid mechanics.
Prerequisite(s): EGM 303 or EGM 330

MEE 504  FUNDAMENTALS OF FLUID MECHANICS  3
An advanced course in fluid mechanics with emphasis on the derivation of
conservation equations and the application of constitutive theory. Navier-
Stokes equations. Ideal fluid approximation. Exact and approximate
solutions to classical viscous and inviscid problems. Compressible and
incompressible flows.
Prerequisite(s): MEE 503

MEE 505  THERMODYNAMICS OF SOLIDS  3
Laws of thermodynamics, auxiliary functions, thermodynamic relations,
phase transitions, thermodynamic equilibrium, thermodynamic properties of
solid solutions, surfaces and interfaces.
Prerequisite(s): MEE 501 or consent of instructor

MEE 506  MECHANICAL BEHAVIOR OF MATERIALS  3
Description of the state of stress and strain in materials, plastic deformation,
fatigue, fracture, creep, and rupture.
Prerequisite(s): EGM 303, EGM 330 or consent of instructor

MEE 508  PRINCIPLES OF MATERIAL SELECTION  3
Basic scientific and practical considerations involved in the intelligent
selection of materials for specific applications. Impact of new developments
in materials technology and analytical techniques.
Prerequisite(s): MEE 501 or consent of instructor

MEE 509  INTRODUCTION TO POLYMER SCIENCE  3
Technical overview of the nature of synthetic macromolecules including the
formation of polymers and their structure-property relationships, polymer
characterization and processing, and applications of polymers.
Prerequisite(s): College chemistry and physics

MEE 511  ADVANCED THERMODYNAMICS  3
Equilibrium, first law, second law, state principle, and zeroth law;
development of entropy and temperature from availability concepts;
chemical potential, chemical equilibrium, and phase equilibrium.
Thermodynamics of irreversible processes; Onsager reciprocal relations;
application of these concepts to direct energy conversion.

MEE 512  MICROSCOPIC THERMODYNAMICS  3
Microscopic thermodynamics; kinetic theory; virial theorem of Clausius;
transport phenomena; Gibbs, Boltzman, Bose-Einstein, Fermi-Dirac
statistics. Connection between statistical and thermodynamic quantities.
Applications to perfect and real gases, liquids, crystalline solids, and thermal radiation. Irreversible thermodynamics.

MEE 513 PROPULSION
Principles of propulsive devices, aerothermodynamics; diffuser and nozzle flow; energy transfer in turbo-machinery; turbojet, turbo-fan, prop-fan engines; RAM and SCRAM jet analysis and a brief introduction to related materials and air frame-propulsion interaction.
Prerequisite(s): MEE 418

MEE 515 CONDUCTION HEAT TRANSFER

MEE 516 CONVECTION HEAT AND MASS TRANSFER
Prerequisite(s): MEE 410 or equivalent

MEE 517 RADIATION HEAT TRANSFER

MEE 518 PHASE CHANGE HEAT TRANSFER AND INTERFACIAL PHENOMENA
Interfacial thermodynamics of liquid-vapor-solid systems; surface wetting statics and dynamics; interfacial and phase stability; homogeneous and heterogeneous nucleation; and boiling heat transfer. Application to liquid-vapor phase change.

MEE 519 ANALYTICAL DYNAMICS
Dynamical analysis of a system of particles and rigid bodies; Lagrangian and Hamiltonian formulation of equations of motion; classical integrals of motion. Stability analysis of linear and nonlinear systems.
Prerequisite(s): MTH 219 and EGM 202 or equivalent

MEE 520 THEORETICAL KINEMATICS
Introduction to the mathematical theory underlying the analysis of general spatial motion. Analysis of mechanical systems including robots, mechanisms, walking machines and mechanical hands using linear algebra, quaternion and screw formulations. Fundamental concepts include forward and inverse kinematics, workspace, Jacobians, and singularities.

MEE 521 KINEMATIC PRINCIPLES IN DESIGN
Study of the use of kinematic principles in the design of mechanical systems including robots, planar and spatial mechanisms, robotic platforms and systems modeled by jointed rigid bodies. The formulation and solution of design problems involving the sizing and placement of these mechanical systems to accomplish specific tasks is the primary goal. Mathematic tools are introduced to account for singularity avoidance and joint limitations.

MEE 522 GEOMETRIC METHODS IN KINEMATICS
Trajectories and velocities of moving bodies are designed and analyzed via the principles of classical differential and algebraic geometry. Fundamentals include centrodies, instantaneous invariants, resultants and center point design curves. Curves, surfaces, metrics, manifolds and geodesics in spaces of more than three dimensions are analyzed to study multi-parameter systems.

MEE 523 ENGINEERING DESIGN OPTIMIZATION
Introduction to the theory and algorithms of nonlinear optimization with an emphasis on applied engineering problems. Fundamentals include Newton's method, line searches, trust regions, convergence rates, and linear programming. Advanced topics include penalty, barrier, and interior-point methods.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEE 525</td>
<td><strong>PRINCIPLES OF CORROSION</strong></td>
<td>Application of electrochemical principles, corrosion reactions, passivation, cathodic and anodic protection, stress corrosion, and high-temperature oxidation.</td>
<td>MEE 501</td>
</tr>
<tr>
<td>MEE 527</td>
<td><strong>AUTOMATIC CONTROL THEORY</strong></td>
<td>Stability and performance of automatic control systems. Classical methods of analysis including transfer functions, time-domain solutions, root locus and frequency response methods. Modern control theory techniques including state variable analysis, transformation to companion forms, controllability, pole placement, observability and observer systems.</td>
<td>MEE 435 or equivalent</td>
</tr>
<tr>
<td>MEE 533</td>
<td><strong>THEORY OF ELASTICITY</strong></td>
<td>Three-dimensional stress and strain at a point; equations of elasticity in Cartesian and curvilinear coordinates; methods of formulation of equations for solution; plane stress and plane strain; energy formulations; numerical solution procedures.</td>
<td>EGM 303 or EGM 330</td>
</tr>
<tr>
<td>MEE 534</td>
<td><strong>THEORY OF PLATES AND SHELLS</strong></td>
<td>Theory of plates: small and large displacement theories of thin plates; shear deformation; buckling; sandwich plate theory. Thin shell theory: theory of surfaces; thin shell equations in orthogonal curvilinear coordinates; bending, membrane, and shallow shell theories.</td>
<td>MEE 533</td>
</tr>
<tr>
<td>MEE 536</td>
<td><strong>RANDOM VIBRATIONS</strong></td>
<td>Introduction to probability distribution; characterization of random vibrations; harmonic analysis; auto- and cross-correlation and spectral density; coherence; response to single and multiple loadings; Fast Fourier Transform (FFT); applications in vibrations, vehicle dynamics, fatigue, etc.</td>
<td>Computer programming and MEE 319</td>
</tr>
<tr>
<td>MEE 537</td>
<td><strong>MECHATRONICS</strong></td>
<td>Emphasis on the integration of sensors, micro-controllers, electromechanical actuators, and control theory in a 'smart' system for a semester-long design project. Topics include: sensor signal processing, electromechanical actuator fundamentals, interfacing of sensors and actuators to micro-controllers, digital logic, and programming of micro-controllers, programmable logic controllers and programmable logic devices. Equal mix of lecture and laboratory.</td>
<td>an undergraduate electronics course</td>
</tr>
<tr>
<td>MEE 538</td>
<td><strong>INTRODUCTION TO AEROELASTICITY</strong></td>
<td>Study of the effect of aerodynamic forces on a flexible aircraft. Flexibility coefficients and natural modes of vibration. Quasi-steady aerodynamics. Static aeroelastic problems; wing divergence and dynamic aeroelasticity; wing flutter. An introduction to structural stability augmentation with controls.</td>
<td>AEE 501</td>
</tr>
<tr>
<td>MEE 539</td>
<td><strong>THEORY OF PLASTICITY</strong></td>
<td>Fundamentals of plasticity theory including elastic, viscoelastic, and elastoplastic constitutive models; plastic deformation on the macroscopic and microscopic levels; stress-strain relations in the plastic regime; strain hardening; limit analysis; numerical procedures.</td>
<td>MEE 503 or 533</td>
</tr>
</tbody>
</table>
| MEE 540     | **BEARINGS AND BEARING LUBRICATION**                         | Theoretical aspects of lubrication; determination of pressure distribution in bearings from viscous flow theory; application of hydrodynamic and... |COREQUISITE(S): MEE 503 OR 533
MEE 541 EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS
Introduction to the mechanical response of fiber-reinforced composite materials with emphasis on the development of experimental methodology. Analytical topics include stress-strain behavior of anisotropic materials, laminate mechanics, and strength analysis. Theoretical models are applied to the analysis of experimental techniques used for characterizing composite materials. Lectures are supplemented by laboratory sessions in which characterization tests are performed on contemporary composites.
Prerequisite(s): MEE 303 or EGM 330

MEE 542 ADVANCED COMPOSITES
Materials and processing. Comprehensive introduction to advanced fiber reinforced polymeric matrix composites. Constituent materials and composite processing will be emphasized with special emphasis placed on structure-property relationships, the role of the matrix in composite processing, mechanical behavior and laminate processing. Specific topics will include starting materials, material forms, processing, quality assurance, test methods and mechanical behavior.
Prerequisite(s): MEE 501, MEE 509, or consent of the instructor

MEE 543 ANALYTICAL MECHANICS OF COMPOSITE MATERIALS
Analytical models are developed to predicting the mechanical and thermal behavior of fiber-reinforced composite materials as a function of constituent material properties. Both continuous and discontinuous fiber-reinforced systems are considered. Specific topics include basic mechanics of anisotropic materials, micromechanics, lamination theory, free-edge effects, and failure criteria.
Prerequisite(s): EGM 303 or EGM 330

MEE 544 MECHANICS OF COMPOSITE STRUCTURES
Comprehensive treatment of laminated beams, plates, and sandwich structures. Effect of heterogeneity and anisotropy on bending under lateral loads, buckling, and free vibration are emphasized. Shear deformation and other higher-order theories and their range of parametric application are also considered.
Prerequisite(s): MEE 543 or consent of instructor

MEE 545 COMPUTATIONAL METHODS FOR DESIGN
Modeling of mechanical systems and structures, analysis by analytical and numerical methods, development of mechanical design criteria and principles of optimum design, selected topics in mechanical design and analysis, use of the digital computer as an aid in the design of mechanical elements.
Prerequisite(s): Computer programming

MEE 546 FINITE ELEMENT ANALYSIS I
Fundamental development of the Finite Element Method (FEM), and solution of field problems and comprehensive structural problems, variational principles and weak-forms; finite element discretization; shape functions; finite elements for field problems; bar, beam, plate, and shell elements; isoparametric finite elements; stiffness, nodal force, and mass matrices; matrix assembly procedures; computer dosing techniques; modeling decisions; program output interpretation. Course emphasis on a thorough understanding of FEM theory and modeling techniques.
Prerequisite(s): MEE 503 or MEE 533

MEE 547 FINITE ELEMENT ANALYSIS II
Advanced topics: heat transfer; transient dynamics; nonlinear analysis; substructuring and static condensation; effects of inexact numerical integration and element incompatibility; patch test; frontal solution techniques; selected topics from the recent literature.
Prerequisite(s): MEE 546

MEE 548 ENERGY METHODS IN SOLID MECHANICS
Development of fundamental energy principles; virtual displacements, strain energy, Castigliano's theorems, minimum potential energy principles. Applications to engineering problems; redundant structures, buckling, static and dynamic analysis.
Prerequisite(s): MEE 503 or MEE 533
MEE 549  THEORY OF ELASTIC STABILITY
Introduction to stability theory: buckling of plates and shells; influence of initial imperfections; nonlinear analysis: numerical solutions methods.
Prerequisite(s): MEE 533

MEE 550  MECHANICAL ENGINEERING PROJECT
Student participation in a departmental research, design, or development project under the direction of a project advisor. The student must show satisfactory progress as determined by the project advisor and present a written report at the conclusion of the project.

MEE 551  NOISE AND VIBRATION CONTROL
The concepts of noise and vibration control applied to mechanical systems. Methodologies covered will include: passive treatments using resistive elements (sound absorbers, vibration damping) and reactive elements (tailoring of material stiffness and mass); active control of sound and vibration; and numerical analysis.
Prerequisite(s): MEE 439 or MEE 319

MEE 552  BOUNDARY LAYER THEORY
Prerequisite(s): MEE 504 or equivalent

MEE 553  COMPRESSION FLow
Fundamental equations of compressible flow. Introduction to flow in two and three dimensions. Two-dimensional supersonic flow, small perturbation theory, method of characteristics, oblique shock theory. Introduction to unsteady one-dimensional motion and shock tube theory. Method of surface singularities.
Prerequisite(s): MEE 504 or equivalent

MEE 555  TURBULENCE
Prerequisite(s): MEE 504 or equivalent

MEE 558  COMPUTATIONAL FLUID DYNAMICS
Numerical solution to Navier-Stokes equations and approximations such as the boundary layer equations for air-flow about a slender body. Numerical techniques for the solution of the transonic small disturbance equations. Numerical determination of fluid instabilities.
Prerequisite(s): MEE 504 or consent of instructor

MEE 565  FUNDAMENTALS OF FUELS AND COMBUSTION
Heat of combustion and flame temperature calculations; rate of chemical reaction and Arrhenius relationship; theory of thermal explosions and the concept of ignition delay and critical mass; phenomena associated with hydrocarbon-air combustion; specific applications of combustion.

MEE 566  COMBUSTION THEORY
Theory of detonation (Rankine-Hugoniot relationships) and flame propagation rates in pre-gas mixed systems; turbulent flames and the well stirred reactor; theory of diffusion flames; fuel droplet combustion; steady burning of solid materials, ignition and flame spreading across solid materials.

MEE 568  INTERNAL COMBUSTION ENGINES
Study of combustion and energy release processes. Applications to spark and compression ignition, jet, rocket, and gas turbine engines. Special emphasis given to understanding of air pollution problems caused by internal combustion engines. Idealized and actual cycles are studied in preparation for laboratory testing of internal combustion engines.

MEE 569  HEATING AND AIR CONDITIONING
Topics dealing with thermal environments and methods of control. Included are psychrometrics, solar radiation, heat transmission through solid boundaries, industrial and residential environments, residential heating and cooling load calculations.

MEE 570  FRACTURE MECHANICS  
Application of the principles of fracture mechanics to problems associated with fatigue and fracture in engineering structures. The course will cover the development of models that apply to a range of materials, geometries, and loading conditions. 
Prerequisite(s): MEE 506 or consent of instructor

MEE 571  DESIGN OF THERMAL SYSTEMS  
Integration of thermodynamics, heat transfer, engineering economics, and simulation and optimization techniques in a design framework. Topics include design methodology, exergy analysis, heat exchanger networks, thermal-system simulation, and optimization techniques.

MEE 572  DESIGN FOR ENVIRONMENT  
Emphasis on design for environment over the life cycle of a product or process, including consideration of mining, processing, manufacturing, use, and post-life stages. Course provides knowledge and experience in invention for the purpose of clean design, life cycle assessment strategies to estimate the environmental impact of products and processes, and cleaner manufacturing practices. Course includes a major design project.

MEE 573  RENEWABLE ENERGY SYSTEMS  
Introduction to the impact of energy on the economy and environment. Engineering models of solar thermal and photovoltaic systems. Introduction to wind power. Fuel cells and renewable sources of hydrogen.

MEE 574  VIRTUAL PROTOTYPEING OF PRODUCTS AND PROCESSES  
The use of virtual prototyping for validating/optimizing the product design and the corresponding manufacturing process(es) before building the physical prototype will be practiced.  
Prerequisite(s): MEE 427

MEE 575  FRACTURE AND FATIGUE OF METALS AND ALLOYS I  
This course will cover the effects of microstructure on the fracture and fatigue behavior of engineering metals and alloys with a special emphasis on static and dynamic brittle and ductile failures and crack initiation. Alloy fracture resistance, fracture toughness, and methods to improve fracture behavior will be discussed in detail. Various analytical techniques in the failure analysis of structural components will be presented.  
Prerequisite(s): MEE 501, MEE 506 or consent of instructor

MEE 576  FRACTURE AND FATIGUE OF METALS AND ALLOYS II  
This course will cover the areas of the effects of microstructure on fatigue crack propagation on fracture and fatigue. This will include fatigue life prediction, damage tolerance approach to component design and microstructural and structural synthesis for optimum behavior. Specific material-related aspects of fatigue mechanisms, fracture mechanics approach, and failure analysis will also be covered.  
Prerequisite(s): MEE 575 or equivalent

MEE 577  ROBOTICS AND NUMERICALLY CONTROLLED MACHINES  
Prerequisite(s): MEE 435 or equivalent

MEE 579  COMPUTER AIDED MECHANICAL DESIGN  
Introduction to computer methods used to facilitate mechanical design. Design using the finite element method, mechanism design, and statistical techniques. Design of components (shafts, springs, etc.) using computer techniques will be combined with the design process to design mechanical systems. Integration of manufacturer's literature into the design. Team design project will be included.  
Prerequisite(s): MEE 427 and MEE 432, or equivalent
MEE 580  STATISTICAL PROCESS CONTROL BY FEEDBACK ADJUSTMENT
Process monitoring using standard quality control techniques provides an ongoing check on the stability of the process and points to problems whose elimination can reduce variation and permanently improve the system. Process adjustment uses feedback control to compensate for those sources of drifting variation that cannot be eliminated in this way. Clearly the two approaches are complementary and considerable advantage is to be gained by augmenting the more commonly used quality control techniques with feedback methods. 
Prerequisite(s): background in statistics or instructor consent

MEE 582  AUTOMATED DESIGN
Examine, discuss, and apply enabling design technologies, methodologies and computer tools to various mechanical product design and manufacturing process design projects. Address selected design topics and how they are used in Product Development Cycle. Model, simulate, and evaluate various mechanical products and manufacturing process designs.

MEE 584  INTEGRATED MANUFACTURING SYSTEMS
Treatment of topics associated with the design, implementation, planning and control of fixed and flexible manufacturing and assembly systems in conjunction with communications and computer technologies. Discuss issues associated with group technology and systems integration.

MEE 585  DESIGN FOR PRODUCIBILITY
Concurrent treatment of product design and manufacturing process issues. Application of various methodologies, tools, and evaluation schemes on various product design, manufacturing, and assembly-related activities.

MEE 587  LEAN MANUFACTURING
Prerequisite(s): MEE 344 or equivalent

MEE 590  SELECTED READINGS
Directed readings in a designated area arranged and approved by the student's faculty advisor and the departmental chair. May be repeated. (A) Materials, (B) Thermal Sciences, (C) Fluid Mechanics, (D) Solids Mechanics, (E) Mechanical Design, or (F) Integrated Manufacturing.

MEE 595  SPECIAL PROBLEMS IN MECHANICAL ENGINEERING
Special assignments in mechanical engineering subject matter arranged and approved by the student's faculty advisor and the department chair.

MEE 599  THESIS

MEE 604  NANOSTRUCTURED MATERIALS
A graduate-level course covering the fundamental physics, properties, and applications of nanostructured materials. Includes carbon nanotubes, nanostructured ceramics, metals, and semiconductor materials.
Prerequisite(s): College physics, fundamental physical and chemical properties of materials

MEE 605  INTRODUCTION TO CARBON NANOTECHNOLOGY
A graduate-level course covering the fundamental and applied aspects of Carbon Nanoscale Science and Technology. The course has three goals: (1) an overview of the current development in carbon science and technology (2) an introduction to the surface science as a means to understand the surface interaction at molecular scale, and (3) to provide some explicit links between macro, micro, and nano scale technologies. Some of the medical field, structural and friction applications will be addressed. This course is aimed at both science and engineering students.
MEE 690  SELECTED READINGS  1 - 6
Directed readings in a designated area arranged and approved by the student's doctoral advisory committee and the department chair. May be repeated. (A) Materials, (B) Thermal Sciences, (C) Fluid Mechanics, (D) Solid Mechanics (E) Mechanical Design, or (F) Integrated Manufacturing.

MEE 695  SPECIAL PROBLEMS IN MECHANICAL ENGINEERING  1 - 6
Special assignments in mechanical engineering subject matter arranged and approved by the student's doctoral advisory committee and the department chair. May be repeated.

MEE 698  D.E. DISSERTATION  1 - 15
An original investigation as applied to mechanical engineering practice. Results must be of sufficient importance to merit publication.

MEE 699  Ph.D. DISSERTATION  1 - 15
An original research effort which makes a definite contribution to technical knowledge. Results must be of sufficient importance to merit publication.
College of Arts and Sciences
(MUS) Music

Dr. Donna M. Cox, Chair of the Department
Dr. Linda A. Hartley, Coordinator, Music Education

The Department of Music offers courses in support of the Master of Science in education degree with a music education concentration. For specific degree requirements visit the Department of Teacher Education in Academic Information. The Department of Music is a member of the National Association of Schools of Music, which accredits its degree programs and curricula.

Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS 501</td>
<td>GRADUATE SEMINAR IN MUSICOLOGY.</td>
<td>2</td>
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</tbody>
</table>
Students will become familiar with selected general aspects of Western music: music notation, editions and performance, social contexts and meanings of musical works. This course explores the range of approaches and research methods in musicology, aiming for a comprehensive understanding and a critical knowledge of the sources and literature of music and musicology, and the rudiments of research and writing techniques.

| MUS 503 | TEACHING WORLD MUSIC                           | 2         |
Methods and techniques for teaching music from representative cultures around the world, and their role and function in society.

| MUS 505 | TEACHING MUSIC WITH TECHNOLOGY I              | 2         |
Provides a hands-on, introductory basis in 1) computer aided notation, 2) recording music with digital instruments, 3) developing multimedia presentations, and 4) utilizing the world wide web for connected learning.

| MUS 506 | TEACHING MUSIC WITH TECHNOLOGY II             | 2         |
Provides an in-depth and hands-on study in 1) computer aided notation, 2) recording music with digital instruments, 3) developing multimedia presentations, and 4) utilizing the world wide web for connected learning. Permission of the instructor required.

| MUS 511 | MUSIC THEORY, ANALYSIS, AND TECHNOLOGY        | 2         |
Investigates music theory and compositional practice of the Western music tradition. Current techniques of tonal theory including linear analysis are explored. Students will also apply music technology in the notation and analysis of music.

| MUS 531 | FOUNDATIONS AND CURRENT ISSUES IN MUSIC EDUCATION | 2 |
Topics include history, philosophy, and psychology of music education; special needs and inclusion; assessment; national and state music education standards; gifted identification; curriculum development; scheduling; Vision 2020; and learning theories.

| MUS 535 | LITERATURE AND RESOURCES FOR CLASSROOM MUSIC  | 1         |

| MUS 536 | LITERATURE AND RESOURCES FOR THE CHORAL ENSEMBLE | 1 |
Review, analysis and critique of standard and new literature for elementary, middle, and high school choral ensembles.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MUS 537</td>
<td>LITERATURE AND RESOURCES FOR THE INSTRUMENTAL</td>
<td>1</td>
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<tr>
<td></td>
<td>ENSEMBLE</td>
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<tr>
<td></td>
<td>Review, analysis and critique of standard and new literature for elementary, middle, and high school instrumental ensembles.</td>
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<tr>
<td>MUS 544</td>
<td>ADVANCED TECHNIQUES FOR CLASSROOM MUSIC</td>
<td>2</td>
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<tr>
<td></td>
<td>Focuses on the development of teaching techniques and methods for grade levels PreK-8. Concentration on areas such as contemporary methodologies, learning theories, and utilization of the National Standards in music education.</td>
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<tr>
<td>MUS 545</td>
<td>ADVANCED CHORAL CONDUCTING AND REHEARSAL</td>
<td>2</td>
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<tr>
<td></td>
<td>TECHNIQUES</td>
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<tr>
<td></td>
<td>Focuses on score study, comprehensive score analysis, performance practice study, ensemble conducting experience, and rehearsal techniques.</td>
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<tr>
<td>MUS 546</td>
<td>ADVANCED INSTRUMENTAL CONDUCTING AND REHEARSAL</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>TECHNIQUES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Focuses on score study, comprehensive score analysis, performance practice study, ensemble conducting experience, and rehearsal techniques.</td>
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<tr>
<td>MUS 581</td>
<td>IMPROVISATION IN THE SCHOOL MUSIC CURRICULUM</td>
<td>2</td>
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<tr>
<td></td>
<td>Emphasis on vocal and instrumental skill development and facilitation of improvisatory experiences suitable for individual students and groups.</td>
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<tr>
<td>MUS 599</td>
<td>GRADUATE PERFORMANCE STUDIES</td>
<td>1</td>
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<tr>
<td></td>
<td>Private lesson instruction, or performance in an approved ensemble (large group or chamber). Lessons (14, 30 minutes each or equivalent) offered in keyboard, strings, winds, percussion, and voice. Ensembles can include university ensembles as well as off-campus ensembles (must have approval of advisor). Fee for lessons.</td>
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</tbody>
</table>
College of Arts and Sciences
PHL Philosophy (Collapse Description)

Paul H. Benson, Chair of the Department

* There is no graduate program in philosophy at this time. The courses listed below support other graduate programs.

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHL 621</td>
<td>AMERICAN PRAGMATISM</td>
<td>0</td>
</tr>
<tr>
<td>PHL 653</td>
<td>AESTHETICS</td>
<td>0</td>
</tr>
<tr>
<td>PHL 654</td>
<td>PHILOSOPHY OF RELIGION</td>
<td>0</td>
</tr>
<tr>
<td>PHL 655</td>
<td>SOCIAL AND POLITICAL PHILOSOPHY</td>
<td>0</td>
</tr>
<tr>
<td>PHL 690</td>
<td>SEMINAR</td>
<td>0</td>
</tr>
<tr>
<td>PHL 695</td>
<td>DIRECTED STUDIES</td>
<td>3</td>
</tr>
</tbody>
</table>

PHL 690 is regularly taught for the School of Law. PHL 653 is still sometimes taught for the School of Education & Allied Professions.

PHL 695 is available to augment the graduate student's previous training or to allow advanced study on a particular problem, philosopher, or historical era. Arrange through the department chair.
College of Arts and Sciences

(PHY) Physics (Collapse Description)

Dr. J. Michael O'Hare, Chair of the Department
Dr. Peter Powers, Graduate Program Director

The Department of Physics, as part of the electro-optics program, offers graduate courses in support of the Master of Science and Doctor of Philosophy in electro-optics. For more details on the program requirements, see electro-optics (EOP) in Academic Information.

Assistantships

A limited number of graduate assistantships are available for graduate students in the electro-optics program. These generally carry a stipend and tuition remission for the courses required for the degree. Recipients are expected to complete the requirements for the Master's degree in two years. Detailed information and application forms may be obtained from the chair of the physics department or the director of the electro-optics program.

Courses (Collapse All Courses)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>PHY 520</td>
<td>SOLID STATE PHYSICS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Crystal structure, thermal properties of solids; insulators; band theory of solids; semiconductors; luminescence.</td>
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</tr>
<tr>
<td>PHY 525</td>
<td>QUANTUM MECHANICS I</td>
<td>3</td>
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<tr>
<td></td>
<td>The physical basis of quantum mechanics, wave packets, free particle motion; Schrodinger's equation applied to potential problems; harmonic oscillator and the hydrogen atom; three-dimensional extrapolation and scattering.</td>
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</tr>
<tr>
<td>PHY 599</td>
<td>GEOMETRIC OPTICS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Wavefronts and rays; Fermat's principle; Gaussian optics and axially symmetric systems; aperture stops; pupils and fields lenses; Lagrange invariant; angular and visual magnification; optical systems; plane mirrors and prisms; aberration theory; introduction to computer ray tracing.</td>
<td></td>
</tr>
<tr>
<td>PHY 599</td>
<td>INTRODUCTION TO LASERS</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Laser theory; coherence; Gaussian beams; optical resonators; properties of atomic and molecular radiation; laser oscillation and amplification; methods of excitation of lasers; characteristics of common lasers; laser applications. Prerequisite(s): EOP 502 or a working knowledge of Maxwell's equations and physical optics, or permission of the course instructor or program director</td>
<td></td>
</tr>
<tr>
<td>PHY 599</td>
<td>OPTICAL RADIATION AND MATTER</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Maxwell's equations; electromagnetic waves; interaction of radiation with atomic electrons; molecular and lattice vibration; study of phenomena related to the interaction of optical radiation with matter; polarization; crystal optics; nonlinear dielectric effects.</td>
<td></td>
</tr>
</tbody>
</table>
**College of Arts and Sciences**

(POL) Political Science  
(Collapse Description)

Christopher M. Duncan, Chair of the Department  
Peter B. Nelson, Director, MPA Program

The Department of Political Science offers two graduate programs, each designed to accomplish a particular objective.

- Master of Public Administration is a professional degree designed to prepare students for administrative careers in contemporary society.
- Master of Arts in political science (concentration in international affairs). This program affords mid-career professionals and other interested individuals an opportunity to enhance their ability to analyze and interpret contemporary issues in international affairs. The program combines theoretical, regional, and functional approaches to the study of world affairs. Students are encouraged to draw insights from the fields of international and comparative politics and from such related disciplines as history, economics, law, and business.

**Assistantships**

The department offers two graduate assistantships each year. The graduate assistants perform research and administrative tasks for the faculty. Each assistant receives full tuition remission plus stipend. An assistant-ship, once granted, is renewable for a second year.

*At this time, students are not admitted into the MAIA program.*

**Programs**  (Collapse All)

Program Name  
Master of Arts in Political Science (POL)

At this time, students are not admitted into the MAIA program.

To receive the Master of Arts degree with a concentration in International Affairs, the student must satisfactorily complete 36 hours of course-work with a cumulative grade point average of 3.0 or better.

At the completion of 12 semester hours of credit, the academic progress of the student will be evaluated by a committee of departmental faculty. It is incumbent upon the student after the completion of 12 semester hours of credit to initiate the petition for review with the chair of the MAIA Committee.

### Political Science

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>POL 500</td>
<td>POLITICS OF INTERNATIONAL ECONOMIC RELATIONS</td>
<td>3</td>
</tr>
<tr>
<td>POL 503</td>
<td>COLLOQUIUM IN COMPARATIVE POLITICS</td>
<td>3</td>
</tr>
<tr>
<td>POL 515</td>
<td>INTERNATIONAL RELATIONS</td>
<td>3</td>
</tr>
<tr>
<td>POL 590</td>
<td>RESEARCH SEMINAR IN POLITICAL SCIENCE</td>
<td>3</td>
</tr>
<tr>
<td>MAIA Electives (selected from the MAIA curriculum)</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

### MAIA Curriculum

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>POL 567</td>
<td>INDEPENDENT STUDY IN POLITICAL SCIENCE</td>
<td>3</td>
</tr>
</tbody>
</table>

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*At this time, students are not admitted into the MAIA program.*
College of Arts and Sciences

(PSY) Psychology

David W. Biers, Chair of the Department
John R. Korte, Director of Graduate Programs and Clinical Program
Charles E. Kimble, Director of General Program
William F. Moroney, Director of Experimental-Human Factors Program

The Department of Psychology offers three graduate programs leading to the Master of Arts:

• Clinical Psychology
• Experimental-Human Factors Psychology
• General Psychology

All programs emphasize the integration of theory and research with appropriate applied experience and competence in the development of relevant and original research. This is the product of individual supervision and a low student-to-faculty ratio. The aim of the department is to prepare the student for further graduate studies at the Ph.D. level, and/or work at the M.A. level in an applied/community, teaching, or research setting. Academic advisors and the department chair will direct students to faculty members who share their specific interests and areas of specialization. Graduate students are encouraged to work with these faculty members on a one-to-one basis.

Assistantships

Graduate teaching and research assistantships are available on a competitive basis and include a stipend as well as tuition and fee remission. The Department of Psychology also offers a limited number of traineeships to students in the clinical psychology program. The traineeship placements are at local mental health agencies and vary in number and stipend from year to year depending upon the budgets and needs of the agencies participating in the traineeship program.

Programs

Program Name

Master of Arts in Clinical Psychology (PSY)

The clinical psychology program is designed with the scientist-practitioner model as its foundation. In addition to a broad academic background and competence in the application of research methodology, this program provides the student with:

1. Thorough exposure to the areas of personality, psychopathology, and psychotherapy,
2. Intensive training in the assessment of intelligence and personality,
3. Supervised practice in interviewing and therapeutic intervention, and
4. The opportunity to emphasize work with either children or adults.

Through practicum experience in various community and clinical settings affiliated with the University, the student can translate classroom learning into practical experience. The clinical program is designed to prepare the student for employment in clinical positions at the master's level or for further study in clinical psychology at the doctoral level, and is accredited by the Masters in Psychology Accreditation Council (MPAC).

All students enrolled in any of the three programs leading to the Master of Arts with a major in Psychology are subject to the following general requirements of the Department of Psychology. Full-time students normally complete program requirements in two years:

1. The number of semester hours and required courses as specified by the individual program described below.
2. Demonstration of satisfactory progress toward the degree that includes the requirement that students maintain a minimum average of B (3.00) in
coursework. Students who fail to meet this requirement are either placed on academic probation or dismissed from the program.
3. Students are permitted no more than six semester hours with grades of C or lower. Students who fail to meet this requirement are dismissed from the program.
4. No more than six semester hours of 400-level courses may apply toward the master's degree, and normally no more than six semester hours of graduate work approved by the department chair may be transferred from other institutions.
5. Attendance is required at regularly scheduled extra-course seminars on selected issues in psychology and at occasional specialized programs.
6. Thesis must deal with an approved research problem, incorporating an appropriate review of theory and literature, and demonstrating competence in the application of research methodology.
7. Students are expected to conduct themselves in a professional and ethical manner in accordance with generally accepted standards for psychologists. Failure to do so may result in dismissal.
8. It is the student's responsibility to know and to meet the requirements of the University and of the graduate program.

The Master of Arts with a major in psychology (clinical) requires 46 semester hours consisting of 42 hours of academic coursework, including thesis, and 4 hours of practicum as specified below.

Clinical Psychology

<table>
<thead>
<tr>
<th>Sem. Hrs.</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>PSY 501 EXPERIMENTAL DESIGN AND STATISTICS I</td>
</tr>
<tr>
<td>3</td>
<td>PSY 502 EXPERIMENTAL DESIGN AND STATISTICS II</td>
</tr>
<tr>
<td>3</td>
<td>PSY 510 HISTORY &amp; SYSTEMS</td>
</tr>
<tr>
<td>3</td>
<td>PSY 599 THESIS</td>
</tr>
<tr>
<td>28</td>
<td>PSY 550 INTRODUCTION TO CLINICAL PSYCHOLOGY</td>
</tr>
<tr>
<td>3</td>
<td>PSY 551 ASSESSMENT OF INTELLIGENCE</td>
</tr>
<tr>
<td>3</td>
<td>PSY 553 THEORIES AND RESEARCH IN PSYCHOPATHOLOGY</td>
</tr>
<tr>
<td>3</td>
<td>PSY 555 THEORIES OF PERSONALITY AND PSYCHOTHERAPY</td>
</tr>
<tr>
<td>3</td>
<td>PSY 556 ASSESSMENT OF PERSONALITY</td>
</tr>
<tr>
<td>3</td>
<td>PSY 564 INDIVIDUAL PSYCHOTHERAPY</td>
</tr>
<tr>
<td>3</td>
<td>PSY 565 ETHICAL &amp; CULTURAL ISSUES IN CLINICAL ASSESSMENT AND PSYCHOTHERAPY</td>
</tr>
<tr>
<td>1</td>
<td>PSY 569 CLINICAL PRACTICUM</td>
</tr>
<tr>
<td>3</td>
<td>PSY 573 DEVELOPMENTAL PSYCHOLOGY</td>
</tr>
<tr>
<td>6</td>
<td>PSY 560 CHILDHOOD PSYCHOPATHOLOGY AND PSYCHOTHERAPY</td>
</tr>
<tr>
<td>3</td>
<td>PSY 569¹ MARRIAGE AND FAMILY THERAPY</td>
</tr>
<tr>
<td>3</td>
<td>PSY 565¹ MARRIAGE AND FAMILY THERAPY</td>
</tr>
</tbody>
</table>

¹With approval of the Director of the Clinical Program, an elective may be substituted for either PSY 558 or 566.

Master of Arts in Experimental-Human Factors Psychology (PSY)

The master's program in experimental-human factors psychology is designed for the student who wishes to integrate the theory, methods, and data of experimental psychology with that of human factors. The program is accredited by the Human Factors and Ergonomics Society. The overall program is structured to prepare the student for further graduate study in experimental psychology or human factors at the Ph.D. level, and/or for a career as a research applied scientist in human factors psychology. The curriculum stresses integration of knowledge in three key areas:
1. the theoretical issues and quantitative research methodology associated with perception, human information processing, motor skills, and other psychological processes;
2. application of knowledge about basic psychological processes to the development of equipment, equipment interfaces, and work environments; and
3. the tools that the human factors specialist applies to system analysis, design, test, and evaluation.

Emphasis is on the integration of coursework with research and practical experience.

All students enrolled in any of the three programs leading to the Master of Arts with a major in Psychology are subject to the following general requirements of the Department of Psychology. Full-time students normally complete program requirements in two years:

1. The number of semester hours and required courses as specified by the individual program described below.
2. Demonstration of satisfactory progress toward the degree that includes the requirement that students maintain a minimum average of B (3.00) in coursework. Students who fail to meet this requirement are either placed on academic probation or dismissed from the program.
3. Students are permitted no more than six semester hours with grades of C or lower. Students who fail to meet this requirement are dismissed from the program.
4. No more than six semester hours of 400-level courses may apply toward the master's degree, and normally no more than six semester hours of graduate work approved by the department chair may be transferred from other institutions.
5. Attendance is required at regularly scheduled extra-course seminars on selected issues in psychology and at occasional specialized programs.
6. Thesis must deal with an approved research problem, incorporating an appropriate review of theory and literature, and demonstrating competence in the application of research methodology.
7. Students are expected to conduct themselves in a professional and ethical manner in accordance with generally accepted standards for psychologists. Failure to do so may result in dismissal.
8. It is the student's responsibility to know and to meet the requirements of the University and of the graduate program.

The Master of Arts with a major in psychology (experimental-human factors) requires 39 semester hours, including thesis, as specified below.

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Psychology Core Requirements</td>
<td>12</td>
</tr>
<tr>
<td>PSY 501 EXPERIMENTAL DESIGN AND STATISTICS I</td>
<td>3</td>
</tr>
<tr>
<td>PSY 502 EXPERIMENTAL DESIGN AND STATISTICS II</td>
<td>3</td>
</tr>
<tr>
<td>PSY 510 HISTORY &amp; SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>PSY 599 THESIS</td>
<td>3</td>
</tr>
<tr>
<td>Experimental-Human Factors Core Requirements</td>
<td>18</td>
</tr>
<tr>
<td>PSY 522 ADVANCED COGNITIVE PROCESSES</td>
<td>3</td>
</tr>
<tr>
<td>PSY 529 PERCEPTION</td>
<td>3</td>
</tr>
<tr>
<td>PSY 531 HUMAN FACTORS IN SYSTEM DEVELOPMENT</td>
<td>3</td>
</tr>
<tr>
<td>PSY 533 ENGINEERING PSYCHOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>PSY 535 ERGONOMICS</td>
<td>3</td>
</tr>
<tr>
<td>PSY 539 HUMAN FACTORS PRACTICUM</td>
<td>3</td>
</tr>
<tr>
<td>Psychology Electives (see below)</td>
<td>9</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
</tr>
<tr>
<td>PSY 506 SELECTED TOPICS IN ADVANCED RESEARCH METHODOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>PSY 524 HUMAN INFORMATION PROCESSING</td>
<td>3</td>
</tr>
<tr>
<td>PSY 528 PSYCHOPHYSIOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>PSY 532 SPECIAL TOPICS IN HUMAN FACTORS</td>
<td>1 - 3</td>
</tr>
<tr>
<td>PSY 534 HUMAN COMPUTER INTERACTION</td>
<td>3</td>
</tr>
<tr>
<td>PSY 536 TRAINING SYSTEM DEVELOPMENT</td>
<td>3</td>
</tr>
<tr>
<td>PSY 537 TEAM AND GROUP PROCESS</td>
<td>3</td>
</tr>
<tr>
<td>PSY 596 EXPERIMENTAL RESEARCH</td>
<td>1 - 3</td>
</tr>
</tbody>
</table>
PSY 597  READINGS  1 - 3

1 Courses may be selected from this list or, with permission of the program director, from other graduate courses within the department and from graduate courses outside the department in such related disciplines as engineering or computer science. No more than six semester hours of courses taken outside the department may count toward program credit.

2 PSY 506 and PSY 532 may be taken more than once for credit

Master of Arts in General Psychology (PSY)

The Master of Arts in general psychology offers students a broad background in some of the basic areas of psychology. The program is designed to prepare students for doctoral work by providing training through research and basic courses. A student takes a minimum of two courses in the areas of cognitive, developmental, and social psychology. Selected courses, but not a multi-course concentration, in human factors and/or clinical psychology are also available to the general psychology student. With the six elective hours, it is also possible to develop interdisciplinary interests in computer science, education, business, engineering, communication, or biology.

All students enrolled in any of the three programs leading to the Master of Arts with a major in Psychology are subject to the following general requirements of the Department of Psychology. Full-time students normally complete program requirements in two years:

1. The number of semester hours and required courses as specified by the individual program described below.
2. Demonstration of satisfactory progress toward the degree that includes the requirement that students maintain a minimum average of B (3.00) in coursework. Students who fail to meet this requirement are either placed on academic probation or dismissed from the program.
3. Students are permitted no more than six semester hours with grades of C or lower. Students who fail to meet this requirement are dismissed from the program.
4. No more than six semester hours of 400-level courses may apply toward the master's degree, and normally no more than six semester hours of graduate work approved by the department chair may be transferred from other institutions.
5. Attendance is required at regularly scheduled extra-course seminars on selected issues in psychology and at occasional specialized programs.
6. Thesis must deal with an approved research problem, incorporating an appropriate review of theory and literature, and demonstrating competence in the application of research methodology.
7. Students are expected to conduct themselves in a professional and ethical manner in accordance with generally accepted standards for psychologists. Failure to do so may result in dismissal.
8. It is the student's responsibility to know and to meet the requirements of the University and of the graduate program.

The Master of Arts with a major in psychology (general) requires 36 semester hours, including thesis, as specified below.

<table>
<thead>
<tr>
<th>General Psychology</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology Core Requirements</td>
<td>12</td>
</tr>
<tr>
<td>PSY 501 EXPERIMENTAL DESIGN AND STATISTICS I</td>
<td>3</td>
</tr>
<tr>
<td>PSY 502 EXPERIMENTAL DESIGN AND STATISTICS II</td>
<td>3</td>
</tr>
<tr>
<td>PSY 510 HISTORY &amp; SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>PSY 599 THESIS</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology Requirements - 6 hours from each of the three content areas below</td>
<td>18</td>
</tr>
<tr>
<td>Developmental Psychology Content Area</td>
<td>6</td>
</tr>
<tr>
<td>PSY 457 TELEVISION AND ITS EFFECTS ON CHILDREN</td>
<td>3</td>
</tr>
<tr>
<td>PSY 573 DEVELOPMENTAL PSYCHOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>PSY 574 COGNITIVE DEVELOPMENT IN CHILDREN</td>
<td>3</td>
</tr>
<tr>
<td>Cognitive Psychology Content Area</td>
<td>6</td>
</tr>
<tr>
<td>PSY 522 ADVANCED COGNITIVE PROCESSES</td>
<td>3</td>
</tr>
</tbody>
</table>
### Social Psychology Content Area

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>PSY 444</td>
<td>ENVIRONMENTAL PSYCHOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>PSY 537</td>
<td>TEAM AND GROUP PROCESS</td>
<td>3</td>
</tr>
<tr>
<td>PSY 585</td>
<td>EXPERIMENTAL SOCIAL PSYCHOLOGY</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

1. In special cases, a Readings (PSY 597) or another course in one of the content areas (e.g., PSY 588, Interpersonal Processes) may be substituted for one of the named courses.

2. Six semester hours, some of which may be from other departments of the University, selected in consultation with the advisor.
PSY 524 HUMAN INFORMATION PROCESSING
Current psychological and artificial intelligence models of cognition. Topics include coding mechanisms in the central nervous system, simulation of sensory processes and recognition, computer models of human memory, semantic information processing by humans and machine, fast retrieval theories, recent theories of language comprehension and problem solving.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 528 PSYCHOPHYSIOLOGY
Neurophysiology of attention, sensation, perception, emotion, learning, memory, and motor control. Emphasis on electrophysiological indicants and cybernetical analyses.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 529 PERCEPTION
Systematic study of methods and research findings in the field of human perception, with an evaluation of theoretical interpretations.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 531 HUMAN FACTORS IN SYSTEM DEVELOPMENT
Introduction to human factors during the system development process. Treats the design process from initial conceptual stages to final testing and evaluation. Emphasis is upon methods and techniques that permit development of data to support human factors functions throughout the process.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 532 SPECIAL TOPICS IN HUMAN FACTORS
Wide ranging topics related to Human Factors Psychology are envisioned. For example: human tracking performance, tactual communication, vigilance, motor memory, skill development, visual displays, technical invention, electrophysiological indicants of human performance, etc. May be repeated.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 533 ENGINEERING PSYCHOLOGY
Treatment of the relationship between problems in human factors engineering and theory-based research in experimental psychology and human performance. Topics covered include theory and research in such areas as decision-making, attention, perception, and motor performance and their potential application to the design of the person-machine interface in complex systems.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 534 HUMAN COMPUTER INTERACTION
A critical review of human factors issues in the design of user interfaces of interactive computer systems. Emphasis will be placed on topics of cognitive engineering as they apply to user-centered systems design.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 535 ERGONOMICS
Ergonomics, the study of work, emphasizes the physical aspects, capabilities, and limitations of humans. Students participate in an anthropometric measurement laboratory, employ computerized biomechanical models, and examine the literature in a specific area of interest.
Prerequisite(s): Graduate student status in Psychology or permission of instructor

PSY 536 TRAINING SYSTEM DEVELOPMENT
Treatment of the systems approach to training program analysis, design, and evaluation. Topics covered include assessment of training objectives, development of training program content, selection of training media, application of simulation technology, and program evaluation procedures,
including transfer of training methodology.

**Prerequisite(s):** Graduate student status in Psychology or permission of instructor

**PSY 537 TEAM AND GROUP PROCESS**

Study of group processes and theories with special application to team training, communication, performance, and coordination in human factors settings and problems. Group decision making and leadership are also emphasized.

**Prerequisite(s):** Graduate student status in Psychology or permission of instructor

**PSY 539 HUMAN FACTORS PRACTICUM**

Experience in applying the theory, methods, and data of experimental-human factors psychology to person-machine problems is acquired through placement in an approved human factors organization.

**Prerequisite(s):** PSY 501, 524, 529, 531 and 533 or permission of the director of the Experimental-Human Factors Program

**PSY 550 INTRODUCTION TO CLINICAL PSYCHOLOGY**

Introduction to interviewing skills with adults and children. Academic and applied components include supervised practice interviews and documentation. Professional components addressed include diversity, ethics, and mental health systems.

**Prerequisite(s):** Graduate status in Clinical Program

**PSY 551 ASSESSMENT OF INTELLIGENCE**

Theoretical rationale and techniques of individual mental testing, with emphasis on the Wechsler Scales (WAIS, WISC, WPPSI) and the Stanford-Binet. Major content areas include theories of intelligence, relevant psychometric principles, clinical interpretation, and current research.

**Prerequisite(s):** Graduate status in Clinical Program or permission of instructor

**PSY 553 THEORIES AND RESEARCH IN PSYCHOPATHOLOGY**

Survey of mental disorders with respect to their characteristics, etiology, and treatment alternatives. Emphasis is on the process of expanding knowledge through research. Practice in the use of the current diagnostic classification system.

**Prerequisite(s):** Graduate status in Clinical Program or permission of instructor

**PSY 555 THEORIES OF PERSONALITY AND PSYCHOTHERAPY**

Survey and critical analysis of the major current theories of personality and psychotherapy, integrating their contributions into a diversified, functional, and adaptable approach to therapy.

**Prerequisite(s):** Graduate status in Clinical Program or permission of instructor

**PSY 556 ASSESSMENT OF PERSONALITY**

Survey of approaches to personality assessment as well as the techniques of administration and interpretation of specific instruments. Emphasis is on the MMPI-2, NEO-PIR, and MCMI-III. Strategies of test construction and evaluation, ethical issues, and research are discussed.

**Prerequisite(s):** Graduate status in Clinical Program, PSY 551 and PSY 553, or permission of instructor

**PSY 558 GROUP PSYCHOTHERAPY**

Survey of theories and techniques of group psychotherapy, including a review of the theoretical and empirical literature, as well as a training group experience.

**Prerequisite(s):** Graduate status in Clinical Program and PSY 555 or permission of instructor

**PSY 560 CHILDHOOD PSYCHOPATHOLOGY AND PSYCHOTHERAPY**

Current views of the etiology and differential diagnosis of psychopathological disorders of childhood and adolescence are examined. Relevant therapeutic approaches are presented and evaluated in relation to recent research.

**Prerequisite(s):** Graduate status in Clinical Program and PSY 553, PSY 555, or permission of instructor

**PSY 564 INDIVIDUAL PSYCHOTHERAPY**
In-depth study of the principles and techniques of an integrated approach to individual psychotherapy (humanistic, dynamic, and cognitive-behavioral) as developed from clinical and empirical findings. **Prerequisite(s):** Graduate status in Clinical Program and PSY 555, or permission of instructor

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PSY 565</td>
<td>ETHICAL &amp; CULTURAL ISSUES IN CLINICAL ASSESSMENT AND PSYCHOTHERAPY</td>
</tr>
<tr>
<td></td>
<td>An examination of ethical theories and principles applied to clinical assessment and psychotherapy. Issues addressed include ethical frameworks, ethical codes, assessment practices, psychotherapy techniques, and common problems arising in clinical practice. <strong>Prerequisite(s):</strong> Graduate status in Clinical Program or permission of instructor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PSY 556</td>
<td>MARRIAGE AND FAMILY THERAPY</td>
</tr>
<tr>
<td></td>
<td>Survey of the major therapeutic approaches to family and marital problems and related research findings. <strong>Prerequisite(s):</strong> Graduate status in Clinical Program and PSY 555, or permission of instructor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSY 567</td>
<td>SPECIAL TOPICS IN CLINICAL PSYCHOLOGY</td>
</tr>
<tr>
<td></td>
<td>A variable topics course on issues relevant to the training of students preparing for work in clinical psychology. May be repeated with different topics. <strong>Prerequisite(s):</strong> Graduate status in Clinical Program or permission of instructor</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PSY 569</td>
<td>CLINICAL PRACTICUM</td>
</tr>
<tr>
<td></td>
<td>Experience in interviewing, psychological testing and therapy is acquired through placement in approved mental health agencies. <strong>Prerequisite(s):</strong> Graduate status in the Clinical Program</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PSY 573</td>
<td>DEVELOPMENTAL PSYCHOLOGY</td>
</tr>
<tr>
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<td>The science of human development with emphasis on theory, research methods, findings and applications. Topics selected from but not limited to personality and social development, language acquisition, problem-solving, attachment, sex roles, children's rights, moral and prosocial behavior, family relations and extrafamilial influences such as television and schools. <strong>Prerequisite(s):</strong> Graduate status or permission of the instructor</td>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>PSY 574</td>
<td>COGNITIVE DEVELOPMENT IN CHILDREN</td>
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<td>Major approaches to the study of cognitive development: attentional and mediational development as demonstrated in children's learning, memory, and problem solving; language development and Piaget's theory. <strong>Prerequisite(s):</strong> Graduate status or permission of the instructor (also PSY 452)</td>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>PSY 585</td>
<td>EXPERIMENTAL SOCIAL PSYCHOLOGY</td>
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<tr>
<td></td>
<td>Designed to provide information and perspective about such social psychological topics as attitude change, interpersonal attraction, social influence, attribution, aggression, helping and intrinsic motivation. <strong>Prerequisite(s):</strong> Graduate status</td>
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<th>Course Code</th>
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<tr>
<td>PSY 588</td>
<td>INTERPERSONAL PROCESSES</td>
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<tr>
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<td>Seminar in research in some prominent sub-areas of social psychology. Emphasis on critical skills and research ideas in topics such as non-verbal communication, self-disclosure, affiliation and attraction, and equity theory. <strong>Prerequisite(s):</strong> PSY 585, permission of instructor</td>
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<tr>
<th>Course Code</th>
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<tr>
<td>PSY 595</td>
<td>SEMINAR IN SPECIAL TOPICS IN PSYCHOLOGY</td>
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<tr>
<td></td>
<td>Various topics of special interest to faculty and students. An intensive critical evaluation of the appropriate literature. May be repeated. <strong>Prerequisite(s):</strong> PSY 585, permission of instructor</td>
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<th>Course Code</th>
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<tr>
<td>PSY 596</td>
<td>EXPERIMENTAL RESEARCH</td>
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<tr>
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<td>Individual graduate students explore particular research areas. Under guidance of the instructor, research projects are formulated and conducted. Project reports are required. May be repeated. <strong>Prerequisite(s):</strong> Permission of instructor</td>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>PSY 597</td>
<td>READINGS</td>
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</tbody>
</table>
Designed for individual, student-faculty study in a specialized area of interest. Topic and criteria for evaluation to be specified prior to registration. May be repeated. 

Prerequisite(s): Permission of instructor

PSY 599 THESIS

An original research project incorporating an appropriate review of theory and literature and demonstrating competence in the application of research methodology. Required of all graduate students.
College of Arts and Sciences

(REL) Religious Studies  (Collapse Description)

Dr. Sandra Yocum Mize, Chair of the Department
Dr. Dennis Doyle, Director of Graduate Studies

The Department of Religious Studies offers two graduate programs leading to the Master of Arts: theological studies and pastoral ministry. A third program leads to the Doctor of Philosophy in theology. The distinctive research focus of the doctoral program is the practices/praxis of Catholicism as it is inculturated in multiple ways in the United States context. Master's and doctoral students join with their professors to form an ecumenical community that integrates the study of the classical disciplines of Christian theology with attentiveness to the multicultural and interdisciplinary dimensions critical to the contemporary study of religion. Intensive study of Roman Catholic traditions remains central to each graduate program. Both the master's and doctoral programs include basic requirements and allow students flexibility in the remainder of their course selection to ensure that their graduate studies serve their desired outcomes, whether in pursuing further academic work or securing placement in professional ministry.

Assistantships

Qualified applicants are eligible for financial assistance in the form of assistantships for master's students and assistantships or fellowships for doctoral students. Awards are determined on a competitive basis. Master's students receive tuition remission for 18 credit hours per year and an annual stipend. Doctoral students receive tuition remission for 18 to 30 credit hours per year and an annual stipend.

Advising

The director of graduate studies functions as the advisor for all incoming master's students. No later than the completion of the tenth semester hour of graduate credit, a student must formally choose an academic advisor from among the full-time religious studies faculty members who teach in the master's program or formally agree to have the director of graduate studies continue as her or his advisor.

The Ph.D. program director (or the director's designate) functions as the initial academic advisor for all Ph.D. students. The Ph.D. program director assists students in first semester course selection and provides initial guidance in scheduling general examinations and selecting the five members of the general examination committee. The Ph.D. program director reports on advising activities for each student to the Ph.D. committee once per semester.

Doctoral students also work with a five-member general examination committee. The committee must include a faculty member from each of the core disciplines: history of Christianity, biblical studies, and theology/ethics. The committee determines whether the student passes or fails the three general examinations.

As soon as doctoral students determine their dissertation topics, they should choose, in consultation with the Ph.D. program director, a dissertation director from among the religious studies faculty members who teach doctoral seminars. The doctoral student, with the dissertation director's guidance, chooses a qualifying examination/dissertation committee. In addition to the dissertation director, this committee ordinarily consists of three religious studies faculty members who teach doctoral seminars and one member outside the department. This committee determines whether the student passes or fails the qualifying examination and reads and evaluates the dissertation.

The composition of both examination committees is subject to the approval of the Ph.D. program director and the Ph.D. committee.

Facilities

Master's and doctoral students have access to distinctive University of Dayton resources such as the Center for Leadership and Community, the Center for Catholic Education, and the Institute for Pastoral Initiatives. The Consortium of Higher Education in Religious Studies offers interaction with area seminaries and other institutions, interchange of facilities, sharing of library resources, cooperative innovative programming, and cross-registration. Students have access not only to a greater variety of courses but also opportunities for even more flexible construction of their degree programs.
The University of Dayton also houses the International Marian Research Institute which administers a doctoral program in Theology (S.T.D.) sponsored by the Pontifical Marianum University in Rome. Religious studies master's students may take courses in the Institute. Interested students should consult with the director of graduate studies for further information.

Programs (Collapse All)

Program Name
Doctorate of Philosophy in Theology (REL)

The Ph.D. in theology employs a unique approach to theological studies and research utilizing the methodologies associated with the academic study of religion, emphasizing strong interaction with the social sciences and humanities. The program's distinctive practice of integrating methodologies prepares students to work within a web of disciplines with theology at the center of research and writing. Using this integrative methodological approach, graduates are able to do theology that is rooted in discovering, analyzing, understanding, and proposing creative transformations in their current religious context, especially as found in the practices/praxis that reflect the United States Catholic experience.

Doctoral students must complete a minimum of 90 semester credit hours beyond the bachelor's degree. Up to 30 credit hours from an accredited master's program in theology or religious studies can be counted toward the 90-credit requirement. The Ph.D. program director, in consultation with the religious studies Ph.D. Committee, determines the number of credits accepted.

All students must complete REL 600 or its equivalent. Between 12 and 30 semester credit hours can be earned as dissertation hours; additional dissertation hours will ordinarily not count toward the minimum of 90 semester credit hours for the Ph.D. Students select doctoral seminars or reading courses to complete the remainder of the 90 credits.

Each student must be in full-time residence; i.e., taking the load of a full-time student, for a minimum of one year before attempting the qualifying examination.

Comprehensive Examinations

Each student, during the course of the program, must successfully complete three general examinations and a qualifying examination.

1. The three GENERAL EXAMINATIONS approximate the master's level comprehensive examinations. A student is expected to demonstrate basic knowledge in three core disciplinary areas of theology: biblical studies, history of Christianity, and systematic theology and ethics. The examinations serve two purposes. First, they provide a student with the background necessary for teaching most college-level introductory courses. Second, they equip the student with the broad knowledge base necessary for skillful theological work. The chair of the examination committee, in cooperation with the Ph.D. program director, oversees the proper administration of the three exams. Each examination consists of a written component followed by an oral examination. Ordinarily, at least one examination must be completed before the student completes 36 hours beyond the bachelor's degree. Students must pass all three examinations before proceeding to the qualifying examination. The student may repeat any examination once. Failure to pass an examination on a second attempt terminates the student from the program. Students who took comparable exams in an accredited master's program may petition for the waiver of any or all of the general examinations. A petition is submitted to the Ph.D. program director who presents it to the religious studies Ph.D. committee. The committee makes the final determination.

2. Each student must pass a QUALIFYING EXAMINATION before beginning the dissertation. Ordinarily, the student must complete 54-80 semester hours beyond the bachelor's degree before attempting this examination. Through the qualifying examination, students demonstrate their ability to do original research in the field of the U.S. Catholic experience. It is, therefore, substantially more detailed and extensive than the three general examinations. The qualifying examination consists of three parts:
   1. a written examination on the U.S. Catholic experience broadly conceived;
   2. a completed dissertation prospectus covering the proposed dissertation area; and
   3. an oral examination.

Upon successful completion of the written examination and submission of the prospectus, the student has an oral examination with her or his committee. The student must be prepared to respond to questions on the U.S. Catholic experience as well as her or his dissertation prospectus.
Research Skills

By the time a student has completed 30 semester hours accepted from other institutions, the student is expected to demonstrate a minimum of three research skills that will enable the student to do primary research in an area of the U.S. Catholic experience.

1. Latin: A basic ability to read official ecclesiastical texts in Latin is ordinarily expected of all students. Proficiency is demonstrated by successful completion of an appropriate course in Latin or by passing an examination consisting of translating a short specific text (e.g., a section of an encyclical) and accurately responding to content questions on another Latin text. The examination is to be completed within a defined time period, aided by a dictionary and grammar guide. A qualified religious studies faculty member administers the exam.

2. Research Languages: All students are expected to demonstrate at least reading proficiency in one modern language other than English. Proficiency is normally demonstrated by the successful completion of a test administered by a qualified faculty member in either the Department of Languages or Religious Studies. Depending upon the precise area of research, the student may be required to demonstrate a higher level of competency in the main research language.

3. Additional Research Languages or Analytical Skills: Depending on her or his precise area of research, each student will be required to demonstrate proficiency in at least one additional research skill. For those whose research focuses on texts, that skill may be an additional language; for those whose research includes a significant component in biblical studies or classical theology, proficiency in biblical languages may be indicated; for those doing statistical or qualitative research, facility in an additional analytical area may be necessary (e.g., statistics, ethnography, participant-observation analysis, etc.). Successful completion of a graduate course in a given analytical skill serves as an acceptable indicator of a sufficient level of proficiency for future research purposes. The specific additional research skills (both languages and analytical) required for the student's program will be determined by the student's dissertation committee in consultation with the Ph.D. program director and religious studies Ph.D. committee. Students who have established proficiency in a language in another graduate program within the last five years may petition the religious studies Ph.D. committee to waive the language examination. A student is notified in writing of specific research skills required of her or him.

Dissertation

The dissertation is a major research project in which the candidate demonstrates the ability to define a research question, develop a research plan, employ relevant research skills and methodologies, and conduct original theological research. The candidate, in close consultation with the dissertation director, determines the topic, methodologies, and pertinent resources. The research plan is outlined in the dissertation prospectus that is submitted as part of the qualifying examination. Passing the qualifying examination means that the prospectus is accepted. Candidates may apply no more than 30 semester hours of dissertation credit to the Ph.D. degree.

The student's dissertation director and committee will be constituted as described above. The dissertation is presented to the committee in a public defense no later than four weeks prior to graduation. The dissertation committee may accept the dissertation without revisions; with minor revisions to be reviewed by the dissertation director; with major revisions to be examined by the committee; or the committee may reject the dissertation (which requires the candidate to retake the dissertation area examination and proceed from that point, as above). Upon final acceptance of the dissertation, the candidate shall be awarded the Ph.D. degree.

Master of Arts in Pastoral Ministry (REL)

The master's program in pastoral ministry integrates the study of theology with the general principles and effective practices of pastoral ministry. The program offers students an opportunity to prepare for a variety of service careers emerging in the contemporary Church, including pastoral positions in catechetics and religious education, family parish, and campus ministry. Courses in religious education and telecommunications, family and parish ministries, and the social teachings of the Church ensure the vitality of the program.
Program Requirements for the M.A.

This program requires 36 credit hours for graduation. The majority of the student’s coursework must be taken in the Department of Religious Studies. A 3.0 grade point average in departmental courses and in the student’s overall program is required for graduation.

Master’s students in both theological studies and pastoral ministry are required to successfully complete the one-credit REL 500A, “Introduction to Research Methods in Religious Studies,” the three two-credit courses: REL 500B, “Foundations of Biblical Studies,” REL 500C, “Foundations of Church History and Historical Theology,” REL 500D, “Foundations of Systematic and Moral Theology.” Students may petition the religious studies graduate committee to waive from one to four of these requirements. The student must present clear evidence of equivalent coursework to that completed in REL 500A, B, C, or D for the requirement to be waived. Students must complete REL 500B prior to taking specialized biblical courses, REL 500C prior to taking specialized historical courses, and REL 500D prior to taking specialized systematic or moral theology courses. Each student must complete at least one additional two- or three-credit course in each of the four core disciplinary areas: biblical studies, historical studies, systematic theology and moral theology.

Upon completion of the basic requirements, students must then draw up a specific program proposal based upon the projected course rotation. The selection of courses is done in consultation with the student’s academic advisor and in light of the student’s needs, interests, and background. This program proposal is submitted to the director of graduate studies for approval.

The programs leading to the master’s degree may be pursued in summer sessions with courses of one to three weeks duration, or be pursued full-time; i.e., throughout the year. The master’s degree must be completed seven calendar years from the time of matriculation.

Structure of the Master’s Program and Coursework

This program is divided into three parts:

1. Theological foundations (12 to 15 hours including the seven required credits);
2. Basic principles for effective ministry (six to nine hours); and
3. The practice and study of specific ministries (nine to 12 hours), including a practicum (three to six hours) and the synthesis seminars (two hours).

Language Proficiency

There is no language requirement for the master’s degree. For specialization in the biblical or historical areas, a working knowledge of the language employed in the area, e.g., Hebrew, Greek, or Latin, is encouraged. Students preparing for doctoral work should work toward proficiency in at least one modern language.

Master of Arts in Theological Studies (REL)

The master’s program in theological studies offers a comprehensive approach to the study of theology and religion. Each student is expected to develop an understanding of biblical sources, historical developments in Christianity, and contemporary systematic and moral theologies, especially in the Roman Catholic tradition. Ecumenical perspectives among Christians and interfaith dialogue among the world religions provide another important matrix for study.

Concentration in Marian Studies

A concentration in Marian Studies is available for students who take between 12 and 16 semester credits in specially designated courses listed under the Marian studies concentration. The International Marian Research Institute at the University of Dayton offers these courses on a regular basis. All graduate students have access to the world-renowned resources of the Marian Library for their research.

Program Requirements for the M.A.

This program requires 36 credit hours for graduation. The majority of the student’s coursework must be taken in the Department of Religious Studies. A 3.0 grade point average in departmental courses and in the student’s overall program is required for graduation.

Master’s students in both theological studies and pastoral ministry are required to successfully complete the one-credit REL 500A, “Introduction to Research Methods in Religious Studies,” the three two-credit courses: REL 500B, “Foundations of Biblical Studies,” REL 500C, “Foundations of Church History and Historical Theology,” REL 500D, “Foundations of Systematic and Moral
Theology. Students may petition the religious studies graduate committee to waive from one to four of these requirements. The student must present clear evidence of equivalent coursework to that completed in REL 500A, B, C, or D for the requirement to be waived. Students must complete REL 500B prior to taking specialized biblical courses, REL 500C prior to taking specialized historical courses, and REL 500D prior to taking specialized systematic or moral theology courses. Each student must complete at least one additional two- or three-credit course in each of the four core disciplinary areas: biblical studies, historical studies, systematic theology and moral theology.

Upon completion of the basic requirements, students must then draw up a specific program proposal based upon the projected course rotation. The selection of courses is done in consultation with the student's academic advisor and in light of the student's needs, interests, and background. This program proposal is submitted to the director of graduate studies for approval.

The programs leading to the master's degree may be pursued in summer sessions with courses of one to three weeks duration, or be pursued full-time; i.e., throughout the year. The master's degree must be completed seven calendar years from the time of matriculation.

**Structure of the Master's Programs and Coursework**

Three arrangements are possible:

1. 36 hours of coursework (including the seven required credits) plus submission of a research paper (completed in a course taken between the 15th and 24th hours of coursework) to the director of graduate studies;
2. 33 hours of coursework (including the seven required credits) plus a three-hour comprehensive project with an oral defense; or
3. 30 hours of coursework (including the seven required credits) plus a 6-hour thesis with an oral defense.

**Language Proficiency**

There is no language requirement for the master's degree. For specialization in the biblical or historical areas, a working knowledge of the language employed in the area, e.g., Hebrew, Greek, or Latin, is encouraged. Students preparing for doctoral work should work toward proficiency in at least one modern language.

**Courses**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Sem. Hrs.</th>
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<tbody>
<tr>
<td>REL 500A</td>
<td>INTRODUCTION TO RESEARCH METHODS IN RELIGIOUS STUDIES</td>
<td>1</td>
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<tr>
<td>REL 500B</td>
<td>FOUNDATIONS OF BIBLICAL STUDIES</td>
<td>2</td>
</tr>
<tr>
<td>REL 500C</td>
<td>FOUNDATIONS OF CHURCH HISTORY AND HISTORICAL THEOLOGY</td>
<td>2</td>
</tr>
<tr>
<td>REL 500D</td>
<td>FOUNDATIONS OF SYSTEMATIC AND MORAL THEOLOGY</td>
<td>2</td>
</tr>
<tr>
<td>REL 501</td>
<td>BIBLICAL HEBREW I</td>
<td>3</td>
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<tr>
<td>REL 502</td>
<td>BIBLICAL GREEK I</td>
<td>3</td>
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</table>
REL 503  BIBLICAL HEBREW II
Introduction to the morphology and syntax of biblical Hebrew to facilitate the handling of basic tools and the reading of simple prose texts.

REL 504  BIBLICAL GREEK II

REL 511  CONTEMPORARY BIBLICAL CRITICISM
Introduction to the principal methodological approaches to the Hebrew Bible and New Testament, with an emphasis on introductory matters, content, and cultural heritage. Will include a survey of the major results of contemporary biblical scholarship.

REL 513  OLD TESTAMENT EXEGESIS

REL 518  NEW TESTAMENT EXEGESIS

REL 519  NEW TESTAMENT THEOLOGY
A thorough study of one theme in the theology of the New Testament. May be taken more than once.

REL 520  HISTORY AND THEOLOGY OF THE MEDIEVAL CHURCH
Early Medieval foundations, the Carolingian Renaissance, the preparation of the 11th and 12th centuries, as well as the post-13th century movement toward nominalism, to give perspective to the High Scholasticism of the 13th century.

REL 521  CHRISTIAN DOCTRINE IN THE EARLY CHURCH
The development of doctrine from the post-apostolic age to the beginning of the Middle Age including the Apostolic Fathers, the Apologists, Gnosticism, Irenaeus, Marcion, Tertullian, John of Damascus, and the Schools of Antioch, Alexandria, and Cappadocia.

REL 522  AUGUSTINE TO OCCAM
Analysis of the life and thought of individual leaders of the Church.

REL 523  TRENT TO VATICAN II
Historical account of Christianity's theological response to the major reformers and of further theological developments of Christianity in the context of philosophy, science, and political revolutions up to Vatican II.

REL 524  PROTESTANT CHRISTIANITY
Survey of the development of Protestant thought from the Reformation to the present. Analysis, in their own writings and historical context, of selected Protestant theologians, such as Luther, Calvin, Knox, Cranmer, Schleiermacher, Ritschl, Harnack, and Barth.

REL 528  U.S. CATHOLICISM
Examination of the experiences and contributions of the people who formed the Catholic Church in the United States. A focus on the influence of Catholicism on American culture, politics, intellectual life, education, and religion and an investigation of how Catholic faith has informed the attitudes and actions of U.S. Catholics regarding culture, politics and social justice. Topics include religious liberty, lay movements in the U.S., anti-Catholicism, contributions of U.S. Catholic women, African American Catholics, and Hispanic/Latino(a) Catholics.

REL 529  AFRICAN AMERICAN RELIGION
Investigation of how religion has shaped African American identity, culture and community. Addresses the religious experience of African Americans through their theology, literature, music, history, and creative arts in the
forms of the slave narratives, the spirituals and Gospel music, black homiletics, and other writings.

REL 535 GOD AND HUMAN EXISTENCE 2 - 3
A survey of Christian theologies of God, traditional and modern, and the viewpoints they represent on the nature and purpose of human existence.

REL 537 CHRISTOLOGY 2 - 3
An examination of the approaches taken by contemporary theologians in discussing Jesus and his significance for Christian faith.

REL 540 ECCLESIOLOGY 2 - 3
Study of the nature and mission of the church, with an emphasis on Catholic perspectives. Topics include the church as mystery, models of the church, ecumenism, authority, laity, and the church-world relationship.

REL 543 SACRAMENTAL THEOLOGY 2 - 3
Detailed study of the principle of sacramentality and of the individual sacraments, stressing the historical development of each and its contemporary renewal.

REL 544 SELECTED CATHOLIC DOCTRINES 2 - 3
An examination from several perspectives (biblical, historical, and systematic) of Catholic doctrines and dogmas, including the notion of dogma, its development, Scripture and Tradition, Papal Infallibility, Freedom of Conscience, the Marian Dogmas, and the Salvation of non-Christians.

REL 545 CONTEMPORARY THEOLOGIANS 2 - 3
An examination of several contemporary approaches to theological method. Beginning with an overview of revolutionary challenges to theology in the nineteenth century, the course will examine the lives and contributions of such influential and diverse religious thinkers as Lonergan, Gutierrez, Rueder, Schillebeeckx, Rahner, and Kung and explore Feminist, Latin American, Asian, and African theologies.

REL 546 LITURGY 2 - 3
Study of the theological perspective on the history and the future of Christian liturgy.

REL 547 THEOLOGY OF CHRISTIAN DISCIPLESHIP 2 - 3
An examination of the meaning of Christian discipleship in light of the Scriptures and contemporary theological insights. Emphasis on the baptismal roots of the call to Christian holiness and the principal dimensions of this call.

REL 548 THEOLOGY OF PRAYER 2 - 3
Study of the meaning of prayer, focusing on prayer in the Hebrew and Christian Scriptures, prayer as reflected in selected classical mystical writers, and contemporary approaches to prayer.

REL 550 FEMINIST THEOLOGY 2 - 3
An examination of the emergence and development of feminist theology (a form of liberation theology), the nature of its discourse and methodology, and the ways in which feminist insights are transforming the study of scriptures, systematic theology, spirituality, and church history. The interfaith character of religious feminism will also be studied.

REL 551 THEOLOGY AND WORLD RELIGIONS 2 - 3
An examination of the reality, challenges, and opportunities confronting faith communities in our multicultural and religiously pluralistic societies. Students explore the spiritual resources of several of the world's religions, the ways in which these religions view one another, and the impact of interreligious dialogue and collaboration on the development of Christian theology today.

REL 561 APPROACHES TO MORALITY 2 - 3
An attempt to establish the foundations of Christian morality, consisting of an historical survey of approaches and developments from the New Testament period to the present.

REL 562 CONTEMPORARY MORAL PROBLEMS 2 - 3
An open approach to contemporary moral issues within theological perspectives.

REL 571 MARY AND THE NEW TESTAMENT
Study of the principal New Testament texts with reference to Mary as Mother of the Redeemer, as figure of the Church, and with reference to her role in the history of salvation.

REL 572 MARY - PATRISTIC PERIOD
Initial development of Marian doctrine and devotion in Greek, Latin, and Oriental patristics (first six centuries).

REL 573 MARY - MEDIEVAL PERIOD
Study of the development of Mariology from the 7th century to the Renaissance: Marian doctrines, Marian devotions, Mary in art and liturgy, Marian feasts, and principal Marian works.

REL 574 MARY - MODERN PERIOD
Study of the development of Mariology from the Renaissance to the 20th century: principal Marian questions/controversies, Marian devotions, Marian shrines, Mary in art and liturgy, Marian feasts, and principal Marian works.

REL 575 MARY - CONTEMPORARY PERIOD
Study of the teaching of Vatican II about the Blessed Virgin Mary, especially in chapter VIII of LUMEN GENTIUM and its implications and developments in contemporary Marian doctrine and devotion. Recent encyclicals on Mary.

REL 576 MARIAN DOCTRINE
Historical and theological study of principal Marian doctrines: Divine maternity, virginity, Immaculate Conception, and Assumption. Study of the question of Mary's spiritual maternity, intercession, and mediation.

REL 577 MARIAN SPIRITUALITY
Study of the spirituality of Mary; e.g., Mary and the Holy Spirit; Mary's virtues; Mary as first disciple of the Lord, as Servant of the Lord, and as model of the Church.

REL 578 SPECIAL MARIAN TOPICS
A study of issues and subjects pertinent to Mariology.

REL 579 IMRI DIRECTED STUDY
Courses studying, analyzing, or investigating a specific area of Mariology.

REL 580 THEOLOGY OF MINISTRY
Study of ministry as the right and responsibility of all Christians; Jesus' dying and rising as the unifying thread linking the description, division, and chief aspects of ministry to evangelization and the kingdom; pastoral implications of the foregoing.

REL 583 RELIGIOUS PSYCHOLOGY
Study of the human response to God in the light of contemporary psychology. The implications for catechesis in the various stages of human development, in the process of conversion and commitment, and in the crises of faith.

REL 585 PASTORAL COUNSELING
Brief study of the methods of counseling with emphasis on those modes most in practice today. Concentration on the major problems faced by counselors in the pastoral area.

REL 586 LEADERSHIP IN PARISH MINISTRY
Study of the traditional parish structure as seen against the background of biblical and historical perspectives on the local church. An examination of the forces for change in the contemporary parish with an effort, out of the theoretical framework of leadership and administration, to assist the student in developing a philosophy and strategy of leadership.

REL 587 SYNTHESIS SEMINAR
Focus on the minister as person in Synthesis Seminar I and as organizational leader in Synthesis Seminar II. This required series of one-credit courses provides students with important opportunities to integrate learning from prior coursework, the practicum experience, and other pastoral experiences and to develop skills and experiences in theological reflection. The courses assist students in articulating their identity as ministers.

**REL 588 TEACHING MORALS AND VALUES IN RELIGIOUS EDUCATION** 2 - 3  
An integration of theory and practical techniques for teaching morals and values in religious education today. An exploration of value and moral development with emphasis on authors such as Piaget, Kohlberg, Erikson, Fowler, and Rokeach. May be repeated for graduate credit when topic changes.

**REL 589 PRACTICUM** 3 - 6  
Approved supervised pastoral involvement coupled with theological reflections.

**REL 590 SELECTED QUESTIONS** 1 - 3  
A study of specific questions and developments in biblical, historical, systematic, or catechetical theology.

**REL 591 SPECIAL TOPICS** 1 - 6  
A graduate workshop and/or seminar investigating and analyzing a specific area of theology and interdisciplinary scholarship concerning contemporary issues.

**REL 592 CONTEMPORARY ISSUES** 1 - 6  
Study of issues and subjects pertinent to theological studies and pastoral ministry.

**REL 593 DIRECTED STUDY** 1 - 3  
A directed study of a particular theologian, problem, or historical period.

**REL 598 COMPREHENSIVE PROJECT** 3

**REL 599 THESIS** 6

**REL 600 SEMINAR IN THEOLOGICAL RESEARCH METHODS** 6  
This two-semester course investigates methods and practice in contemporary theological research. Required of all entering doctoral students; open with permission to advanced master's students.

**REL 620 SEMINAR - U.S. CATHOLIC EXPERIENCE IN HISTORICAL PERSPECTIVE** 3  
Examinations of the complex interactions between European-formed, medieval and post-Tridentine Catholic spiritualities, theologies and communities, in the early contact period with indigenous cultures and the later U.S. national context. A focus upon specific people, movements, thought, practices, and institutions prior to Vatican II will provide the content for considering enduring influences or decisive moments in shaping the contemporary U.S. Catholic experience. The seminars consider social, cultural, economic, political as well as the religious and theological influences that comprise the multiplicity of the U.S. Catholic experience.

**REL 640 SEMINAR - THE U.S. CHURCH AND THE GLOBAL CHURCH** 3  
Examinations of relationships between the U.S. Catholic Church and particularly the churches outside Western Europe. Foci may include theological influences, the ethics of political and economic ties of the U.S. to other nations, communication, and communication theory.

**REL 645 SEMINAR - U.S. CATHOLIC EXPERIENCE IN THEOLOGICAL PERSPECTIVE** 3  
Examinations of the complex interaction between U.S. Catholic experience and theologies after Vatican II and social, cultural, economic, and political movements which influence and are influenced by contemporary theologies. Foci may include specific people, movements (e.g., ecumenism, feminism, ecological issues, multi-culturalism, restorationism, etc.), theologies, practices, or institutions.
REL 660 SEMINAR - ETHICS, PRACTICE, AND CONTEMPORARY SOCIETY
Examinations of specific foundational or applied questions in contemporary Christian ethics, especially in patterns of communal practices such as evangelization, catechesis, liturgy, etc. Issues with particular relevance for North America will be the focus of research in these seminars. Differing perspectives from diverse methodological traditions will be highlighted.

REL 670 SEMINAR - RELIGION IN A PLURIFORM SOCIETY
Examinations of how religion functions in a diverse society, drawing upon the social sciences. Foci can include the personal search for meaning, concern for the commonweal, church-state relations, the family, studies of specific religious practices or local communities, the influence of social location (e.g., race, class, gender) on religious experience.

REL 697 DIRECTED READINGS
1 - 3
Designed for individual, student-faculty study in a specialized area of interest. Topic and criteria for evaluation to be specified prior to registration. Students may take no more than two directed readings per term.

REL 699 DISSERTATION
3 - 12
Research for an original research project for the doctoral degree, incorporating an appropriate review of theory and literature and demonstrating competence in the application of research methodology.
School of Education and Allied Professions
(EDT) Teacher Education (Collapse Description)

Kathryn Kinnucan-Welsch, Chair of the Department

The mission of the Department of Teacher Education is the development of reflective, competent, and humane teachers. Recognizing the value of balancing theory and practice in professional education, the department provides candidates and faculty with the opportunity to be of service and to do research in P-12 settings. It dedicates itself to the discovery, construction, and development of the knowledge, skills, and dispositions that enable teachers to become educational leaders. The goal is to be a center of excellence in teacher education, thereby supporting continuing professional development and advocacy within the profession of teaching.

Licensure Requirements

The Department of Teacher Education offers several graduate programs leading to licensure in the State of Ohio. Candidates who wish to obtain a license or an endorsement on an existing certificate or license must apply for admission to that program. Candidates who complete the requirements for licensure may choose to complete the additional requirements for the master's degree, but it is not mandatory. Although candidates typically complete licensure prior to completing the master's degree, the coursework may be taken concurrently. If the candidate does wish to pursue the master's degree after completing the requirements for licensure, application to the appropriate master's degree program must be made.

In addition to the coursework required for the various licensure programs, the State of Ohio requires candidates to pass Praxis II Exams as a condition for provisional licensure. Praxis requirements are specific to each licensure program. See advisor for details. Under the new licensure rules for the State of Ohio, entry year teachers must pass Praxis III during the two-year provisional license period.

If candidates have student teaching as part of their program, they must apply for an assignment in the term prior to the student teaching term and must have satisfied all prerequisites and program requirements. Credit earned for student teaching does not apply to a master's degree program. Candidates must meet the approved reading requirements to qualify for the professional license.

Programs (Collapse All)
Program Name
Adolescence to Young Adult Education (LICEYA and MSE.YEA) (EDT)

Completion of the program requirements for adolescence and young adult education leads to provisional licensure in the State of Ohio for grades 7 - 12. Candidates must complete approved licensure program coursework in one of the following teaching concentration areas: integrated mathematics, science, integrated social studies, and integrated language arts. Concentration requirements also include professional education coursework. Candidates must pass the required PRAXIS II subject assessment exam(s) prior to student teaching. Candidates must also pass the PRAXIS II Principles of Learning and Teaching prior to licensure.

Candidates may choose to complete the master's degree after completing the requirements for licensure by completing the core requirements for the master's degree.

Adolescence to Young Adult Education
Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 502 or 503</td>
<td>PHILOSOPHICAL STUDIES IN EDUCATION (EDT 502)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HISTORY OF EDUCATION IN THE UNITED STATES (EDT 503)</td>
<td></td>
</tr>
</tbody>
</table>
This graduate program, designed to prepare individuals who seek to work with young children and their families, leads to a Master of Science in education with a specialization in transdisciplinary early childhood education as well as the two Ohio Department of Education teaching licenses listed below. It is also possible to meet the requirements for the Early Intervention Certificate awarded by the Ohio Department of Health and Human Services in conjunction with the Ohio Department of Mental Retardation and Developmental Disabilities.

The transdisciplinary early childhood program is a "unified" concentration meaning that special education and regular education coursework is blended and cannot be separated. Candidates must pass appropriate Praxis exams prior to licensure.

**Early Childhood License (LIC.ECE)**
Valid for teaching children who are typically-developing, at-risk, gifted, and who have mild to moderate educational needs. Licenses are issued for ages three through eight (prekindergarten through grade three).

**Early Intervention Specialist License (LIC.ECE.EIS)**
Valid for teaching children who have mild, moderate to intensive educational needs, including service coordination. Licenses are issued for ages three through eight (pre-kindergarten through grade three).

**Early Intervention Certificate (CER.ECE.EIC)**
Valid for servicing infants and toddlers, ages birth through two, who have an identified developmental delay or who are at risk for developing such a delay. The young child is served within the context of its family.

### Pre-coursework

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 508</td>
<td>THEORIES OF LEARNING AND HUMAN DEVELOPMENT</td>
<td>3</td>
</tr>
<tr>
<td>EDT 509</td>
<td>INSTRUCTION, MANAGEMENT, AND ASSESSMENT</td>
<td>3</td>
</tr>
<tr>
<td>EDT 518</td>
<td>INTEGRATED CURRICULUM AND INSTRUCTION FOR KINDERGARTEN-PRIMARY GRADES</td>
<td>4</td>
</tr>
<tr>
<td>EDT 527</td>
<td>STUDENT TEACHING K-PRIMARY</td>
<td>7</td>
</tr>
<tr>
<td>EDT 570</td>
<td>EDUCATING DIVERSE STUDENT POPULATIONS IN INCLUSIVE SETTINGS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 571</td>
<td>LANGUAGE DEVELOPMENT AND EMERGENT LITERACY</td>
<td>3</td>
</tr>
<tr>
<td>EDT 600</td>
<td>READING METHODS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 601</td>
<td>PHONICS, SPELLING, AND VOCABULARY</td>
<td>3</td>
</tr>
<tr>
<td>EDT 602</td>
<td>CRITICAL READING IN THE CONTENT AREAS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 603</td>
<td>FOUNDATIONS OF LITERACY THROUGH LITERATURE</td>
<td>3</td>
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</table>

### Cohort Group Coursework

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDT 510</td>
<td>INTRODUCTION TO TRANSDISCIPLINARY EARLY CHILDHOOD EDUCATION</td>
<td>2</td>
</tr>
<tr>
<td>EDT 511</td>
<td>INTEGRATED CURRICULUM FOR PRESCHOOL</td>
<td>2</td>
</tr>
</tbody>
</table>
Early Intervention Certification

Prerequisites/co-requisites

EDT 508  THEORIES OF LEARNING AND HUMAN DEVELOPMENT  3
EDT 570  EDUCATING DIVERSE STUDENT POPULATIONS IN INCLUSIVE SETTINGS  3
EDT 571  LANGUAGE DEVELOPMENT AND EMERGENT LITERACY  3

Coursework

EDT 510  INTRODUCTION TO TRANSDISCIPLINARY EARLY CHILDHOOD EDUCATION  2
EDT 512  SUMMER PLAY INSTITUTE  2
EDT 513  DEVELOPMENTALLY AND INDIVIDUALLY APPROPRIATE PRACTICE  3
EDT 514  CURRICULUM AND INSTRUCTION FOR INFANTS AND TODDLERS WITH SPECIAL NEEDS  3
EDT 515  INFANT AND TODDLER DEVELOPMENT PRACTICUM  2
EDT 516  COLLABORATIVE ASSESSMENT  3
EDT 517  EARLY CHILDHOOD SEMINAR ON MEDICAL AND HEALTH ISSUES  2
EDT 529  INTERNSHIP IN EARLY INTERVENTION (Birth to Age 3)  3
EDT 573  COLLABORATING WITH FAMILIES, COLLEAGUES, AND AGENCIES  3

1To be eligible for either the Early Childhood or the Early Intervention Specialist licenses, 16 hours of the following coursework must be satisfied (undergraduate or graduate), before beginning coursework in a Cohort Group. The remaining courses can be taken as co-requisites during the Cohort Group coursework.

2If not previously completed, these courses must be taken during the first three terms of coursework. EDT 508 and 570 must have been taken within the past five years. Evidence of 300 field hours must be provided.

3EDT 527 may be taken later in the program during the same term as EDT 528.

4Professional Education Requirements for the Early Childhood License and Early Intervention Specialist License.

5EDT 517 is required only for Early Intervention Specialist License.

6To be eligible for the Early Intervention Certificate from MR/DD the following coursework must be satisfied as a part of the cohort group.

Intervention Specialist Mild/Moderate (LIC.EIS.EMM and MSE.EIS.EMM) (EDT)

Completion of this program leads to a license in Intervention Specialist Mild/Moderate. This program is for individuals wishing to teach students with mild/moderate disabilities (learning disabilities, mild cognitive disabilities, and emotional disturbance). Candidates must pass the PRAXIS II specialty area exam prior to Intervention Specialist licensure. Candidates may choose to complete the Master's Degree after completing the requirements for licensure by completing the core requirements for the master's degree.

Prerequisites:
Teaching certificate/license and the following co-requisites:

Twelve semester hours in the teaching of Reading:

EDT 600  Reading Methods 3
EDT 450/601  Phonics, Spelling, and Vocabulary 3
EDT 452/602  Critical Reading in Content Areas 3
EDT 350/603  Foundations of Literacy Through Literature 3

1. Documentation of CPR competence.
2. Teachers holding an Adolescent, Middle School or Secondary License must have coursework in Language Development (EDT 571).

3. Teachers holding an Early Childhood, Primary or Elementary License must have coursework in human development with emphasis on adolescent development (EDT 508 or equivalent).

### Intervention Specialist Mild/Moderate

**Professional Education Requirements**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Sem. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>EDT 570</td>
<td>EDUCATING DIVERSE STUDENT POPULATIONS IN INCLUSIVE SETTINGS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 572</td>
<td>INTRODUCTION TO EDUCATION OF LEARNERS WITH MILD/MODERATE LEARNING NEEDS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 573</td>
<td>COLLABORATING WITH FAMILIES, COLLEAGUES, AND AGENCIES</td>
<td>3</td>
</tr>
<tr>
<td>EDT 574</td>
<td>BEHAVIOR MANAGEMENT</td>
<td>3</td>
</tr>
<tr>
<td>EDT 575</td>
<td>ASSESSMENT: MILD/MODERATE</td>
<td>3</td>
</tr>
<tr>
<td>EDT 576</td>
<td>CURRICULUM: MILD/MODERATE</td>
<td>2</td>
</tr>
<tr>
<td>EDT 577</td>
<td>CAREER EDUCATION/SPECIAL EDUCATION</td>
<td>2</td>
</tr>
<tr>
<td>EDT 578</td>
<td>APPLICATION OF COMPUTERS/TECHNOLOGY IN SPECIAL EDUCATION</td>
<td>2</td>
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<tr>
<td>EDT 579</td>
<td>INSTRUCTIONAL STRATEGIES FOR MILD/MODERATE</td>
<td>2</td>
</tr>
<tr>
<td>EDT 589</td>
<td>STUDENT TEACHING</td>
<td>3 - 7</td>
</tr>
</tbody>
</table>

### Intervention Specialist Moderate/Intensive (LIC.EIS.EMI and MSE.EIS.EMI) (EDT)

Completion of this program leads to licensure in Intervention Specialist Moderate/Intensive. This program is for individuals wishing to teach students with moderate/intensive disabilities (e.g., more severe levels of mental retardation, emotional disabilities, multiple disabilities). Candidates must pass the PRAXIS II Principles of Learning and Teaching prior to Intervention Specialist licensure. Candidates may choose to complete the master's degree after completing the requirements for licensure by completing the core requirements for the master's degree. Persons interested in this program should contact the Department of Teacher Education at 229-3346.

### Concentration Requirements

The Department of Teacher Education offers several concentration areas leading to the master's degree. Candidates must complete both the concentration requirements as listed in each concentration as well as the core requirements.

**Art Education (MSE.EAR)**

The concentration in art education is designed to help individuals gain perspective in the teaching of art in a larger community as well as teach candidates how to research issues in art education.

**Interdisciplinary Educational Studies (MSE.EIP)**

A concentration in interdisciplinary studies offers the graduate candidate flexibility to design a program to meet diverse professional goals. Candidates must select coursework from both the School of Education and Allied Professions and from at least one department outside of the SOEAP.

**Literacy (MSE.ERL)**

The master's degree concentration in literacy prepares a candidate to assume professional and leadership roles related to literacy in a school setting. The coursework in this concentration supports the performance outcomes as outlined by the Standards for Reading Professionals as adopted by the International Reading Association.

**Music Education (MSE.EUS)**

The concentration in music education is offered collaboratively through the School of Education and Allied Professions and the College of Arts & Sciences. This program is designed for music educators and focuses on practical applications to the music classroom and rehearsal room.

**Prerequisite:** Candidates must have a bachelor's degree or licensure in music education.

**Technology-Enhanced Learning (END.TEC and MSE.TEC)**

This graduate program prepares in-service teachers to integrate technology-
enhanced learning into their own teaching and to assist other professionals in their buildings in accomplishing the same. The courses focus on helping teachers increase candidate learning in the context of a technology-enhanced, problem-based learning environment. Candidates must complete all 21 hours listed below for the technology endorsement from the State of Ohio.

**Teacher as Leader (MSE ETL)**
The teacher as leader concentration offers teachers an opportunity to pursue professional development and leadership opportunities other than building and district administration. Teachers pursuing this degree would likely fulfill roles such as instructional leader, lead teacher, mentor teacher and curriculum committee member. All candidates in this concentration must complete the teacher leader core sequence; several options are available for specialty areas.

<table>
<thead>
<tr>
<th>Teacher Education</th>
<th>Sem. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Requirements</td>
<td></td>
</tr>
<tr>
<td>EDT 500</td>
<td>MODELS OF TEACHING</td>
</tr>
<tr>
<td>EDT 502 or 503</td>
<td>PHILOSOPHICAL STUDIES IN EDUCATION (EDT 502)</td>
</tr>
<tr>
<td>EDT 503</td>
<td>HISTORY OF EDUCATION IN THE UNITED STATES (EDT 503)</td>
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<tr>
<td>EDT 660</td>
<td>INTRODUCTION TO EDUCATIONAL RESEARCH</td>
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<tr>
<td>Option A: Thesis</td>
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<tr>
<td>EDT 661</td>
<td>EDUCATIONAL RESEARCH DESIGN AND METHODOLOGY</td>
</tr>
<tr>
<td>EDT 6621</td>
<td>THESIS</td>
</tr>
<tr>
<td>EDT 6631</td>
<td>THESIS</td>
</tr>
<tr>
<td>Option B: Research Study</td>
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<tr>
<td>EDT 681</td>
<td>EDUCATIONAL RESEARCH DESIGN AND METHODOLOGY</td>
</tr>
<tr>
<td>EDT 665</td>
<td>RESEARCH STUDY SEMINAR</td>
</tr>
<tr>
<td>Concentration Requirements (see below)</td>
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</tr>
<tr>
<td>Concentration Areas</td>
<td></td>
</tr>
<tr>
<td>Art Education (MSE.EAR)</td>
<td></td>
</tr>
<tr>
<td>EDT 590</td>
<td>CURRICULUM THEORY IN ART EDUCATION</td>
</tr>
<tr>
<td>EDT 591</td>
<td>CURRENT ISSUES IN ART EDUCATION</td>
</tr>
<tr>
<td>EDT 629</td>
<td>COGNITION, LEARNING AND TECHNOLOGY</td>
</tr>
<tr>
<td>EDT 659</td>
<td>SPECIAL TOPICS IN TEACHING</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
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<tr>
<td>Interdisciplinary Educational Studies (MSE.EIP)</td>
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<tr>
<td>Approved Concentration Courses in Education</td>
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</tr>
<tr>
<td>Approved Concentration Courses outside the SOEAP</td>
<td>6-12</td>
</tr>
<tr>
<td>Literacy (MSE.ERE)</td>
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</tr>
<tr>
<td>EDT 601</td>
<td>PHONICS, SPELLING, AND VOCABULARY</td>
</tr>
<tr>
<td>EDT 602</td>
<td>CRITICAL READING IN THE CONTENT AREAS</td>
</tr>
<tr>
<td>EDT 605 or 610</td>
<td>ADVANCED STUDY IN READING/LANGUAGE ARTS (EDT 605)</td>
</tr>
<tr>
<td>EDT 606</td>
<td>ADVANCED STUDY IN READING/LANGUAGE ARTS (PK-PRIMARY) (EDT 610)</td>
</tr>
<tr>
<td>EDT 607</td>
<td>ASSESSMENT &amp; EVALUATION OF READING DIFFICULTIES</td>
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<tr>
<td>EDT 6083</td>
<td>PRACTICUM IN READING INTERVENTION TECHNIQUES</td>
</tr>
<tr>
<td>EDT 609</td>
<td>THE WRITING CLASSROOM</td>
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<tr>
<td>EDT 610</td>
<td>ISSUES, TRENDS, &amp; RESEARCH IN READING</td>
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Music Education (MSE.EUS)

MUS 501 GRADUATE SEMINAR IN MUSICOLOGY | 2
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>MUS 503</td>
<td>TEACHING WORLD MUSIC</td>
<td>2</td>
</tr>
<tr>
<td>MUS 511</td>
<td>MUSIC THEORY, ANALYSIS, AND TECHNOLOGY</td>
<td>2</td>
</tr>
<tr>
<td>MUS 531</td>
<td>FOUNDATIONS AND CURRENT ISSUES IN MUSIC EDUCATION</td>
<td>2</td>
</tr>
<tr>
<td>MUS 537 or 535 or 536</td>
<td>LITERATURE AND RESOURCES FOR THE INSTRUMENTAL ENSEMBLE (MUS 537)</td>
<td>1</td>
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<tr>
<td>MUS 546 or 544 or 545</td>
<td>ADVANCED INSTRUMENTAL CONDUCTING AND REHEARSAL TECHNIQUES (MUS 546)</td>
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<tr>
<td>MUS 599</td>
<td>GRADUATE PERFORMANCE STUDIES</td>
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</table>

Electives (MUS, EDT, EDW, or EDA) 6

Technology-Enhanced Learning (END.TEC and MSE.TEC)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDT 629</td>
<td>COGNITION, LEARNING AND TECHNOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>EDT 630</td>
<td>MULTIMEDIA PRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>EDT 631</td>
<td>TEACHING AND LEARNING IN VIRTUAL ENVIRONMENTS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 632</td>
<td>DISTANCE EDUCATION IN A DIGITAL AGE</td>
<td>3</td>
</tr>
<tr>
<td>EDT 633</td>
<td>WEB DESIGN AND DEVELOPMENT</td>
<td>3</td>
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<tr>
<td>EDT 656 or 657</td>
<td>NETWORK MANAGEMENT (EDT 656)</td>
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Teacher as Leader (MSE.ETL)

TL Core Sequence

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>EDA 515</td>
<td>SCHOOL LAW</td>
<td>3</td>
</tr>
<tr>
<td>EDT 570</td>
<td>EDUCATING DIVERSE STUDENT POPULATIONS IN INCLUSIVE SETTINGS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 650</td>
<td>PROFESSIONAL DEVELOPMENT OF TEACHER LEADERS</td>
<td>3</td>
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</table>

Choose from one of the following specialty areas:

Specialty: Leadership

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDA 509</td>
<td>SUPERVISION &amp; PROFESSIONAL DEVELOPMENT</td>
<td>3</td>
</tr>
<tr>
<td>EDA 510</td>
<td>INSTRUCTIONAL LEADERS</td>
<td>3</td>
</tr>
<tr>
<td>EDA 511</td>
<td>CURRICULUM</td>
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</table>

Specialty: Literacy

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDT 605 or 610</td>
<td>ADVANCED STUDY IN READING/LANGUAGE ARTS (EDT 605)</td>
<td>3</td>
</tr>
<tr>
<td>EDT 609</td>
<td>ISSUES, TRENDS, &amp; RESEARCH IN READING</td>
<td>3</td>
</tr>
<tr>
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Specialty: Special Education

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<tr>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDT 572</td>
<td>INTRODUCTION TO EDUCATION OF LEARNERS WITH MILD/MODERATE LEARNING NEEDS</td>
<td>3</td>
</tr>
<tr>
<td>EDT 573</td>
<td>COLLABORATING WITH FAMILIES, COLLEAGUES, AND AGENCIES</td>
<td>3</td>
</tr>
<tr>
<td>EDT 574</td>
<td>BEHAVIOR MANAGEMENT</td>
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Specialty: Technology

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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDT 629</td>
<td>COGNITION, LEARNING AND TECHNOLOGY</td>
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<td>EDT 630</td>
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<td>EDT 631</td>
<td>TEACHING AND LEARNING IN VIRTUAL ENVIRONMENTS</td>
<td>3</td>
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</table>

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000483&p=-1&c=-1 7/10/2012
EDT 632 DISTANCE EDUCATION IN A DIGITAL AGE 3

Specialty: National Board Certification Preparation Sequence
EDT 651 ACADEMIC WRITING FOR TEACHERS 3
EDT 652 ACCOMPLISHED TEACHING I (National Board NBCT) 3
EDT 653 ACCOMPLISHED TEACHING II (National Board NBCT) 3

1 EDT 662 and EDT 663 must be taken in consecutive terms.
2 Candidates must have taken the required twelve hours in the teaching of reading as outlined by the State of Ohio Licensure Requirements as part of this concentration. If a candidate has not taken EDT 601 Phonics or EDT 602 Critical Reading in the Content Areas, these must be included in the Master's Concentration. Those persons who have completed the required twelve hours will have the option for electives.
3 EDT 608 is an elective for candidates who must take both EDT 601 and 602

Middle Childhood Education (LIC.EMS and MSE.EMS) (EDT)

Completion of the program requirements for middle childhood education leads to provisional licensure in the State of Ohio for grades 4-9. Candidates must complete approved licensure program coursework in two teaching concentration areas for initial licensure and one area for additional licensure. The teaching concentration areas include: mathematics, science, social studies, and reading/language arts. Concentration requirements also include professional education coursework. Candidates must pass the required PRAXIS II subject assessment exam(s) prior to student teaching. Candidates must also pass the PRAXIS II Principles of Learning and Teaching prior to licensure.

Candidates may choose to complete the master's degree after completing the requirements for licensure by completing the core requirements for the master's degree.

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<th>Sem. Hrs.</th>
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<td>EDT 531 CLASSROOM ENVIRONMENT FOR MIDDLE CHILDHOOD 3</td>
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<td>EDT 603 FOUNDATIONS OF LITERACY THROUGH LITERATURE 3</td>
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<td>EDT 535 SOCIAL STUDIES METHODS FOR MIDDLE CHILDHOOD 3</td>
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Multi-age Education (LIC.EAG and MSE.EAG) (EDT)

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=1000000483&p=-1&c=-1 7/10/2012
Completion of the program requirements for multi-age education leads to provisional licensure in the State of Ohio for grades pre-kindergarten through twelve. Candidates must complete approved licensure program coursework in one of the following teaching concentration areas: foreign language, visual arts, and music. Concentration requirements also include professional education coursework. Candidate must pass required PRAXIS II subject assessment exam(s) prior to student teaching. Candidates must also pass the PRAXIS II Principles of Learning and Teaching prior to licensure.

Candidates may choose to complete the master's degree after completing the requirements for licensure by completing the core requirements for the master's degree.

### Multi-age Education

**Core Requirements**

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<td>EDT 508</td>
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<td>EDT 570</td>
<td>EDUCATING DIVERSE STUDENT POPULATIONS IN INCLUSIVE SETTINGS</td>
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<td>EDT 602</td>
<td>CRITICAL READING IN THE CONTENT AREAS</td>
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Methods courses specific to licensure: See advisor for specific courses

Student teaching specific to licensure: See advisor for specific courses

### Reading Teacher Endorsement (END.ERE) (EDT)

The Reading Teacher Endorsement can be added only to an existing standard teaching certificate/license. The endorsement is for grades k - 12. To obtain the Reading Teacher Endorsement, candidates must have taken the required twelve hours in the teaching of reading as outlined by the State of Ohio Licensure Requirements. These may be taken at the graduate or undergraduate level. In addition to the required coursework, candidates must pass the PRAXIS II specialty area exam prior to receiving the endorsement.

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<th>Code</th>
<th>Title</th>
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<tr>
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<td>FOUNDATIONS OF LITERACY THROUGH LITERATURE (EDT 603)</td>
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<td>EDT 450 or 601</td>
<td>PHONICS, SPELLING, AND VOCABULARY (EDT 450)</td>
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<td>PHONICS, SPELLING, AND VOCABULARY (EDT 601)</td>
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<td>EDT 452 or 602</td>
<td>CRITICAL READING IN THE CONTENT AREAS (EDT 452)</td>
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<td>CRITICAL READING IN THE CONTENT AREAS (EDT 602)</td>
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<td>EDT 453 or 458 or 600</td>
<td>INTRODUCTION TO LITERACY FOR EARLY CHILDHOOD (EDT 453)</td>
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<td>READING METHODS FOR MIDDLE CHILDHOOD (EDT 458)</td>
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<td>READING METHODS (EDT 600)</td>
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<td>EDT 605</td>
<td>ADVANCED STUDY IN READING/LANGUAGE ARTS</td>
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<td>EDT 606</td>
<td>ASSESSMENT &amp; EVALUATION OF READING DIFFICULTIES</td>
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<tr>
<td>EDT 610</td>
<td>ADVANCED STUDY IN READING/LANGUAGE ARTS (PK-PRIMARY)</td>
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**Courses**

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EDT 350  TEACHING READING THROUGH LITERATURE
This course serves as an introductory course to the reading/language arts (listening, speaking, reading, writing, viewing, visual representation) and the role literature plays in these processes. It is a foundation course in reading and is intended to align with the requirements of Ohio Reading Core licensure standards for the Early Childhood, Middle Childhood, and Intervention Specialist programs. Topics examined include the foundations of literacy, research, theories and related models of reading, aspects and structures of text, various children's and young adult literature, the integration of technology in literacy, an overview of the importance of ongoing assessment in teaching reading/language arts, and an awareness of cultural, linguistic, and ethnic diversity in individual learners.
Prerequisite(s): EDT 110, 207, 211 or 222

EDT 450  PHONICS, SPELLING, AND VOCABULARY
This course provides the background knowledge necessary for effectively teaching and assessing the role of phonics in the reading process. Emphasis is on developing phonemic awareness, phonics, spelling, and word recognition/word meaning embedded in the context of a total reading/language arts program focused on meaning construction.
Prerequisite(s): EDT 453 or 458 (may be taken concurrently with EDT 450)

EDT 452  CRITICAL READING IN THE CONTENT AREAS
In this course, Middle Childhood and Intervention Specialist candidates examine the strategies and techniques in the development of prior knowledge skills, study skills, vocabulary, technology, and assessment as they relate to critical reading abilities in a variety of curriculum areas.
Prerequisite(s): EDT 350

EDT 453  INTRODUCTION TO LITERACY FOR EARLY CHILDHOOD
This course is a study of appropriate instruction and assessment supporting the literacy development of children (P-3). Major emphasis is on developing the knowledge base related to a comprehensive framework for literacy instruction, including reading, writing, and content area literacy, with a focus on instruction supporting emerging and early readers and writers.
Prerequisite(s): EDT 350

EDT 458  READING METHODS FOR MIDDLE CHILDHOOD
An integrated language arts course focusing on the knowledge base underpinning the teaching of reading and related language arts processes within the language arts and across the curriculum to students of various needs and abilities. Topics include planning, instructional methods, materials, assessment, and evaluation techniques. Field experience: 90 hrs.
Prerequisite(s): EDT 350
Corequisite(s): EDT 458L and two content methods courses

EDT 500  MODELS OF TEACHING
This course is a study of eight instructional models specifically designed to meet the needs of diverse learners. Candidates will be expected to design instructional units that integrate the models.

EDT 502  PHILOSOPHICAL STUDIES IN EDUCATION
This course is a study of the writings of major philosophers as they relate to education (including those in the Marianist tradition). Interpretations are made for the development of a critical, personal theory of teaching, counseling, educational administration, and psychological services.

EDT 503  HISTORY OF EDUCATION IN THE UNITED STATES
This course is a study of the relationship of schools and social change in the United States from Colonial times to the present. Interpretations of changes in educational policies for the development of a critical theory of education are discussed.

EDT 508  THEORIES OF LEARNING AND HUMAN DEVELOPMENT
This course is a study of theories of learning and human development (physical, social, emotional, intellectual, and moral) as they relate to PK - 12 practices, including early, middle, and adolescent/young adult licensure areas.

EDT 509  INSTRUCTION, MANAGEMENT, AND ASSESSMENT

http://bulletin.udayton.edu/bulletin.ud?v=2&g=0&pp=10000000483&p=-1&c=-1  7/10/2012
This course is a study of curriculum, instruction, management styles, and assessment techniques that promote student learning and achievement. Emphasis is on classroom-based theory-to-practice connections. This course is primarily intended for initial licensure candidates. Field experience: 10 hours.

**Prerequisite(s):** EDT 508

**EDT 510**  
**INTRODUCTION TO TRANSDISCIPLINARY EARLY CHILDHOOD EDUCATION**

This course is an introduction to the cohort group and to transdisciplinary methods of learning and collaboration. Candidates will work in teams to explore educational models and current issues associated with the field of early childhood education. This course is technology enhanced. Field hours: 15.

**Prerequisite(s):** EDT 504 or EDT 508, EDT 570

**EDT 511**  
**INTEGRATED CURRICULUM FOR PRESCHOOL**

This course introduces and develops the theoretical and practical bases for creation of integrated curriculum for preschool children using a play-based approach. The content areas of mathematics and science for preschool children provide the particular framework.

**EDT 512**  
**SUMMER PLAY INSTITUTE**

The Summer Play Institute is a field-based forum in which candidates implement the integrated curriculum activities developed in EDT 511. Candidates will engage in child-initiated play sessions that will be videotaped and reviewed by members of the cohort and the instructor. Supported play which facilitates development will be emphasized.

**Prerequisite(s):** EDT 510, EDT 511

**EDT 513**  
**DEVELOPMENTALLY AND INDIVIDUALLY APPROPRIATE PRACTICE**

The course shifts focus from the age-appropriate practice to the needs of the individual child and family. Candidates will learn to develop practice that supports and facilitates the development of young children ages 3-8 specifically those with disabilities. Significant review of related research drives this course. Field Hours: 10.

**Prerequisite(s):** EDT 510

**EDT 514**  
**CURRICULUM AND INSTRUCTION FOR INFANTS AND TODDLERS WITH SPECIAL NEEDS**

This course focuses on the planning and instructional methods, materials and evaluation techniques for working with young children who are at risk for or who have been identified with developmental delays (birth-age 3) and their families. Field Hours: 20.

**Prerequisite(s):** EDT 570

**EDT 515**  
**INFANT AND TODDLER DEVELOPMENT PRACTICUM**

This guided practicum will provide an opportunity for candidates to develop and apply their knowledge of typical and atypical development from conception to age 3 as they observe young children in both structured and naturalistic settings. Developmental milestones as well as related risk factors will be emphasized. Field Hours: 30.

**Prerequisite(s):** EDT 510

**EDT 516**  
**COLLABORATIVE ASSESSMENT**

**BIRTH TO AGE 8:** This course is the study of the transdisciplinary and collaborative nature of assessment in diagnosis, screening, and instruction of young children (birth to age 8) who are typically developing as well as those with disabilities. The course will focus on the role of the family in the assessment process. Systemic observation using a play-based approach will be emphasized. Field Hours: 20.

**Prerequisite(s):** EDT 510

**EDT 517**  
**EARLY CHILDHOOD SEMINAR ON MEDICAL AND HEALTH ISSUES**

This course is the study of the health care needs and medical aspects of disabilities associated with young children. Field Hours: 10.

**Prerequisite(s):** EDT 513 or EDT 515, EDT 516, EDT 573

**EDT 518**  
**INTEGRATED CURRICULUM AND INSTRUCTION FOR KINDERGARTEN-PRIMARY GRADES**

This course will focus on integrating curriculum and instruction for kindergarten and the primary grades. Special attention will be paid to the
Ohio academic content standards with an emphasis on science, social studies, and math instruction. Planning, instructional methods, materials, and evaluation techniques for teaching children on the kindergarten-primary levels will be covered. Field hours: 20.

**EDT 527** STUDENT TEACHING K-PRIMARY

Full-time supervised and evaluated teaching in a K-3 setting. The candidate is to demonstrate the knowledge, skills, attitudes and dispositions required of a beginning K-Primary teacher. Attendance at a weekly seminar is required.

**Prerequisite(s):** Approved student teaching/internship application packet submitted to the Department of Teacher Education at the beginning of the term prior to the student teaching experience

**EDT 528** INTERNSHIP IN TRANSDISCIPLINARY EARLY CHILDHOOD EDUCATION (Ages 3-5)

Supervised and evaluated teaching in an integrated preschool setting. Candidates are to demonstrate the knowledge, skills, attitudes and dispositions needed to comply with the National Association for the Education of Young Children (NAEYC) and the Division for Early Childhood of the Council of Exceptional Children (DEC) guidelines for appropriate practice. Field Hours: 150.

**Prerequisite(s):** Approved student teaching/internship application packet submitted to the Department of Teacher Education at the beginning of the term prior to the student teaching experience

**EDT 529** INTERNSHIP IN EARLY INTERVENTION (Birth to Age 3)

Supervised and evaluated teaching in an infant/toddler educational setting. Candidates are to demonstrate the knowledge, skills, attitudes and dispositions needed to comply with the National Association for the Education of Young Children (NAEYC) and the Division for Early Childhood and the Council of Exceptional Children (DEC) guidelines for appropriate practice. Field Hours: 150.

**Prerequisite(s):** Approved student teaching/internship application packet submitted to the Department of Teacher Education at the beginning of the term prior to the student teaching experience

**EDT 530** THE MIDDLE SCHOOL PRINCIPLES AND PRACTICES

This course is primarily a study of organization (school structure), philosophy, and curriculum of middle level education (9-14 year olds), grades 4-9. It is designed to present the theoretical knowledge base about middle childhood education. Field experiences via technology or school site placements with middle level students and experienced middle level educators are a critical component in the implementation of the middle school knowledge base. Issues and concerns, current trends and the essential elements relating to middle level education will be discussed throughout the semester of study. A variety of inquiry methods will be modeled that encourage critical thinking skills.

**EDT 531** CLASSROOM ENVIRONMENT FOR MIDDLE CHILDHOOD

This course is the study of the middle childhood student within the classroom environment. Theories of learning and practical applications, motivation, classroom management and discipline, lesson and unit planning, teaching methodologies and assessment are examined and practiced.

**EDT 532** READING/LANGUAGE ARTS METHODS FOR MIDDLE CHILDHOOD

This course focuses on the planning, diagnosis, instructional methods, materials, assessment and evaluation techniques for teaching reading/language arts to students in the middle schools with varied needs and abilities. The topics emphasized in this course include: an understanding of Ohio's academic content standards for grades 4-9, applications and instructional techniques that address the Ohio proficiency tests, various resources, technologies, interdisciplinary connections, various grouping techniques, and current research.

**Prerequisite(s):** EDT 530, EDT 531 or EDT 509, EDT 603

**EDT 533** MATH METHODS FOR MIDDLE CHILDHOOD

This course focuses on the planning, diagnosis, instructional methods, materials, assessment and evaluation techniques for teaching mathematics to students in the middle schools with varied needs and abilities. The topics emphasized in this course include: an understanding of Ohio's academic content standards for grades 4-9, applications and instructional techniques
that address the Ohio proficiency tests, various resources, technologies, manipulatives, and other visuals, interdisciplinary connections, various grouping techniques, and current research.  
**Prerequisite(s):** EDT 530, EDT 531 or EDT 509

**EDT 534  SCIENCE METHODS FOR MIDDLE CHILDHOOD**

This course focuses on the planning, diagnosis, instructional methods, materials, assessment, and evaluation techniques for teaching science to students in the middle schools with varied needs and abilities. The topics emphasized in this course include: an understanding of Ohio's academic content standards for grades 4-9, applications and instructional techniques that address the Ohio proficiency tests, various resources, technologies and active hands-on experiences, other visuals, interdisciplinary connections, various grouping techniques, and current research.  
**Prerequisite(s):** EDT 530, EDT 531 or EDT 509

**EDT 535  SOCIAL STUDIES METHODS FOR MIDDLE CHILDHOOD**

This course focuses on the planning, diagnosis, instructional methods, materials, assessment, and evaluation techniques for teaching social studies to students in the middle schools with varied needs and abilities. The topics emphasized in this course include: an understanding of Ohio's academic content standards for grades 4-9, applications and instructional techniques that address the Ohio proficiency tests, various resources, technologies and active hands-on experiences, other visuals, interdisciplinary connections, various grouping techniques, and current research.  
**Prerequisite(s):** EDT 530, EDT 531 or EDT 509

**EDT 549  STUDENT TEACHING MIDDLE CHILDHOOD**

Full-time supervised and evaluated teaching in grades 4-9 in at least one of the two candidate's concentration subjects. Attendance at weekly seminars is required.  
**Prerequisite(s):** two of the four content methods courses (EDT 532, EDT 533, EDT 534, EDT 535), and formal admission to student teaching a full term in advance

**EDT 550  INTEGRATED LANGUAGE ARTS METHODS FOR AYA**

This course focuses on planning, diagnosis, instructional methods, materials, assessment, and evaluation techniques for teaching all levels of integrated language arts to students in grades 7-12 with varied needs and abilities. Topics include: understanding Ohio's academic content standards for grades 7-12, applications and instructional techniques that address the Ohio achievement testing, various resources, technologies, interdisciplinary connections, various grouping techniques, and current research. Field experience: 90 hrs.  
**Prerequisite(s):** EDT 508, EDT 509. This course is for initial licensure candidates

**EDT 551  INTEGRATED SOCIAL STUDIES METHODS FOR AYA**

This course focuses on planning, diagnosis, instructional methods, materials, assessment, and evaluation techniques for teaching all levels of integrated social studies to students in grades 7-12 with varied needs and abilities. Topics include: understanding Ohio's academic content standards for grades 7-12, applications and instructional techniques that address the Ohio achievement testing, various resources, technologies, interdisciplinary connections, various grouping techniques, and current research. Field experience: 90 hrs.  
**Prerequisite(s):** EDT 508, EDT 509. This course is for initial licensure candidates

**EDT 552  FOREIGN LANGUAGE METHODS FOR AYA**

This course focuses on planning, diagnosis, instructional methods, materials, assessment, and evaluation techniques for teaching all levels of foreign language studies to students in grades 7-12 with varied needs and abilities. Topics include: understanding Ohio's academic content standards for grades 7-12, applications and instructional techniques that address the Ohio achievement testing, various resources, technologies, hands-on activities and other visuals, interdisciplinary connections, various grouping techniques, and current research. Field experience: 90 hrs.  
**Prerequisite(s):** EDT 508, EDT 509. This course is for initial licensure candidates

**EDT 553  MATH METHODS FOR AYA**
This course focuses on planning, diagnosis, instructional methods, materials, assessment, and evaluation techniques for teaching all levels of mathematics to students in grades 7-12 with varied needs and abilities. Topics include: understanding Ohio's academic content standards for grades 7-12, applications and instructional techniques that address the Ohio achievement testing, various resources, technologies, manipulatives, and other visuals, interdisciplinary connections, various grouping techniques and current research. Field experience: 90 hrs.

Prerequisite(s): EDT 508, EDT 509. This course is for initial licensure candidates

EDT 554 SCIENCE METHODS FOR AYA
This course focuses on planning, diagnosis, instructional methods, materials, assessment, and evaluation techniques for teaching all levels of science to students in grades 7-12 with varied needs and abilities. Topics include: understanding Ohio's academic content standards for grades 7-12, applications and instructional techniques that address the Ohio achievement testing, various resources, technologies, hands-on activities, and interdisciplinary connections, various grouping techniques, and current research. Field experience: 90 hrs.

Prerequisite(s): EDT 508, EDT 509. This course is for initial licensure candidates

EDT 555 RELIGION METHODS
This course examines the planning, diagnosis, instructional methods, material, and assessment techniques utilized in teaching religion to students with varied needs and abilities.

EDT 562 TOPICS IN SCIENCE INSTRUCTION
This course is a study of research in contemporary science instruction, materials, and curriculum.

EDT 563 TOPICS IN MATHEMATICS INSTRUCTION
This course is a study of research in contemporary mathematics instruction. Emphases include effective curriculum and curricular materials.

EDT 566 STUDENT TEACHING
AYA: Full-time supervised and evaluated teaching in the content area in grades 7-12. Candidate is to demonstrate the knowledge, skills, and dispositions required of a beginning teacher of grades 7-12. Attendance at weekly seminars is required.

Prerequisite(s): passing of PRAXIS II in content area, completion of two-thirds of content area courses, and formal admission to student teaching a semester in advance

EDT 570 EDUCATING DIVERSE STUDENT POPULATIONS IN INCLUSIVE SETTINGS
This course is the study of the characteristics, legal aspects, and educational needs of students with learning problems. The role of the general educator in making curricular modifications and accommodations, adapting instruction and collaborating with other educators to facilitate learning in the regular classroom for these students is examined. Field experience: 20 hrs.

EDT 571 LANGUAGE DEVELOPMENT AND EMERGENT LITERACY
This course is the study of oral language and literacy development in children, with implications for all learners, including children with special needs.

Prerequisite(s): EDT 570

EDT 572 INTRODUCTION TO EDUCATION OF LEARNERS WITH MILD/MODERATE LEARNING NEEDS
This course is the study of the role and function of the special educator. This course presents issues of definition, identification, and placement procedures. The candidate will acquire knowledge of major researchers and historians, variations in belief, traditions and values across cultures, and current practices in the field. Field experience: 20 hrs.

Prerequisite(s): EDT 570

EDT 573 COLLABORATING WITH FAMILIES, COLLEAGUES, AND AGENCIES
This course examines theories and techniques to assist teachers in working with colleagues, families and agency personnel to provide an appropriate
educational program, improve home-school relationships and develop family -professional partnerships. Historical and legal perspectives of parental influence on special education services are examined.

**Prerequisite(s):** EDT 570

**EDT 574 BEHAVIOR MANAGEMENT**

This course examines the principles and methods of observing, recording, measuring, and managing human behavior with an emphasis on students with mild/moderate disabilities.

**Prerequisite(s):** EDT 570

**EDT 575 ASSESSMENT: MILD/MODERATE**

This course is the study of the multidisciplinary use of assessment devices and techniques in the diagnosis, planning and evaluation of the special needs learner and the development of individual education plans.

**Prerequisite(s):** EDT 570, EDT 572

**EDT 576 CURRICULUM: MILD/MODERATE**

This course is the study of curriculum development considering the motor, cognitive, academic, social, language, affective, functional, life skills, and individual programming of students with mild/moderate disabilities. Field experience required.

**Prerequisite(s):** EDT 570, EDT 572, EDT 575.

**Corequisite(s):** EDT 579

**EDT 577 CAREER EDUCATION/SPECIAL EDUCATION**

This course examines the theories and techniques of job classification, assessment, selection, placement, and activities related to work experience. Career development and transition needs are examined for teachers working with preschoolers to adults.

**Prerequisite(s):** EDT 570, EDT 572

**EDT 578 APPLICATION OF COMPUTERS/TECHNOLOGY IN SPECIAL EDUCATION**

This course is the study of basic computer applications in special education, including instructional programs, software evaluation, telecommunications, multimedia and hypermedia, assistive technology, augmentative devices, resources, and legal/ethical issues.

**Prerequisite(s):** EDT 570 and basic computing/technology skills

**EDT 579 INSTRUCTIONAL STRATEGIES FOR MILD/MODERATE**

This course examines the strategies, materials, and evaluation techniques for teaching students with mild/moderate learning problems. Field experience required.

**Prerequisite(s):** EDT 570, EDT 572, EDT 575

**Corequisite(s):** EDT 576, EDT 589

**EDT 589 STUDENT TEACHING**

MILD/MODERATE: Full-time supervised and evaluated teaching with students demonstrating mild/moderate learning problems. Candidate is to demonstrate the knowledge, skills and dispositions of a beginning teacher. Attendance at a weekly seminar is required.

**Prerequisite(s):** EDT 575, EDT 576, EDT 579

**EDT 590 CURRICULUM THEORY IN ART EDUCATION**

This course is an analysis of critical, aesthetic, artistic, and historical theories in the education curriculum, with emphases on planning, diagnosis, instructional methods, evaluation techniques and the interdependence of the community, school, art educator and students in diverse settings.

**EDT 591 CURRENT ISSUES IN ART EDUCATION**

This course is a study and analysis of literature on teaching approaches to art education. The role of the art teacher is examined with an emphasis on developing an awareness of various philosophical positions on current issues in art education.

**EDT 599 STUDENT TEACHING-ART (P-12)**

Full-time supervised and evaluated teaching of visual arts in early childhood, middle childhood, and adolescent to young adult settings. Candidate is to demonstrate the knowledge, skills, and dispositions required of a beginning art teacher. Attendance at weekly seminars is required.

**Prerequisite(s):** passing of PRAXIS II, completion of two-thirds of content
area courses and formal admission to student teaching a semester in advance

EDT 600  READING METHODS
An integrated language arts course focusing on the knowledge base underpinning the teaching of reading and related language arts processes within the language arts and across curriculum to students of various ages, needs, and abilities. Topic include: planning, instructional methods, materials, assessment, and evaluation techniques. Field experience: 24 hours. This course is part of Ohio's 12 Hour State Mandated Reading Core. Early Childhood, Middle Childhood, and Intervention Specialist licensure candidates must meet this requirement. Adolescent/Young Adult candidates are also required to meet this requirement if working toward Ohio's Reading Teacher Endorsement.

Prerequisite(s): EDT 600

EDT 601  PHONICS, SPELLING, AND VOCABULARY
This course provides the background knowledge necessary for effectively teaching and assessing the role of phonics in the reading process. Emphasis is on developing phonemic awareness, phonics, spelling, and word recognition/word meaning embedded in the context of a total reading/language arts program focused on meaning construction. This course is part of Ohio's 12 Hour State Mandated Reading Core. Early Childhood, Middle Childhood and Intervention Specialist licensure students must meet this requirement. Adolescent/Young Adult candidates are also required to meet this requirement if working toward Ohio's Reading Teacher Endorsement.

Prerequisite(s): EDT 600

EDT 602  CRITICAL READING IN THE CONTENT AREAS
This course is an exploration of strategies and techniques in the development of comprehension skills, study skills, vocabulary, technology, and assessment as they relate to critical reading and writing abilities in a variety of curriculum areas. This course is part of Ohio's 12 Hour State Mandated Reading Core. Early Childhood, Middle Childhood, Intervention Specialist, and Multi-Age licensure students must meet this requirement.

Prerequisite(s): EDT 600

EDT 603  FOUNDATIONS OF LITERACY THROUGH LITERATURE
This course serves as an introductory course to the reading/language arts (listening, speaking, reading, writing, viewing, visual representation) and the role literature plays in these processes. It is a foundation course in reading and is intended to align with the requirements of Ohio Reading Core licensure standards for the Early Childhood, Middle Childhood, and Intervention Specialist programs. Topics examined include the foundations of literacy, research theories and related models of reading, aspects and structures of text, various children's and young adult literature, the integration of technology in literacy, an overview of the importance of ongoing assessment in teaching reading/language arts, and an awareness of cultural, linguistic, and ethnic diversity in individual learners. This course is part of Ohio's 12 Hour State Mandated Reading Core. Early Childhood, Middle Childhood and Intervention Specialist licensure students must meet this requirement. Adolescent/Young Adult candidates are also required to meet this requirement if working toward Ohio's Reading Teacher Endorsement.

Prerequisite(s): EDT 600

EDT 605  ADVANCED STUDY IN READING/LANGUAGE ARTS
This course is designed to provide teachers the opportunity to extend their knowledge of the reading/language arts processes and the principles underlying effective instruction. Key concepts are drawn from recent research and theory in language learning, developmental reading research, and research describing the literacy processes of children.

Prerequisite(s): EDT 453, EDT 458 or EDT 600

EDT 606  ASSESSMENT & EVALUATION OF READING DIFFICULTIES
This course is the study of formal and informal diagnostic tests and procedures for identifying reading strengths and weaknesses with applications for reading programs. Candidates must register for EDT 607 the next semester.

Prerequisite(s): EDT 605 or EDT 610

EDT 607  PRACTICUM IN READING INTERVENTION TECHNIQUES
Laboratory portion of EDT 606. This course must be taken the semester immediately following EDT 606.

Prerequisite(s): EDT 606

EDT 608 THE WRITING CLASSROOM
This course will focus on the teacher as a writer. Elements of the writing process will be discussed and implemented. Candidate will develop a classroom writing program.

EDT 609 ISSUES, TRENDS, & RESEARCH IN READING
A basic course for teachers concerned with the psychology of learning to read and current issues, trends and research in teaching reading/language arts.

Prerequisite(s): EDT 606, EDT 608

EDT 610 ADVANCED STUDY IN READING/LANGUAGE ARTS (PK-PRIMARY)
This course will focus on early literacy acquisition and development. Principles underlying effective instruction in early childhood settings will be explored.

Prerequisite(s): EDT 453, EDT 458, or EDT 600

EDT 629 COGNITION, LEARNING AND TECHNOLOGY
This course is a study in building technology-enhanced, problem-based learning environments grounded in the latest research on human cognition and constructivist learning theory.

EDT 630 MULTIMEDIA PRODUCTION
In this course the candidate will learn how to manipulate and manage multimedia resources, including presentation software, graphics, and audio and video clips, to create engaging learning experiences.

Prerequisite(s): EDT 629

EDT 631 TEACHING AND LEARNING IN VIRTUAL ENVIRONMENTS
This course gives the candidate the opportunity to skillfully employ the latest simulation and modeling software to promote interactive learning and higher order thinking skills with specific application to their grade level or academic discipline.

Prerequisite(s): EDT 629

EDT 632 DISTANCE EDUCATION IN A DIGITAL AGE
This course prepares the candidate to design powerful learning experiences that connect students to the real world by using a variety of distance education tools, including Web-based and teleconferencing technologies.

Prerequisite(s): EDT 629

EDT 633 WEB DESIGN AND DEVELOPMENT
In this course, candidates learn how to use the latest web design tools to create educational websites that enhance teaching and learning in the classroom or school district.

Prerequisite(s): EDT 629, EDT 630

EDT 650 PROFESSIONAL DEVELOPMENT OF TEACHER LEADERS
This course is a study of existing and emerging models of professional development designed to provide classroom teachers with opportunities to assume new leadership roles and responsibilities in the school community.

EDT 651 ACADEMIC WRITING FOR TEACHERS
This course focuses on the development of a teacher's personal writing skills through an examination of one's writing styles. Information about writing is linked to the National Board Certification process that requires teachers to write descriptively, analytically, and reflectively in a portfolio evaluation. This course can be used as a foundation for research/thesis writing.

EDT 652 ACCOMPLISHED TEACHING I (National Board NBCT)
Orientation, area/subject standards overview, review of academic writing requirements, Entry IV portfolio completion. This course is for a candidate seeking National Board certification. This course is to be taken in consecutive semesters with Accomplished Teaching II.

EDT 653 ACCOMPLISHED TEACHING II (National Board NBCT)
Candidates will analyze student work, assessment techniques and personal teaching styles as evidenced by videotaping. Candidate will complete and submit portfolios to National Board.

Prerequisite(s): EDT 652 or with permission from instructor

EDT 656 NETWORK MANAGEMENT
This course instructs candidates how to design, manage, and grow the information technology infrastructure at the K-12 school or district-wide level. Required of students serving as, or aspiring to be, technology coordinators.

Prerequisite(s): EDT 629

EDT 657 CASE STUDIES IN TECHNOLOGY-ENHANCED LEARNING
In this course, candidates will learn how to identify, analyze, and resolve the diverse problems that often constrain classroom teachers from using technology-enhanced learning strategies. Required of students dedicated to continued service as a classroom teacher.

Prerequisite(s): EDT 629, EDT 633

EDT 658 INDEPENDENT STUDY
This course is an in-depth study of a selected educational topic. The candidate develops an individual learning plan that includes objectives, schedule of readings, and assignments, products and methods of evaluation.

Prerequisite(s): Permission of chairperson

EDT 659 SPECIAL TOPICS IN TEACHING
This course is the study of specialized areas of education not typically included in the professional education sequence. Topics are announced.

EDT 660 INTRODUCTION TO EDUCATIONAL RESEARCH
This course is a study of key concepts necessary to understand, analyze and evaluate research. Emphasis is on understanding the foundational principles of inquiry and related issues. This course is the first research course and should be taken during the first half of a candidate's program. The major requirement of this course is the development of a paper reviewing related literature.

EDT 661 EDUCATIONAL RESEARCH DESIGN AND METHODOLOGY
This course involves application of educational research methodology, design data analysis and interpretation, specifically as related to a proposal development. This course should be taken at the end of the candidate's program, just prior to EDT 662 or EDT 665.

Prerequisite(s): EDT 660

EDT 662 THESIS
These serve as the culmination of courses in a candidate's graduate program where thesis was chosen as a research option. The student conducts the research guided by the proposal developed in EDT 661. There is a mandatory two-term requirement for thesis, and the culminating product is a written thesis.

EDT 663 THESIS
These serve as the culmination of courses in a candidate's graduate program where thesis was chosen as a research option. The student conducts the research guided by the proposal developed in EDT 661. There is a mandatory two-term requirement for thesis, and the culminating product is a written thesis.

EDT 665 RESEARCH STUDY SEMINAR
This course is the culminating activity of a student's program where research study was chosen as the research option. The student conducts the research guided by the proposal developed in EDT 661. The student must also share his/her research with the educational community.

Prerequisite(s): EDT 661

EDT 671 CURRENT ISSUES IN EDUCATION
This course is a study of selected educational initiatives as related to policy and practice.

EDT 672 HISTORY OF HIGHER EDUCATION IN THE UNITED STATES
This course is a study of the development of post-secondary education in the United States from the Colonial period to the present with special emphasis on topics such as liberal arts, vocational preparation, and community colleges.