

NEW COURSES APPROVED

(THE FOLLOWING COURSES HAVE BEEN APPROVED
SINCE THE PUBLICATION OF THE
2000-02 *GRADUATE SCHOOL BULLETIN*.)

AERONAUTICS AND ASTRONAUTICS:

A&AE 550 Multidisciplinary Design Optimization Sem. 1. Class 3, cr. 3. Ability to solve mathematical problems with MATLAB, IMSL, or similar software helpful.

Basics of numerical optimization: problem formulation, conditions of optimality, search direction, and step length. Calculus-based techniques for univariate and multivariate optimization. Constrained and unconstrained optimization methods. Global optimization methods. Multi-objective optimization: Pareto optimality and approaches. Recent multidisciplinary design optimization techniques: approximations, response surface methodology, and collaborative optimization. Applications of various methods and techniques to representative engineering problems, culminating in a final project. Professor Crossley.

A&AE 696 Theory and Practice of Multivariable Control Sem. 1. Class 3, cr. 3. Prerequisite: A&AE 564 or consent of instructor.

Theory, methodology, and software productivity tools for the analysis and design of model-based control systems with multiple actuators and multiple sensors. Control oriented model parameterizations and modeling errors. Definitions and criteria for robust stability and performance. Linear controller synthesis: formulation and solution to the H_2 and H_{∞} optimization problems. Design methodologies based on the H_2 and H_{∞} optimization problems: practical cost functions, use of frequency shaping filters, and design iterations. Methods to simplify the control law: state-space truncation/residualization of plant model or controller. Practical considerations: nonlinear fixes to accommodate actuator limits, control law discretization, and input/output scaling of control law. Mechatronic design examples. Professor Rotea.

AGRICULTURAL AND BIOLOGICAL ENGINEERING:

ABE 680 Bioseparations and Bioprocess Engineering: Principles, Practice, and Economics Sem. 1. Class 3, cr. 3. Admission by consent of instructor.

Engineering fundamentals of separations and purification of biological molecules. Case studies and examples illustrate principles and practice of centrifugation, precipitation, crystallization, filtration, membrane separations, chromatography, and affinity separation of recombinant proteins and other biomolecules. Process scale-up and economics of biotechnology products and processes are mentioned in the context of their impact on purification development. Professor Ladisch.

ABE 691 Special Topics Sem. 1 and 2. SS. Cr. 1-4. Admission by consent of instructor. (May be repeated for credit if different topics.)

Primarily designed for advanced specialized topic areas in agricultural and biological engineering for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of a course. Staff.

AUDIOLOGY AND SPEECH SCIENCES:

AUS 524 Infant Communication Disorders Sem. 2. Class 4, cr. 2 (8 weeks). Prerequisite: AUS 523 or consent of instructor.

Theories of normal and disordered communication development (including related areas of cognitive and social development) are studied. Theoretical knowledge is applied to a range of clinical populations to generate assessment and treatment approaches for infants and their families.
Professor Goffman.

AUS 537 Developmental Motor Speech and Feeding Disorders Sem. 1. Class 4, cr. 2 (8 weeks). Prerequisite: AUS 521 or consent of instructor.

Normal aspects of speech motor and feeding development are studied. Theories derived from normal processes are applied to designing assessment and intervention approaches for infants and children with a range of clinical diagnoses (e.g., cleft palate, tracheostomy, or Down Syndrome).
Professor Goffman.

AUS 679 Advanced Clinical Practice in Audiology Sem. 1 and 2. SS. Experiential 8-40, cr. 1-8. (May be repeated for credit.) Prerequisite: AUS 579 or equivalent and consent of instructor.

An advanced-level clinical practicum in audiology.

BIOCHEMISTRY:

BCHM 691 Biochemistry of the Cell Cycle Sem. 2. Class 2, cr. 2. Prerequisite: BCHM 659 and 660 and AGRY 320, or equivalent.

A critical introduction to the molecular basis of regulation of cell cycle progression using budding yeast as the model system of choice. Key aspects of the life cycle of yeast will be examined in the context of cell cycle, with particular attention paid to the G1 phase. Topics covered include regulation of the HO locus, mating factor arrest, and feedback control. Highlights of cell cycle regulation in other model systems are addressed in light of observations from yeast. Professor Ogas.

BCHM 696 Advanced Seminars in Biochemistry Sem. 1 and 2. Class 1, cr. 1. (May be repeated for credit.) Prerequisite: BCHM 659, 660, and 663, or consent of instructor.

The frontiers of biochemistry and molecular biology. Critical examination of the state-of-the-art in various specialties as represented by members of the department. Currently advanced work in the following fields can be offered: RNA catalysis, mechanisms in transcription, cell cycle control, DNA rearrangements, enzyme catalysis, membrane transport, protein folding, molecular biology of protozoans, plant intermediary metabolism, molecular biology of viruses, cell signaling in the immune system, and signaling through protein phosphorylation. The field in which work is offered will be indicated in the student's record. Staff.

BIOLOGICAL SCIENCES:

BIOL 565 Immunobiology Laboratory (Offered at Fort Wayne only.) Lab. 3, cr. 1. Prerequisite or corequisite: BIOL 537.

A survey course in laboratory experiments and demonstrations using classical immunological techniques and modern immunoassays with up-to-date technological equipment. The laboratory supplements the lecture portion of BIOL 537 but is not required. Typical assays include immuno-double diffusion Ouchterlony methodology, immunofluorescence identification of cell surface antigens, cytokine and mitogen stimulated proliferation of immune cells, ELISA assays, and PAGE with Western blotting.
Professor Blumenthal.

BIOL 584 Molecular Biology and Applications Laboratory (Offered at Fort Wayne only.) Lab. 3, cr. 1. Prerequisite or corequisite: BIOL 509.

A lab consisting of mini-projects that emphasize the applications of several molecular biological techniques, such as Southern blotting, DNA-DNA hybridization, purification and cloning of genes into plasmid vectors, genetic engineering, and PCR amplification. Applications emphasized include DNA fingerprinting in humans, evolution and systematics by comparing 18S and 16S rDNA from different species, and genetic engineering of yeast with genes encoding beta carotene. Professors Kuhl and Mourad.

BIOMEDICAL ENGINEERING:

BME 595 Selected Topics in Biomedical Engineering Sem. 1 and 2. SS. Cr. 1-3. Admission by consent of instructor. (May be repeated for credit.)

This course is designed primarily for specialized topic areas for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of a course.

BME 601 Principles of Biomedical Engineering I Sem. 1. Class 3, cr. 3. Prerequisite: graduate standing or consent of instructor.

An introduction to the fundamentals and interdisciplinary aspects of biomedical engineering. Topics addressed include: cell behavior and tissue engineering, transplantation and artificial pancreas, the central nervous system, the cardiovascular system, cardiac pacing, artificial heart, biological fluid mechanics, and hemodialysis. Staff.

BME 602 Principles of Biomedical Engineering II Sem. 2. Class 3, cr. 3. Prerequisite: graduate standing or consent of instructor.

An introduction to the fundamentals and interdisciplinary aspects of biomedical engineering. Topics discussed include: biomaterials, blood compatibility, controlled release systems, musculoskeletal physiology, orthopedic and dental prosthetic devices, and imaging. Staff

BME 695 Advanced Topics in Biomedical Engineering Sem. 1 and 2. SS. Cr. 1-3. Admission by consent of instructor. (May be repeated for credit.)

This course is designed primarily for specialized topic areas for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of an advanced course.

BME 696 Advanced Biomedical Engineering Projects Sem. 1 and 2. SS. Cr. 1-6. Admission by consent of instructor. (May be repeated for credit.)

Individual research projects to be approved by the supervising faculty member before registering for the course. An approved written report is required.

BME 697 Directed Reading in Biomedical Engineering Sem. 1 and 2. SS. Cr. 1-3. Admission by consent of instructor. (May be repeated for credit.)

Individualized reading course supervised by an appropriate faculty member. Approval for each reading course must be obtained from the department prior to registration.

BME 698 Research M.S. Thesis.

BME 699 Research Ph.D. Thesis.

CHEMISTRY:

CHM 528 Principles and Practice of NMR (Offered at Fort Wayne only.) Sem. 1. Class 2, lab. 3, cr. 3. Prerequisite: CHM 256 or 262 and PHYS 221 or 251 or 261, or consent of instructor.

Designed for biology, chemistry, and technology majors. The theory of modern NMR is taught and demonstrated by hands-on access and computer labs. Topics include theory and experimental applications of multinuclear NMR spectroscopy, as needed for the structural elucidation of biomolecules, polymers, and inorganic materials; H-NMR in one or more dimensions.

CHM 579 Computational Chemistry Sem. 2. Class 2, lab. 2, cr. 3. Prerequisite or corequisite: CHM 374.

Theoretical basis and practical applications of computational methods relevant to chemical and biochemical research problems.

CIVIL ENGINEERING:

CE 521 Construction Business Management Sem. 1. Class 3, cr. 3. Prerequisite: CE 392 and MGMT 200 or consent of instructor.

Develops students' understanding of the fundamental theories and applied principles of management of U.S. construction companies. Exposes students to the present and future practice of business management at the construction company level. Provides insight into basic construction business operations including strategic planning, organizational structure, marketing, accounting, financing, risk analysis, quality, and international construction business practice.

CE 527 Analytical Methods for the Design of Construction Operations Sem. 1, Class 3, cr. 3. Prerequisite: CE 392 or equivalent, or consent of instructor.

Provides an investigation of quantitative methods used for the design and analysis of construction operations to maximize productivity and minimize resource idleness. Includes discussions on queueing theory, line of balance techniques, linear programming, and simulation. Comprehensive group projects involve modeling and analyzing actual construction operations.

COMMUNICATION:

COM 565 Sociolinguistics (ANTH 565, AUSL 565, ENGL 565, FLL 565) Sem. 1 and 2. Class 3, cr. 3. Prerequisite: LING 500 or equivalent or consent of instructor.

An introduction to language in its social context, focusing on uses and users of language. Topics include social class, ethnic group, gender, language attitudes, and bilingualism.

COM 600 Foundations of Human Communication Inquiry I Sem. 1. Class 3, cr. 3.

Introduces doctoral students to major and emerging approaches to understanding human communication and provides them with the theoretical background and analytic skills needed to navigate the tensions among these approaches. Reviews the intellectual history of communication inquiry, overviews traditional and innovative questions about human communication, examines the ways in which these questions can be addressed from different perspectives, addresses some of the varied forms that knowledge about human communication can take, and explores how different research traditions go about making and warranting knowledge claims.

COM 601 Foundations of Human Communication Inquiry II Sem. 2. Class 3, cr. 3. Prerequisite: COM 600.

Following COM 600, this course continues to introduce doctoral students to major and emerging approaches to understanding human communication and provides theoretical background and analytic skills needed to navigate the tensions among these approaches. Reviews the intellectual history of communication inquiry, overviews traditional and innovative questions about human communication, examines the ways in which these questions can be addressed from different perspectives, addresses some of the varied forms that knowledge about human communication can take, and explores how different research traditions go about making and warranting knowledge claims.

COM 695 Curricular Practical Training Sem. 1 and 2. SS. Experiential 5-10, cr. 1 or 2.

Prerequisite: good standing in the graduate program of the Department of Communication; an approved plan of study including the internship; and consent of instructor. (May be repeated for credit.)

Internship providing practical field experience under professional supervision in selected situations related to the student's area of specialization.

COMPUTER SCIENCES:

CS 526 Information Security Sem. 1. Class 3, cr. 3. Prerequisite: CS 503 or equivalent.

Basic notions of confidentiality, integrity, availability; authentication models; protection models; security kernels; secure programming; audit; intrusion detection and response; operational security issues; physical security issues; personnel security; policy formation and enforcement; access controls; information flow; legal and social issues; identification and authentication in local and distributed systems; classification and trust modeling; and risk assessment.

CS 531 Computational Geometry Sem. 1 or 2. Class 3, cr. 3. Prerequisite: CS 580 or consent of instructor.

Computational geometry studies how to compute with and reason about geometric objects. The subject is playing an increasingly important role in computer graphics, game software, geometric modeling, geographic information systems, and many other applications. Course topics include convex hull, segment manipulations, triangulations, range searching, Voronoi diagrams, window queries, Delaunay triangulation, and duality. Some key algorithms are implemented. Questions of floating-point accuracy and robust algorithm design are considered throughout the course.

CS 626 Advanced Information Assurance Class 3, cr. 3. (Offered every third semester.) Prerequisite: CS 526 and 555.

Advanced topics in information assurance, including selections from the following: penetration testing, formal verification of systems, formal models of information flow and protection, distributed system authentication, protocol design and attack, computer viruses and malware, intrusion and anomaly detection models, multi-level security, active defenses, investigation and forensics, network firewalls, anonymity and identity, e-commerce support, and database security models and mechanisms.

CS 655 Advanced Cryptology Class 3, cr. 3. (Offered every third semester.) Prerequisite: CS 526 and 555.

Advanced topics in cryptography and cryptanalysis, including selections from the following: Steganographic methods, Cryptanalytic techniques, including differential cryptanalysis, and chosen plaintext attacks. Message digest algorithm construction. Digital cash. Quantum cryptography. N-key systems. Minimal and zero-knowledge systems. Protocol design and failure. Verification of algorithms. Key generation and management. Traffic analysis. VPN construction and operation. Politics, espionage, and law enforcement concerns.

CONSUMER SCIENCES AND RETAILING:

CSR 630 Social Policy and the Economics of Aging Sem. 1 and 2. Class 3, cr. 3. Prerequisite: STAT 511 and 512, or equivalent.

Interaction of consumption of public and private resources and economic well being of older adults. Individualized projects. Professor DeVaney.

ELECTRICAL AND COMPUTER ENGINEERING (IUPUI):

EE 536 Introduction to Computational Intelligence (Offered at Indianapolis only.) Class 3, cr. 3.

Prerequisite: C programming skills; graduate standing or consent of instructor.

Basic concepts in theory and paradigms for neural networks, evolutionary computation, and fuzzy logic; algorithms and applications for hybrids of these tools known as computational intelligence are explored. Topics include artificial neural networks, fuzzy systems, and evolutionary computation. Implementations of a number of paradigms are presented, including particle swarm optimization. Applications to various areas, such as biomedical engineering and nonlinear control, are examined. Professor Eberhart.

EE 537 Multimedia Applications (Offered at Indianapolis only.) Class 2, lab. 2, cr. 3. Prerequisite: EE 301 and 362.

Treatment of multimedia algorithms and implementation using high-speed multimedia processors. Detailed discussion of entropy coding, transform coding, speech compression, image compression, video compression, and architecture, addressing modes, and instruction set of multimedia processors. Professor El-Sharkawy.

FOOD SCIENCE:

FS 697 Supervised University Teaching in Food Science Sem. 1 and 2. Experiential I, cr. 1.

Prerequisite: EDCI 589A, Special Topics for Teachers. College Teaching Workshop. (Offered as pass/not-pass only.)

Students assist a faculty member in teaching a Food Science course to obtain training and experience in various aspects of classroom and laboratory teaching. Professor Nelson.

HEALTH, KINESIOLOGY, AND LEISURE STUDIES:

HPER 501 Graduate Student Orientation Seminar Class 1, cr. 0.

A course designed to help orient entering graduate students to graduate study in the Department of Health, Kinesiology, and Leisure Studies. Professors Harper and Templin.

HPER 524 Managing Health, Fitness, and Sports Organizations Sem. 1. Class 3, cr. 3. Admission by consent of instructor.

An overview of the major principles, considerations, and techniques involved in managing health, fitness, and sports (HFS) organizations. Emphasizes the skills and competencies involved in the planning, organization, and control of opportunities, resources, and facilities in HFS settings. Professor Klenosky.

HPER 525 Marketing and Promotion in Health, Fitness, and Sports Organizations Sem. 2. Class 3, cr. 3. Admission by consent of instructor.

An overview of marketing and promotion in health, fitness, and sports organizations. Emphasizes the skills necessary to develop marketing and promotion plans and to develop materials and approaches for carrying out these plans in health, fitness, and sports settings. Professor Klenosky.

H&S 686 Theories and Concepts of Stress Management Sem. 2. Class 3, cr. 3. Prerequisite: BIOL 203, 204, and consent of instructor.

Development of a conceptual understanding of stress and stress management. A seminar focused on the review of literature regarding psychophysiology of stress, relationship between stress and disease, and methods of preventing/relieving stress, models of stress research, and issues surrounding stress research methodology. Professors Black and Lyle.

H&S 688 Health Policy in the United States Sem. 1. Class 3, cr. 3. Admission by consent of instructor.

Examines the formation, implementation, and evaluation of health policies, with emphasis on the legislative and regulatory processes that are involved. Discusses legislation in areas specific to public health promotion. Students are encouraged to consider their role in future policy initiatives.
Professor Galer-Uni.

HEALTH SCIENCES:

HSCI 546 Advanced Industrial Hygiene Control Technology Sem. 2. Class 1, cr. 1. Prerequisite or corequisite: HSCI 345 and 346 or equivalent and consent of instructor.

Students and faculty present readings, lead discussions on current research and practice in industrial hygiene control technology, including general control strategy, personal protective equipment, and ventilation. Students conduct self-paced, step-wise solutions to practical case studies. Ventilation design software is used to solve design problems. Professors Zimmerman and Rosenthal.

HSCI 570 Introduction to Medical Diagnostic Imaging Sem. 1. Class 3, cr. 3. Prerequisite: MA 262 and HSCI 514, or consent of instructor.

This course teaches the fundamentals of medical imaging, including the basic physics and engineering associated with each imaging modality (CT, MRI, PET, and ultrasound), as well as mathematics and computational tools associated with image reconstruction and image processing. The course is intended for students in health sciences, biomedical engineering, physics, and life sciences.
Professor Liang.

HSCI 580 Occupational Ergonomics Sem. 1. Class 3, cr. 3. Prerequisite: BIOL 203, PHYS 221, HSCI 345, or consent of instructor.

Teaches the fundamentals of occupational ergonomics, with a focus on anthropometry, physiology, kinesiology, biomechanics, and workstation design. Intended for senior undergraduates and first and second-year graduate students in health sciences, nursing, industrial engineering, biomedical engineering, health, kinesiology, and leisure studies, industrial technology, and life sciences.
Professor McGlothlin.

HSCI 581 Applied Occupational Ergonomics Sem. 2. Class 3, cr. 3. Prerequisite: HSCI 580 or consent of instructor.

Students learn how to perform ergonomics risk assessments and provide recommendations that will reduce and prevent ergonomic-related musculoskeletal disorders at a variety of industrial sites in Greater Lafayette, Indiana. Intended for students in health sciences, industrial engineering, and industrial technology. Professor McGlothlin.

HSCI 582 Video Exposure Monitoring Methods Sem. 2. Class 2, cr. 2. Prerequisite: HSCI 580 or consent of instructor.

Designed specifically for industrial hygiene majors in the School of Health Sciences who want to use video exposure monitoring methods to evaluate and control hazardous physical, chemical, and biological agents in the occupational environment. Intended for senior undergraduates and first and second-year graduate students in health sciences, environmental engineering, and technology.
Professor McGlothlin.

HISTORY:

HIST 602 Seminar in European History Sem. 1 and 2. Class 3, cr. 3. Prerequisite: graduate standing or consent of instructor. (May be repeated for credit.)

Individual and group study of topics in European history from the medieval period to the modern era. Topics reflect the research, teaching, or historiographical specialties of the faculty offering the course. Subtitles indicate the focus of the research seminar. Staff.

HIST 652 Seminar in American History Sem. 1 and 2. Class 3, cr. 3. Prerequisite: graduate standing or consent of instructor. (May be repeated for credit.)

Individual and group study of topics in American history from the colonial period to the present. Topics reflect the research, teaching, or historiographical specialties of the faculty offering the course. Subtitles indicate the focus of the research seminar. Staff.

HOSPITALITY AND TOURISM MANAGEMENT:

HTM 522 Food Equipment for Restaurants, Hotels, and Institutions Sem. 1 and 2. Class 3, cr. 3. Prerequisite: RHIT 291, 291L, and upper-division standing.

Principles of selection, operation, and maintenance of food service equipment, including materials, structural detail, design, cost, performance, and specification standards. Emerging technologies and new production methods are discussed. Professor Nelson.

HTM 523 Hospitality Facility Design Sem. 1 and 2. Class 2, lab. 2, cr. 3. Prerequisite: RHIT 291, 291L, 321, 322, and a basic computer science course, or consent of instructor.

Development of efficient work spaces for hospitality operations, with emphasis on space utilization, human factors, ergonomics, environmental concerns, and development of work-flow patterns within functional areas and the facility as a whole. Introduction to the use of computer-aided design (CAD) to generate 2-dimensional drawings. Professor Nelson.

HTM 602 Research Topics and Methods Seminar Sem. 1 and 2. Class 1, cr. 1. Prerequisite: RHIT 501, STAT 501 and 502, or consent of instructor. Open to graduate students and honors undergraduates. Required for doctoral students. (May be repeated for a maximum of 3 credits.)

Examination of current research in hospitality and tourism. Focuses on industry research needs and appropriate methodologies. Professor Woods.

HTM 611 Seminar in Hospitality and Tourism Sem. 1 and 2. Class 3, cr. 3. Prerequisite: RHIT 212 and 499, or consent of instructor.

A course designed to introduce students to the societal forces affecting the full range of hospitality and tourism industries. The seminar is based on readings that cover sociological, economic, and political factors impacting national and international hospitality businesses. Professor Pearson.

HTM 612 RHIT Management Challenge Analysis Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: basic management organization class.

A course designed to discuss specific management problems in the hospitality and tourism industries. Through the use of case studies, students study current challenges, management analysis, the process of decision making, and the impacts of corporate decisions. Professor Pearson.

HTM 699 Research Ph.D. Thesis

INDUSTRIAL AND PHYSICAL PHARMACY:

IPPH 562 Introduction to Pharmaceutical Manufacturing Processes Sem. 1. Class 2, lab. 3, cr. 3. Admission by consent of instructor.

A course intended to provide the student with basic understanding of both the theoretical and practical aspects of pharmaceutical manufacturing by combining a thorough classroom treatment of the underlying principles of each pharmaceutical unit operation with hands-on execution of these activities in the laboratory. Professors Peck and Morris.

INDUSTRIAL ENGINEERING:

IE 696 Graduate Professional Practice Sem. 1 and 2. SS. Cr. 0. Admission by consent of adviser or major professor and the graduate professional practice administrator. (May be repeated.)

Practice in industry and comprehensive written reports of this practice.

MATHEMATICS:

MA 503 Abstract Algebra Sem. 1. Class 3, cr. 3. Prerequisite: two upper-division mathematics courses, one on linear algebra and one on abstract algebra.

Group theory: definitions, examples, subgroups, quotient groups, homomorphisms, and isomorphism theorems. Ring theory: definitions, examples, homomorphisms, ideals, quotient rings, fraction fields, polynomial rings, Euclidean domains, and unique factorization domains. Field theory: algebraic field extensions, straightedge, and compass constructions.

MA 533 Fractals and Chaos with Applications in the Earth Sciences Sem. 2. Class 3, cr. 3. Prerequisite: MA 262 or 265/266 or 351/366.

An introduction to the theory and phenomenology of nonlinear dynamics, chaos, self-similarity, and fractal geometry, for advanced undergraduate and beginning graduate students. Includes applications of this theory to geophysical problems.

MECHANICAL ENGINEERING:

ME 507 Laser Processing Sem. 1. Class 3, cr. 3. (Offered in alternate years.) Prerequisite: ME 315 or equivalent.

Introduces background knowledge in laser science and laser technology and fundamentals involved in laser processing and manufacturing. The following topics are discussed: laser fundamentals, industrial laser systems and processes, and the laser-induced thermal, thermo-mechanical, and thermo-acoustic effects. The course also discusses emerging areas of laser applications, such as microscale laser processing, ultrafast laser processing, and the related energy transport analyses. Laboratory and video demonstration sessions are used to enhance the overall understanding of the course materials. Professor X. Xu.

ME 508 Heat Transfer in Biological Systems Sem. 2. Class 3, cr. 3. (Offered in alternate years.) Prerequisite: senior or graduate standing, or consent of instructor.

Introduction to applications of heat transfer in living systems to students who have general interests in biomedical engineering. Fundamental concepts of biology and engineering involved in these applications are introduced. Regulation of blood flow under external thermal stimuli and its effect on heat transfer are discussed. Clinical applications of heat transfer, including cancer therapy and gene therapy. Professor L. X. Xu.

ME 518 Analysis of Thermal Systems Sem. 1. Class 3, cr. 3. (Offered in alternate years.) Prerequisite: ME 300 and 315.

Modeling and optimization of thermal systems with a focus on heat-pumping equipment, such as vapor compression, absorption, and some advanced heat-pumping cycles. Students combine the use of thermodynamics, heat transfer, fluid mechanics, and numerical methods to develop and apply mathematical models for the analysis and optimization of specific equipment. Professors Braun and Groll.

ME 526 Spray Applications and Theory Sem. 1. Class 3, cr. 3. (Offered in alternate years.) Prerequisite: ME 315 or consent of instructor.

Theory of spray formation and evolution, as well as treating a host of spray applications. Topics include drop size distributions, breakup of liquid sheets and ligaments, drop formation and breakup, drop motion and the interaction between a spray and its surroundings, drop evaporation, nozzle internal fluid mechanics, external spray characteristics, nozzle performance, and experimental techniques relevant to these subjects. Applications include: (1) agricultural sprays, (2) consumer products, (3) gas turbine combustion, (4) heat transfer, (5) internal combustion engines, (6) paints and coatings, (7) pharmaceutical and medicinal sprays, and (8) spray drying. Professor Sojka.

ME 540 Internal Combustion Engines Sem. 2. Class 2, lab. 3, cr. 3. (Offered in alternate years.)

Prerequisite: senior standing or consent of instructor. Not available to students with credit in ME 440.

Performance of internal combustion engines in relation to the fundamentals of thermodynamics, fluid mechanics and heat transfer in the engine intake, cylinder, and exhaust systems. Spark-ignition and compression-ignition engine processes. Fundamental physics of turbulence, boundary layer effects, atomization and structure of sprays, premixed and non-premixed combustion and pollutants. Modeling of engine processes. Hands-on experiences through laboratory experiments. Professor Abraham.

ME 553 Product and Process Design Sem. 2. Class 3, cr. 3. Prerequisite: senior standing or consent of instructor.

Fundamental principles of product and process design to produce a marketable product, develop a preliminary business strategy, and construct an operational prototype. Overview of relevant principles related to product and process design. Market analysis, design parameters, manufacturing prototype plan, production process plan, and a business strategy developed in teams. Broad overview of the entire product development process, including patents, commercialization of new technologies, and the highly interdisciplinary nature of product design through industry guest lectures. Impact of information technologies and the Internet on product design, prototyping, marketing, and customization. Product prototype is required. Design and product software – information technology service-type concepts. Professor Ramani.

ME 556 Lubrication, Friction, and Wear Sem. 2. Class 3, cr. 3. (Offered in alternate years.)

Prerequisite: senior standing or consent of instructor.

Science, technology, and application of lubricated interacting surfaces in relative motion. Advanced analysis techniques and hands-on exposure to modern experimental methods provide an enhanced understanding of fundamental principles of lubrication, friction, and wear. Basics of design and analysis of machine components operating in the presence of air and liquid lubricants. Rolling fatigue, friction and wear models, and measurement techniques. Professor Sadeghi.

ME 559 Micromechanics of Materials Sem. 2. Class 3, cr. 3. Prerequisite: senior standing or consent of instructor.

Prediction of the macroscopic behavior of materials from their microstructure and the design of new materials. Microstructure-property relationships between the macroscopic material behavior and microscopic structure. Application to traditional structural as well as to new engineering materials. Adapting emerging constitutive relations into structure analyses. Introduction of this new approach to materials, its applications in predictive analysis tools, and its importance in simulation-based engineering. Professor Siegmund.

ME 588 Mechatronics – Integrated Design of Electro-Mechanical Systems Sem. 1. Class 2, lab. 3, cr. 3. Prerequisite: senior standing or consent of instructor.

Electronic and interfacing techniques for design and control of electro-mechanical systems. Basis digital and analog design with applications to electro-mechanical interfacing via hands-on laboratory experience. Commonly used actuators and sensors and corresponding interfacing techniques. Realistic and integrated product development experience provided through a comprehensive final project where working prototypes are built to defined specifications. Professor Chiu and staff.

ME 696 Advanced Professional Internship Sem. 1 and 2. SS. Cr. 0. Prerequisite: graduate standing and approval by the student's major professor (or academic adviser) and professional practice administrator. (May be repeated.)

Advanced professional experience in mechanical engineering. The program is coordinated by the school with the cooperation of participating employers. Students submit a summary report.

MEDICAL EDUCATION:

LCME 504 Molecular Biology of the Cell Sem. 1. Class 3 (13 weeks), cr. 2.5.

A lecture course that introduces the cell, with emphasis on molecular mechanisms and the relationship between structure and function. Topics include: the properties and interactions of the macromolecules that comprise the cell; DNA, RNA, and protein synthesis and processing, regulation of transcription and translation; protein sorting and organelle traffic; cell motility; signal transduction; and the cell cycle. Designed to develop proficiency for Competency III "Using Science to Guide Diagnosis, Management, Therapeutics, and Prevention," and Competency IV "Lifelong Learning," Level 1. Professor Sherman and Staff.

LCME 506 Medical Microbiology Sem. 2. Class 3, lab. 2 (eight sessions), cr. 3.5.

Properties of bacteria, viruses, fungi, and animal parasites of medical importance and their relation to infectious diseases. Designed to develop proficiency for Competency I "Effective Communication," Competency III "Using Science to Guide Diagnosis, Management, Therapeutics, and Prevention," Level 1. Professor Filmer and Staff.

NUCLEAR ENGINEERING:

NUCL 511 Reactor Theory and Kinetics Sem. 2. Class 3, cr. 3. Prerequisite: NUCL 510.

Advanced methodologies for neutron flux calculation, nodal methods, introduction to transport theory, transport correction, multigroup theory, and introduction to the generation of group constants. Reactor kinetics, perturbation theory, adjoint fluxes, reactivity calculation from perturbation theory, reactivity coefficients due to Doppler effect, temperature and density changes, void coefficient, and energy and power coefficients. Microkinetics, theory of reactivity measurements, approximate methods: prompt jump approximation, and prompt kinetics. Transients with feedback, safety implications, and spatial kinetics.

NUCL 555 Thermalhydraulics Measurement and Instrumentation Sem. 2. Class 2, lab. 2, cr. 3. Prerequisite: senior standing or consent of instructor.

Measurement techniques in fluid flow, heat transfer, and multi-phase flow. The principle and practice of measurement of temperature, flow, level, pressure, and void fraction (in two-phase flow systems) as applied to nuclear reactor systems. Instrument error and measurement errors, and data acquisition system using PC. Hands-on experience in the laboratory with special instruments (LDA, gamma densitometer, and conductivity probe).

NUCL 655 Two-Phase Flow Computational Fluid Dynamics Applications Sem. 1. Class 3, cr. 3.

The course guides the student to two-fluid model solutions using computational fluid dynamics (CFD). Topics include: review of the two-fluid model, review of elliptic and parabolic partial differential equations, description of numerical algorithms, and two-phase flow channel and jet flows.

NURSING:

NUR 501 Foundations of Advanced Practice Nursing Sem. 1 and 2. SS. Class, 2, cr. 2. (C, WL)

Explores the historical and contemporary context of advanced practice nursing. Provides students with the content necessary for them to gain the most from their graduate school experiences, to make informed choices concerning career goals for advanced practice nursing, and to follow the educational paths that fit their individual goals. Students apply skills in information mastery and acquisition, analysis, and utilization, as they examine models and role competencies of the advanced practice nurse.

NUR 505 Sociocultural Influences on Health Sem. 1 and 2. Class 3, cr. 3. (C, WL)

Analyzes various social, cultural, and economic factors that impact the health and illness perceptions and behaviors of various ethnic and minority groups. Content includes an examination of social, psychological, and cultural theories, a review of current research about health and illness beliefs and behaviors and the development of strategies that will improve the care provided by the advanced practice nurse. Professor Plawecki.

NUR 682 Nursing Administration: Concept Synthesis and Application (Offered at Fort Wayne only.) Independent Study 3, cr. 3. Prerequisite: all required courses in the graduate program curriculum. Any one of NUR 653, 665, 672, or COM 574 may be taken as a corequisite. This course is taken in the student's last semester.

A capstone course designed for the synthesis, assessment, and application of nursing administration theoretical concepts. Case method is extensively utilized, and the student writes and presents an oral defense of a position paper. The course content focuses on such concepts as application of research methodology to problem solving, decision-making models, critical thinking, interpretation of arguments, causal relationships, analysis of inductive reasoning, and assessing the logic of inferred conclusions. Students will demonstrate mastery of the concepts through case analysis and case discussion.

PSYCHOLOGY AT IUPUI:

PSYI 501 Multicultural Counseling Class 3, cr. 3. Prerequisite: graduate standing.

Explores the role of increasing diversity in the U.S. population and how it will impact the delivery of mental health services. Focuses on different ethnic and minority groups, their customs and values, and the impact that these cultural factors have on the utilization of psychological services. Professor Evans.

PSYI 591 Psychopathology Class 3, cr. 3. Prerequisite: graduate student standing or consent of instructor.

An intensive survey of the methods, theories, and research concerning the nature, causes, and development of psychopathology. An evaluation of current systems of assessment and classification of abnormal behavior is emphasized. Professor Svanum.

PSYI 618 Interventions in Health Psychology Class 3, cr. 3.

This course will familiarize students with clinical interventions and research relevant to health problems and lifestyle. This will enable students to critically evaluate the work that has been accomplished and to design and implement intervention protocols.

SOCIOLOGY AND ANTHROPOLOGY:

SOC 572 Comparative Healthcare Systems Sem. 1 or 2. Class 3, cr. 3. Prerequisite: six hours of social science or consent of instructor.

Using cost, quality, and access to care as core concepts, this course explores healthcare in comparative context. Special topics are health and gender, the environment, epidemics, long-term care, technology, and rationing, among others. Professors Anderson and Street.

TECHNOLOGY:

TECH 511 The Development of Graphics in Technology Sem. 1 and 2. SS. Class 3, cr. 3. Admission by consent of instructor.

An introduction to the historical development of visual science in western civilization and its effect on computer graphics techniques and practices. Topics include the historical, contemporary, and future developments in computer graphics. Emphasizes the study of visual science and the significance of computer graphics as a communications medium. Professor Bertoline.

TECH 512 Human Factors of Computer Interface Design Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: TECH 507 or consent of instructor.

Addresses an array of human factors issues related to human computer interaction and the graphic user interface. Theoretical and practical relationships are drawn between aesthetics and the cognitive sciences in the development of primarily multimedia and hypermedia products. Methods to validate design solutions are learned through controlled usability testing and assessment through small and large prototype projects. Professor Faiola.

TECH 513 Interactive Multimedia Development and Research Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: TECH 507.

A survey of the interactive multimedia development process, knowledge base, and applications in business and industry. Particular attention is paid to research issues surrounding theoretical, technological, and interactive techniques, and validating those approaches through applied research. Emphasis is placed on the interdisciplinary nature of the development of new media tools. Professor Mohler.

TECH 530 Facilities Engineering Technology Sem. 1 and 2. SS. Class 2, lab. 2, cr. 3. Prerequisite: undergraduate physics and calculus and senior standing or baccalaureate degree in engineering technology or engineering, or equivalent industrial experience.

A study of the application of the engineering sciences and technology to the solution of problems associated with mechanical and electrical systems in buildings. Emphasizes commercial and industrial facilities. Identifying energy conservation measures for both mechanical and electrical systems and evaluating their economic impact are an important focus of the course. Professors Dewitt, Hutzel, and Skvarenina.

TECH 535 Optimization of Metalcasting Design Sem. 1 and 2. SS. Class 2, lab. 2 (or arranged hours), cr. 3. Prerequisite: senior standing or baccalaureate degree in engineering technology or engineering, or consent of instructor.

The course focuses on optimal design of metalcastings to fit structural requirements (applied loads) and to assure sound manufacturability (castability). Students are expected to learn the general principles of design optimization through hands-on laboratory exercises based on the application of finite element and computational fluid dynamics software. Professor Tomovic.

TECH 550 Organizational Impact of Information Technology Sem. 1 and 2. SS. Class 3, cr. 3. Admission by consent of instructor.

An enterprise view of the organizational impact of information technology as the most effective means for achieving “better, faster, cheaper operations” in today’s highly competitive business environment. Examines how information technology has enabled new organizational forms and changes in business processes, products, markets, delivery systems, ways of working, and people management issues and challenges. Professor Mendonca.

TECH 551 Information Technology Economics Sem. 1 and 2. SS. Class 3, cr. 3. Admission by consent of instructor.

Examines the economics of information systems and information technology as it relates to business performance. Topics include strategic information technology planning, alignment with business planning, value assessment, and performance measurement. Special emphasis is placed on issues relevant to strategic information technology infrastructure management, both for the information technology unit as well as the business as a whole. Professor Goldman.

TECH 552 Information Technology Project Management Sem. 1 and 2. SS. Class 3, cr. 3. Admission by consent of instructor.

Explores the necessary skills and knowledge to successfully initiate, plan, manage, control, and report on information technology projects. Special emphasis is placed on learning the PMBOK and its practices concerning integration management, scope management, time management, cost management, quality management, human resource management, communications management, risk management, and procurement management. Practical examples are used to demonstrate the concepts and techniques, plus hands-on experience is received by working on a case study. Professor Dittman.

TECH 572 Human Error Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: AT 454 and consent of instructor.

Explores the definition and nature of human error, error chains, and causal factors in error generation. Error taxonomies are reviewed in order to provide a classification scheme for grouping errors and assessing error criticality. Methods for assessing risk and predicting error generation potentials are learned, as well as strategies for controlling or eliminating errors. Case studies are utilized throughout the course to illustrate course concepts. Professor Eiff.

TECH 573 Managing the Risk of Organizational Accidents Sem. 1 and 2. SS. Class 3, cr. 3.
Prerequisite: AT 454 and consent of instructor.

Examines strategies various industries use to assess the risk of organizational accidents and to develop safety management programs to prevent, capture, and recover from conditions that lead to disastrous outcomes. Strategies such as High Reliability Organizations, Operational Risk Management, Behavioral Based Safety, Tripod Delta, and Safety Cultures are explored as successful methods for improving organizational safety in high-risk environments and endeavors. Professor Eiff.

VISUAL AND PERFORMING ARTS:

A&D 547 Advanced Lighting Theory for Interiors Sem. 1. Class 1, studio 5, cr. 3. Prerequisite: A&D 320 or THTR 362 or equivalent, graduate standing, or consent of instructor.

Advanced lighting design and theories for architectural interiors. Includes manual and computer generation of lighting techniques and natural and artificial illumination. Professor Feng.

A&D 551 Space Design and Analysis Sem. 1. Class 1, studio 5, cr. 3. Prerequisite: A&D 430, graduate standing, or consent of instructor.

Functional and aesthetic analysis of interior spaces, including pre-design programming methodologies and post-occupation analysis. Professor R. Kilmer.

A&D 560 Advanced Interior Design Studio Sem. 2. Class 1, studio 5, cr. 3. Prerequisite: A&D 440 or equivalent, graduate standing, or consent of instructor.

To develop, apply, and test theories of design on projects dealing with interior space planning and/or design components. Professor W. Kilmer.

A&D 591 Practicum for Art and Design Teaching Assistants Class 1-3, cr. 0. Open only to Art and Design teaching assistants; mandatory for teaching assistants each semester they teach. Admission by consent of department.

Seminar to train new Art and Design teaching assistants in the content, policies, and format of the courses they teach. Topics include problem/project presentation, critique techniques, grading, and discipline. Subsequent semesters focus on improving and refining teaching skills.

THTR 670 Formalist Analysis of Drama Sem. 1 and 2. Class 3, cr. 3. Prerequisite: THTR 601. Admission by consent of instructor.

A seminar that emphasizes play analysis through the careful study of 12 scripts in conjunction with a textbook based on Aristotelian (formalist) analysis. Students are responsible for in-depth discussion, written assignments, and group presentations. Professor Fliotsos.

THTR 671 Modern Theory and Criticism Sem. 1 and 2. Class 3, cr. 3. Prerequisite: THTR 601. Admission by consent of instructor.

A seminar on modern performance theory, aesthetics, and practice. Emphasis on European theatre since 1875 and American theatre after 1960, with application through performance projects. Professor Fliotsos.