841. Advanced Gas Dynamics

Spring. 3(3-0) 432; MTH 322 or 422 or 424 or approval of department.

Compressible subsonic and supersonic flow, shock waves, expansion fans, inviscid equations, perturbation theory, similarity rules, methods of measurement, method of characteristics, hodograph methods.

842. Inviscid Fluids

Spring. 3(3-0) MMM 810; MTH 322 or 423.

Kinematics; dynamical equations; potential flows, transformations, Helmholtz flows; added masses, forces and moments; vortex motion; wave motion.

843. Turbulence

Winter, Summer. 4(4-0) MMM 810 or approval of department.

Basic equations of turbulent motions including momentum, kinetic energy, scalar contaminants, correlation and spectrum functions. Basic elements of statistical descriptions, isotropic and shear flows, phenomenological theories and hot-wire anemometry.

850. Advanced Space and Orbit Ballistics

Fall of odd-numbered years. 3(3-0) MMM 306; MTH 215, 309.

Particle motion; missile trajectories; motion of a rocket; orbits; effects of oblateness on satellite orbit; orbital lifetime; rendezvous transfer in earth-moon system; optimization; low thrust space propulsion systems; trip to Mars.

851. Modeling of Engineering Systems

Fall. 4(4-0) 458 or E E 415. Interdepartmental with Systems Science.

Modeling of engineering devices and components; assembly into systems; bond graph representation; prediction of dynamic behavior by linear, nonlinear and simulation methods; applications to mechanical, electrical, fluid, thermal systems.

860. Topics in Parameter Estimation

(818.) Spring. 4(4-0) May re-enroll for a maximum of 8 credits when different topics are taken. STT 421 or 441 recommended.

Nonlinear estimation of parameters in ordinary and partial differential equations. Related concepts in probability and statistics. Least squares, maximum likelihood and other estimators. Sequential methods. Optimum experiment design. Model-building.

862. Mechanical and Aerospace Optimization

Winter. 3(3-0) MTH 424.

Elementary fundamentals of calculus of variations, maximum principle. Optimization techniques applied to fluids, gas dynamics, optimization of airfoil shapes, fuel consumption, heat transfer, wave propagation in solids and physical properties in plasmas.

890. Special Topics

Fall, Winter, Spring, Summer. 2 to 4 credits. May re-enroll for a maximum of 9 credits. Approval of department.

Special topics in mechanical engineering of current interest and importance.

899. Research

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

920. Theory of Vibrations II

Winter of odd-numbered years. 4(4-0) MTH 422; 823 or approval of department. Interdepartmental with and administered by the Department of Metallurgy, Mechanics and Materials Science.

Vibrations of one, two, and three-dimensional models of elastic and inelastic continua. Interaction phenomena. Stability. Variational methods. Applications to aeronautics, aerospace and undersea technology.

921. Theory of Vibrations III

Spring of odd-numbered years, Summer. 4(4-0) MMM 920 or approval of department. Interdepartmental with and administered by the Department of Metallurgy, Mechanics and Materials Science.

Nonlinear oscillations. Resonance; subharmonics; self-sustained motions; stability. Methods of Poincare, van der Pol, etc. Random vibrations. Parametric excitations; stochastic processes; power spectra. Applications.

925. Mechanical Engineering Problems

Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 9 credits. Approval of department.

Analysis of advanced engineering problems involving design, thermodynamics, fluid dynamics, gas dynamics, space.

942. Viscous Fluids

Fall of even-numbered years. 3(3-0) MMM 810 or CHE 841.

Exact solutions of Navier-Stokes equations, i.e., Oscillatory Motion, Laminar Jet, Converging Channel, etc.; Hydrodynamic Stability including free convection, surface tension, gravitational and free-surface instabilities, and Tollmien-Schlichting waves.

999. Research

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

MEDICAL TECHNOLOGY M T

College of Human Medicine
College of Osteopathic Medicine

201. Medical Technology

Fall. 1(1-0) Approval of school.

Relationship of medical technology to medicine and research, and the necessary interaction with other paramedical sciences.

401. Seminar in Medical Technology

Spring. 1 credit. Juniors.

Acquaints students with the operation and administration of a hospital, the philosophy and understanding of the entire profession of medical technology.

495. Independent Study

Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 10 credits. Approval of department.

Independent study including assigned reading and reviews of appropriate scientific periodicals.

MEDICINE MED

College of Human Medicine

512. Infectious Diseases

Fall. 4(3-3) MPH 511, or approval of department. Interdepartmental with and administered by the Department of Microbiology and Public Health.

Infectious diseases of man, including biology of the causative microorganism, epidemiology, pathogenesis, host-parasite relationships, clinical and laboratory diagnosis, and clinical management.

590. Special Problems in Medicine

Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 12 credits. Human Medicine students or approval of department.

Each student will work under direction of a staff member on an experimental, theoretical or applied problem.

608. Senior Medical Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 43 credits. Primary clerkship, third year Human Medicine students.

Based in community hospitals, this clerkship will stress interviewing skills, history, physical examination, along with problem solving and therapy, and care of the whole patient leading to independence in patient management.

609. Hematology Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. 608.

Development of skills in data collection, problem solving and management related to common hematologic disorders of children and adults.

610. Oncology Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. 608.

Development of skills in data collection, problem solving and management of the more prevalent cancers in children and adults.

611. Cardiology Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. H M 602.

A clinical clerkship in which students evaluate in depth patients with cardiac diseases. This includes experiences with special diagnostic procedures including cardiac cuticularization, phonocardiography, echocardiography and electrocardiography.

612. Nephrology/Urology Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. H M 602.

Integrated concepts of renal physiology and pathophysiology of renal disease. Clinical experience.

613. Dermatology Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. H M 602.

Office based experience with a dermatologist to learn clinical skills in dermatology and develop observational and diagnostic skills in skin disease.

614. Medical Chest Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. H M 602.

A clerkship covering four aspects of chest diseases: tuberculosis, diagnosis, pulmonary function, and physiology. The student works with medical residents, utilizing outpatient and hospital facilities.

615. Gastroenterology Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. H M 602.

Referred patients with gastrointestinal problems are seen as either in- or out-patients. Many long term problems are followed. Patients with psychosocial problems are seen conjointly with Social Service.

616. Allergy Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. 608 and H M 602 or H D 608.

Office and hospital based experience to learn and develop diagnostic skills in allergy with a review of basic therapeutics as they relate to allergic diseases.

617. Neurology Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. H M 602.

A combined office and in-patient experience that will provide the student with an opportunity to learn the concepts of evaluation and management of neurological disease.

618. Infectious Disease Clerkship

Fall, Winter, Spring, Summer. 1 to 17 credits. May re-enroll for a maximum of 34 credits. H M 602 and MED 608 or H D 608. Interdepartmental with the Department of Microbiology and Public Health.

The clerkship emphasizes acquisition in depth of knowledge and skills essential in solution of clinical problems in infectious and immunologic diseases. Integrated basic science input is afforded through relevant seminars.

619. Clinical Pharmacology Clerkship

Fall, Spring. 4 credits. H M 602; MED 608 and H D 608.

Understanding and use of drugs; adverse effects; and misuse of drugs.

620. Endocrinology and Metabolism Clerkship

Fall, Winter, Spring, Summer. 4 to 8 credits. May re-enroll for a maximum of 16 credits. H M 602.

Clinical and/or clinical-research clerkship to allow the student to work closely with patients having endocrine diseases, electrolyte abnormalities, endocrine hypertension or diabetes mellitus.

621. Computer Medicine Clerkship

Fall, Winter, Summer. 4 to 16 credits. May re-enroll for a maximum of 16 credits. H M 602.

Learning BASIC computer language; preparing flow chart for elementary management of medical problem.

622. Diabetes and Metabolism Clerkship

Fall, Winter, Spring, Summer. 4 credits. H M 602; MED 608 and H D 608.

Clinical experience with diabetic patients and other related endocrine disorders.

624. Geriatrics Clerkship

Fall, Winter, Spring, Summer. 16 credits. H M 602; MED 608 and H D 608.

Exposure to a wide variety of geriatric medical problems.

626. Physical Medicine and Rehabilitation Clerkship

Fall, Winter, Spring, Summer. 4 to 8 credits. May re-enroll for a maximum of 8 credits. H M 602; MED 608 and H D 608.

Experience in prescription writing for physical medicine procedures, occupational therapy and rehabilitation skills.

627. Rheumatology Clerkship

Fall, Winter, Spring, Summer. 4 credits. H M 602; MED 608 and H D 608.

Combined office and hospital consultative clerkship which develops diagnostic skills in areas of rheumatic diseases.

628. Internal Medicine Clerkship

Fall, Winter, Spring, Summer. 4 to 16 credits. May re-enroll for a maximum of 16 credits. H M 602; MED 608 and H D 608.

Elective experiences in internal medicine.

630. Emergency Medicine Clerkship

Fall, Winter, Spring, Summer. 4 to 8 credits. May re-enroll for a maximum of 8 credits. 608, H D 608 or SUR 608; H M 602. Interdepartmental with the Department of Surgery.

Pathophysiology and other basic concepts will be used to explain the development of emergent conditions. Clinical diagnosis and treatment of emergencies seen in community emergency departments will be discussed.

METALLURGY, MECHANICS AND MATERIALS SCIENCE MMM

College of Engineering

201. Introduction to Engineering Mechanics

Winter. 4(4-0) PHY 237. Interdepartmental with the Department of Engineering.

Laws of mechanics governing the behavior of rigid and deformable bodies emphasizing how these laws influence engineering design. Extensive use of demonstrations.

205. Mechanics I

Fall, Winter, Spring, Summer. 4(4-0) MTH 214 or concurrently.

Vector description of forces and moments. Two and three dimensional equilibrium problems. Statics of frames and machines. Friction. Shear and moments in beams and shafts.

211. Mechanics of Deformable Solids

Fall, Winter, Spring, Summer. 4(4-0) 205; 215 or concurrently, MTH 215.

Deformable solids, stress and strain, principal axes, material behavior (elastic, plastic, viscoelastic, temperature dependent). Boundary value problems, torsion, beams. Instability, columns.

215. Materials Testing Laboratory

Fall, Winter, Spring, Summer. 1(0-3) 211 or concurrently.

Physical properties of engineering materials, resistance to primary types of static loading.

230. Introduction to Materials Science

Spring. 4(4-0) Sophomores.

A qualitative survey of metals, ceramics, and polymers, and the relationship of electronic, molecular, and crystal structure to the physical, mechanical, thermal, electrical and magnetic properties.

306. Mechanics II

(206.) Fall, Winter, Spring, Summer. 4(4-0) 205, MTH 215.

Dynamics of particles and particle systems. Energy and momentum principles. Two and three dimensional rigid body dynamics.

341. Materials Chemistry II

Winter. 4(4-0) CEM 361 or M E 311.

An integrated treatment of the physical chemistry of metals and engineering materials is presented in 341 and 342. Thermochemistry, solutions, phase equilibria; electrochemistry; corrosion; reaction kinetics in liquids and solids; diffusion; surface phenomena.

342. Materials Chemistry III

Spring. 4(4-0) 341.

Continuation of 341.

360. Physical Metallurgy I

Fall. 4(4-0) CEM 153 or approval of department.

Relationship of properties to microstructure as affected by solidification transformations in heterogeneous systems, cold work, recrystallization, and grain growth. Emphasis on the important commercial metals and alloys.

361. Physical Metallurgy II

Winter. 4(4-0) 360.

Continuation of 360.

370. Metals and Alloys I

Fall, Winter. 4(3-3)

Principles of physical metallurgy applied to engineering metals and alloys.

371. Metals and Alloys II

Winter. 3(3-0) 370.

Continuation of 370.

372. Metals and Alloys III

Spring. 3(3-0) 371.

Continuation of 371.

375. Failure Analysis

Spring. 3(3-0) Juniors and 211.

Modes and causes of failure of mechanical components. Steps in analyzing failures are illustrated through individual projects. Field trip required.

380. Physical Metallurgy Laboratory I

Fall. 1(0-3) 360 or concurrently.

First of an integrated sequence of laboratory courses designed to illustrate the parallel theory courses. Introduction to metallography, pyrometry, and testing of metals.

381. Physical Metallurgy Laboratory II

Winter. 1(0-3) 380; 361 concurrently.

Continuation of 380.