

**970. Wave Motion in Continuous Media II**  
Spring of even-numbered years. 4(4-0)  
M E 870 or approval of instructor.  
Continuation of M E 870.

**999. Doctoral Dissertation Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**MEDICAL  
TECHNOLOGY** **M T**

**College of Natural Science**

**110. Clinical Laboratory Science and Health Care Delivery**  
Fall. 2(2-0)

The history and definition of medical technology, its diagnostic and therapeutic role in health care delivery, and its relationship to other allied health professions.

**210. Exploration of the Disciplines of the Clinical Laboratory Sciences**  
Spring. 2(2-0) Sophomores in medical technology.

Clinical laboratory disciplines including hematology, immunohematology, chemistry, microbiology, cytology, and histology through an examination of laboratory testing and its roles in the assessment, prevention, monitoring of health state.

**410. General Pathology**  
Spring. 3(3-0) ANT 316; PSL 432 or concurrently. Interdepartmental with the Department of Pathology.

Features of lethal and sublethal cell injury and inflammation and repair process. Definition of the major causes of pathologic change with a consideration of specific associated diseases.

**411. Basic Histopathology**  
Spring. 2(1-2) ANT 420, PSL 432; M T 410 or concurrently. Interdepartmental with the Department of Pathology.

Microscopic examination of cell injury and death, inflammation and tissue repair. Pathologic tissue changes in diseases resulting from degenerative changes, abnormal metabolism, neoplasia, immunologic processes, infection, mechanical trauma and malnutrition.

**420. Hematology**  
Winter, Summer. 3(3-0) BCH 401, PSL 432.  
Physiology, pathophysiology and laboratory assessment of hematological states.

**421. Hematology Laboratory**  
Winter, Summer. 2(0-4) M T 420 or concurrently.  
Laboratory techniques in hematology. Normal and abnormal blood cell morphology.

**430. Immunohematology**  
Fall, Spring. 3(3-0) MPH 462.  
Genetics and immunology pertinent to blood group systems, antibody identification, and compatibility testing. Common practices of transfusion centers. Clinical correlations related to transfusion reactions and to hemolytic disease of the newborn.

**431. Immunohematology Laboratory**  
Fall, Spring. 2(0-4) M T 430 or concurrently.

Techniques relevant to practice of immunohematology. Special emphasis on blood typing, antibody screening and identification, compatibility testing, prenatal and postnatal testing, quality assurance and problem solving.

**440. Clinical Microscopy and Hemostasis**  
Winter, Summer. 2(2-0) PSL 432, BCH 401.

Renal physiology pertinent to the physical, chemical, and microscopic analysis of urine. The coagulation and fibrinolytic mechanisms including inherited and acquired diseases, laboratory testing and anticoagulant therapy.

**441. Clinical Microscopy and Hemostasis Laboratory**  
Winter, Summer. 1(0-2) M T 440 concurrently.

Routine urinalysis including the physical, chemical and microscopic examination. Semi-automated procedures for routine coagulation testing including prothrombin times, partial thromboplastin times, and factor assays.

**461. Medical Immunology and Microbiology**  
Winter. 5(5-0) MPH 301, MPH 302. Interdepartmental with and administered by the Department of Microbiology and Public Health.

The immune system, cellular interaction of the in vitro and in vivo reaction, and associated immunopathology. Characterization of infectious agents and their pathogenic processes.

**495. Independent Study**  
Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll 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**  
Spring. 4(3-3) MPH 511, or approval of department. Interdepartmental with and administered by the Department of Microbiology and Public Health.

Infectious diseases of humans, 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 reenroll 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.

**607. Ambulatory Care Clerkship**  
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 9 credits. H M 602. Interdepartmental with the departments of Community Health Science, Family Practice, and Pediatrics and Human Development. Administered by the Department of Family Practice.

Outpatient experience, lasting an equivalent of 34 half-days and extending over a minimum of 26 weeks. Continuous and comprehensive patient care under supervision of appropriate physicians.

**608. Senior Medical Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll 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 reenroll for a maximum of 34 credits. MED 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 reenroll for a maximum of 34 credits. MED 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 reenroll 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 reenroll 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 reenroll 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 reenroll 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.

**Descriptions — Medicine  
of  
Courses**

**615. Gastroenterology Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Referred patients with gastrointestinal problems are seen as either inpatients or outpatients. 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 reenroll for a maximum of 34 credits. MED 608 and H M 602 or PHD 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 reenroll for a maximum of 34 credits. H M 602.

A combined office and inpatient 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 reenroll for a maximum of 34 credits. H M 602 and MED 608 or PHD 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.

**620. Endocrinology and Metabolism Clerkship**  
Fall, Winter, Spring, Summer. 4 to 8 credits. May reenroll 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.

**622. Diabetes and Metabolism Clerkship**  
Fall, Winter, Spring, Summer. 4 credits. H M 602; MED 608 and PHD 608.

Clinical experience with diabetic patients and other related endocrine disorders.

**626. Physical Medicine and Rehabilitation Clerkship**  
Fall, Winter, Spring, Summer. 4 to 8 credits. May reenroll for a maximum of 8 credits. H M 602; MED 608 and PHD 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 PHD 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 reenroll for a maximum of 16 credits. H M 602; MED 608 and PHD 608.

Elective experiences in internal medicine.

**630. Emergency Medicine Clerkship**  
Fall, Winter, Spring, Summer. 4 to 8 credits. May reenroll for a maximum of 8 credits. MED 608, PHD 608 or SUR 608; H M 602.

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.

**270. Computer Graphics**  
(EGR 270.) Spring. 3(3-0) MMM 160, CPS 120 or approval of department.  
Use of computer controlled display systems for the solution of multidimensional problems.

**280. Manufacturing Processes**  
Fall, Spring. 3(2-3)  
An introduction to the materials and processes used in manufacturing, to convert ideas into products, machines, and structures for the use of people. Extensive use is made of audiovisual techniques. Field trips required.

**306. Mechanics II**  
Fall, Winter, Spring, Summer. 4(4-0) MMM 205, MTH 310.  
Dynamics of particles and particle systems. Energy and momentum principles. Two and three dimensional rigid body dynamics.

**330. Metallurgical Thermochemistry**  
Fall. 3(3-0) CEM 152 or approval of department.  
Laws of thermodynamics. Free energy of heterogeneous reactions. Gibb's phase rule. Solutions. Quasichemical theory of solutions. Thermodynamics of surfaces and interfaces. Thermodynamics of defects.

**340. Computer Aided Manufacturing**  
(M E 341.) Spring. 4(3-2) CPS 115 or CPS 120 or CPS 251 or LBS 124. Interdepartmental with the Department of Computer Science.  
APT and COMPACT numerical control languages. Group technology and computer-aided process planning. Introduction to manufacturing robotics.

**350. Mechanical Properties of Materials I**  
Fall. 3(3-0) MMM 211, MMM 215, MMM 250.  
Mechanical properties in tension, compression direct shear, torsion, flexure. True stress-strain. Cold work constants. Hardness, impact, fatigue properties. Effect of temperature on mechanical behavior, creep, stress rupture.

**351. Mechanical Properties of Materials II**  
Winter. 3(3-0) MMM 350.  
Mechanism of slip, slip systems, critical resolved shear stress, mechanical twinning. Deformation in polycrystalline materials. Impurity effect and yield point phenomenon. Dislocation reactions, multiplication, movement under force.

**352. Mechanical Property Laboratory**  
Fall. 1(0-3) MMM 350 or concurrently.  
Laboratory experiments related to the topics covered in MMM 350.

**360. Physical Metallurgy I**  
Winter. 3(3-0) MMM 250.  
Complex binary and ternary phase diagrams. Solidification structures, precipitation, clustering, order-disorder transformation. Recovery, recrystallization and grain growth.

**361. Physical Metallurgy II**  
Spring. 3(3-0) MMM 360.  
Structure and theory of metallic phases. Diffusion in metals and alloys. Martensitic transformation, spinodal decomposition. Role of defects in physical metallurgy. Surfaces and interfaces.

**METALLURGY, MECHANICS,  
AND MATERIALS  
SCIENCE** **MMM**

**College of Engineering**

**160. Engineering Communications**  
(EGR 160.) Fall, Winter, Spring. 4(3-4) MTH 108 or MTH 111 or concurrently.  
Engineering graphics, descriptive geometry, freehand sketching, graphical, numerical and computer problem solutions. Written technical reports and oral technical presentations.

**201. Introduction to Engineering Mechanics**  
Fall. 4(4-0) PHY 237.  
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 215 or concurrently.  
Vect or 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 I**  
Fall, Winter, Spring, Summer. 4(4-0) MMM 205; MTH 310 concurrently, MMM 215 concurrently.  
Deformable solids, stress and strain, principal axes, material behavior (elastic, plastic, viscoelastic, temperature dependent). Boundary value problems, torsion, beams. Instability, columns.

**215. Solid Mechanics Laboratory**  
Fall, Winter, Spring, Summer. 1(0-2) MMM 211 concurrently.  
Instrumentation, physical properties of materials, comparison of experiment and theory.

**230. Introduction to Materials Science**  
Spring. 4(4-0) Non-Materials Science majors only.  
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.

**250. Introduction to Metallurgy**  
(370.) Fall, Winter, Summer. 4(3-3) CEM 141A, MTH 113.  
Structure-property relationship in metals and alloys. Mechanical properties, crystal structure, phase diagrams, iron-carbon system. Laboratory includes mechanical property tests, heat-treatment, microstructural observations.