970. Wave Motion in Continuous Media
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

College of Natural Science

110. Clinical Laboratory Science and Health Care Delivery
Fall, Spring. 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(0-0) Sophomores in medical technology.
Clinical laboratory disciplines including hematology, immunohematology, chemistry, microbiology, cytology, and histology through an examination of laboratory testing and its role in the assessment, prevention, monitoring, and management of health states.

410. General Pathology
Spring. 3(0-0) 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(1-0) 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 hematologic 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(3-0) MPH 301, MPH 302. Interdepartmental with and administered by the Department of Microbiology and Public Health.
The immune system, cellular interaction of the in vivo 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(3-0) 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 8 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.

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 catheterization, echocardiography, electrocardiography and electrophysiology.

612. Nephrology/Urology Clerkship
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

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. A clinical clerkship in which students evaluate in depth patients with dermatologic diseases.

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 disease: 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 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. H M 602 and 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 PHD 608. Interdepartmental with the Department of Microbiology and Public Health.
The clerkship emphasizes acquisition in depth of knowledge and skill 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.
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.

METALLURGY, MECHANICS, AND MATERIALS

College of Engineering

160. Engineering Communications
MG 160. Fall, Winter, Spring. 4(3-0) MTH 105 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
PHY 201. Fall, 4(4-0) PHY 201.
Laws of mechanics governing the behavior of rigid and deformable bodies. Group technology and computer-aided process planning. Introduction to manufacturing robotics.

205. Mechanics I
PHY 205. Fall, Winter, Spring, Summer. 4(4-0) MTH 101 or concurrently.
vector description of forces and moments. Two and three dimensional rigid body dynamics.

211. Mechanics of Deformable Solids I
PHY 211. Fall, Winter, Spring, Summer. 4(4-0) PHY 207.
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) PHY 211 concurrently.
Instrumentation, physical properties of materials, comparison of experiment and theory.

230. Introduction to Materials Science
PHY 230. Fall, Winter, Spring, Summer. 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
PHY 250. Fall, Winter, Summer. 4(3-3) GEM 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.

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

280. Manufacturing Processes
MG 280. 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
MG 306. Fall, Winter, Spring, Summer. 4(4-0) MTH 120, MTH 130.
Dynamics of particles and particle systems. Energy and momentum principles. Two and three dimensional rigid body dynamics.

330. Metallurgical Thermochemistry
MG 330. Fall, 3(3-0) or concurrently.

340. Computer Aided Manufacturing
MG 340. Fall, Winter, Spring, Summer. 4(3-3) MTH 145 or CPS 251 or LBS 124.
Interdepartmental with the Department of Computer Science.

350. Mechanical Properties of Materials
MG 350. Fall, Winter, Spring. 3(3-0) MTH 201, MTH 215, MTH 230.

351. Mechanical Properties of Materials
MG 351. Winter. 3(3-0) MTH 350.

352. Mechanical Property Laboratory
MG 352. Fall, Winter, Spring. 3(3-0) MTH 350 or concurrently.
Laboratory experiments related to the topics covered in MTH 350.

360. Physical Metallurgy
MG 360. Winter. 3(3-0) MTH 230.
Complex binary and ternary phase diagrams. Solidification structures, precipitation, clustering, order-disorder transformation. Recovery, recrystallization and grain growth.

361. Physical Metallurgy II
MG 361. Spring. 3(3-0) MTH 360.