300. Foundations of Laboratory Practices
Fall. 3(0-0) Clinical Laboratory Sciences majors.
Quality assurance of clinical laboratory analysis.

400. Clinical Laboratory Sciences Educational Practices
Fall. 2(0-0) Clinical Laboratory Sciences majors, approval of Medical Technology Program.
Development and implementation of educational programs for clinical laboratory personnel. Includes scope of CLS education, administration of programs and accreditation standards.

410. General Pathology
(PPT 404, M T 404.) Spring, 3(0-0) ANT 318; 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 consideration of specific associated diseases.

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

421. Hematology Laboratory
Spring, Summer, 1(0-2) or 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 461.
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. 1(0-2) or 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, gromat and postmat testing, quality assurance and problem solving.

440. Clinical Microscopy and Hemostasis
Winter, Summer, 2(0-0) 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. 1(0-2) or 2(0-4) 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.

451. Senior Seminar I
Fall. 3(0-0) Clinical Laboratory Sciences majors, approval of Medical Technology Program.
Problem oriented learning approach to develop managerial, scientific and educational leadership for the clinical laboratory. Topics to include clinical chemistry, hematology, immunology, microbiology, hemostasis, quality control, instrumentation.

452. Senior Seminar II
Winter. 3(0-0) M T 452.
Continuation of M T 451. Problems of increasing difficulty and based on additional topics in immunohematology and medical mycology.

453. Senior Seminar III
Spring, 3(3-0) M T 452.
Continuation of M T 452. Problems of increasing difficulty and based on additional topics from medical parasitology.

461. Medical Immunology and Microbiology
Winter. 3(0-0) 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.

481. Clinical Chemistry
Fall, Winter, Spring, Summer, 6 credits. Clinical Laboratory Sciences majors, approval of Medical Technology Program.
Application of the theory and technical skills of chemistry in a clinical laboratory.

482. Clinical Hematology
Fall, Winter, Spring, Summer, 3 credits. Clinical Laboratory Sciences majors, approval of Medical Technology Program.
Application of the theory and technical skills of hematology in a clinical laboratory.

483. Clinical Immunohematology
Fall, Winter, Spring, Summer, 4 credits. Clinical Laboratory Sciences majors, approval of Medical Technology Program.
Application of the theory and technical skill of immunohematology in a clinical laboratory.

484. Clinical Microbiology
Fall, Winter, Spring, Summer, 6 credits. Clinical Laboratory Sciences majors, approval of Medical Technology Program.
Application of theoretical and technical aspects of clinical microbiology in a clinical laboratory.
609. **Hematology Clerkship**  
Fall, Winter, Spring, Summer. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
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. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
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. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
A clinical clerkship in which students evaluate in depth patients with cardiac disease. This includes experiences with special diagnostic procedures including cardiac catheterization, phonocardiography, echocardiography and electrocardiography.

612. **Nephrology Clerkship**  
Fall, Winter, Spring, Summer. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  

613. **Dermatology Clerkship**  
Fall, Winter, Spring, Summer. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
Office base 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. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
A clinic 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. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
Referral patients with gastrointestinal problems are seen as either inpatients or outpatients. Many long term problems are followed. Patients with peptic ulcer disease are seen jointly with Social Service.

616. **Allergy Clerkship**  
Fall, Winter, Spring, Summer. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
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. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
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. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606. 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. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
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.

626. **Physical Medicine and Rehabilitation Clerkship**  
Fall, Winter, Spring, Summer. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
Experience in prescription writing for physical medicine procedures, occupational therapy and rehabilitation skills.

627. **Rheumatology Clerkship**  
Fall, Winter, Spring, Summer. 2 to 12 credits. May reenroll for a maximum of 12 credits. MED 606.  
Combined office and hospital consultative clerkship which develops diagnostic skills in areas of rheumatic diseases.

628. **Advanced Internal Medicine Clerkship**  
Fall, Winter, Spring, Summer. 2 to 18 credits. May reenroll for a maximum of 30 credits. MED 606.  
Clinical experiences which refine diagnostic and management skills in general internal medicine.

630. **Emergency Medicine Clerkship**  
Fall, Winter, Spring, Summer. 2 to 18 credits. May reenroll for a maximum of 18 credits. MED 606.  
Pathophysiology and other basic concepts will be used to explain the development of emergent conditions. Clinical diagnostic and treatment of emergencies seen in community emergency departments will be discussed.

METALLURGY, MECHANICS, AND MATERIALS SCIENCE

College of Engineering

160. **Engineering Communications**  
(3-4) Fall, Winter, Spring. 4(3-3) MTH 119 or MTH 108 or concurrently.  
Engineering graphics, descriptive geometry, freehand sketching, graphical, numerical and computer-based 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. 4(4-0) MTH 215 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 I**  
Fall, Winter, Spring. 4(4-0) MTH 210 concurrently. MTH 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) MTH 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. 3(3-0) MMM 160, COMP 120 or approval of department.  
Use of computer controlled display systems for the solution of multidimensional problems.

255. **Manufacturing Processes**  
Fall. 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. Approved through Winter 1986.

306. **Mechanics II**  
Fall, Winter, Spring. 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 Thermodynamics**  
(3-3) Fall, Winter, Spring. 4(4-0) CEM 152 or approval of department.  

340. **Computer Aided Manufacturing**  
(M E 341) Fall, Winter, Spring. 3(4-2) CEM 152 or CEM 151 or CEM 153 or CEM 251 or LBS 184. Interdepartmental with the Department of Computer Science.  