

Descriptions—Mechanical Engineering of Courses

852. Intermediate Control Systems

Spring. 3(3-0) P: ME 451.

Design of controllers for dynamic systems in mechanical engineering. Modeling, analysis and simulation.

855. Digital Data Acquisition and Control

Spring of odd years. 3(2-3) P: ME 451.

Real-time digital measurement and control programming for mechanical engineering systems. Analog-to-digital and digital-to-analog converters, timer/counters, and instrument interfaces. Open-loop and closed-loop control. Laboratory projects.

857. Modeling and Simulation of Dynamic Systems

Fall. 3(3-0) P: ME 451.

Energy-based methods for modeling dynamic engineering components and systems. Systematic formulation of nonlinear state-space equations. Qualitative aspects of response: equilibrium points, linearization. Simulation techniques and design projects.

860. Theory of Vibrations

Fall. 3(3-0) Interdepartmental with Materials Science and Mechanics.

Discrete systems and continua. Analytical mechanics. Variational principles. Modal analysis. Function spaces. Eigenfunction expansions. Integral transforms. Stability. Approximations. Perturbations.

863. Nonlinear Vibrations

Spring of even years. 3(3-0) P: ME 461.

Perturbation methods. Weakly nonlinear partial and ordinary differential equations. Modal interactions, internal tuning, saturation, sub/super/combination resonances, jump phenomenon. Nonlinear normal modes.

871. Elastodynamics of Machinery and Robotic Systems

Fall of even years. 3(3-0)

Rigid-body kinematic analysis. Linkage synthesis. Variational formulations, nonlinear phenomena, composites and smart materials.

875. Optimal Design of Mechanical Systems

Spring of even years. 3(3-0) P: ME 461.

Optimal design for static and dynamic response of mechanical and structural systems. Necessary and sufficient conditions for optimality. Discrete and continuous parameter problems. Sensitivity of response to design variations. Algorithms.

892. Parameter Estimation

Fall of odd years. 3(3-0) P: STT 421 or STT 441.

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

898. Master's Project Research

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 7 credits in all enrollments for this course. R: Open only to master's students in the Mechanical Engineering major. Approval of department.

Master's degree Plan B individual student project: original research, research replication, or survey and reporting on a topic such as system design and development, or system conversion of installation.

899. Master's Thesis Research

Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 24 credits in all enrollments for this course.

913. Advanced Heat Conduction

Fall of even years. 3(3-0) P: ME 812 or MTH 849.

Inverse and ill-posed problems in heat transfer: function estimation, regularization, and adjoint methods in conduction.

930. Selected Topics in Fluid Mechanics

Fall. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: ME 830.

Current topics in fluid mechanics will be presented.

940. Selected Topics in Thermal Science

Spring. 1 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course. P: ME 812, ME 814, ME 816. R: Open only to Mechanical Engineering majors.

Conduction, convection, radiation, phase change and interactive combined modes of heat transfer. Mass transfer. Irreversible thermodynamics.

960. Selected Topics in Vibrations

Fall. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: ME 860.

Current topics of interest to the student and faculty.

961. Nonlinear Dynamics and Chaos

Fall of even years. 3(3-0) P: (ME 857 or ME 860 or ECE 826 or MTH 441)

Qualitative theory of dynamical systems applied to physical system models. Bifurcation theory for continuous and discrete-time systems, chaos, the Smale horseshoe, Melnikov's method, and nonlinear data analysis.

990. Independent Study in Mechanical Engineering

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.

Individualized study of a current problem in mechanical engineering.

999. Doctoral Dissertation Research

Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 72 credits in all enrollments for this course.

MEDICAL TECHNOLOGY

MT

Medical Technology Program College of Natural Science

212. Fundamentals of Laboratory Analysis

Fall, Summer. 3(3-0) P: (MTH 103 or MTH 116 or LBS 117) RB: (BS 111L)

Chemical, biological and instrumental concepts in laboratory analyses: quality assurance, laboratory mathematics, safety, health care systems and regulatory issues.

213. Application of Clinical Laboratory Principles

Fall, Summer. 1(0-3) P: (MT 212 or concurrently) RB: (BS 111L) R: Open only to students in Clinical Laboratory Sciences or Medical Technology or Human Biology major or LBS Medical Technology coordinate major.

Lab safety and standards of good laboratory practice including specimen handling and processing. Application of technologies and techniques to the performance of clinical diagnostic testing.

414. Clinical Chemistry I: Laboratory Analysis and Practice

Spring. 3(3-0) P: (STT 200 or STT 201 or STT 231 or STT 351 or STT 421) (MT 212 and MT 213) RB: (PHY 231 And PHY 232)

Concepts and principles of analytic methods commonly used in the clinical laboratory are presented. Emphasis on qualitative and quantitative features of instrumental analysis. Issues of QC, QA, method evaluation and standards of laboratory practice.

415. Clinical Chemistry and Body Fluid Analysis Laboratory

Spring. 1(0-3) P: (MT 213) R: Open only to students in the Clinical Laboratory Sciences major. C: MT 414 concurrently.

Quantitative analysis of blood and body fluids. Spectrophotometry, electrophoresis, chromatography, enzymatic assays, and immunoassays.

416. Clinical Chemistry II: Pathophysiology and Body Fluid Analysis

Fall. 5(5-0) P: (MT 212) and (BCH 401 or BCH 462) and (PSL 250) or (PSL 431 and PSL 432) RB: (MT 414)

Correlation of laboratory test results with normal physiology and biochemistry and with disease states. Emphasis on metabolic and endocrine systems, and acquired and inherited diseases. Therapeutic drug monitoring, toxicology and urinalysis.

422. Hematology and Hemostasis

Fall. 4(4-0) P: (MT 212 or concurrently) (PSL 250) RB: (BS 111 And BS 111L And BCH 401)

Structure and function of normal blood cells with changes seen in benign and malignant diseases and acquired and hereditary disorders. Mechanisms of hemostasis, fibrinolysis and hemostatic control.

423. Hematology and Hemostasis Laboratory

Fall. 1(0-3) P: (MT 213 or concurrently) R: Open only to students in the Clinical Laboratory Sciences major. C: MT 422 concurrently.

Diagnostic assessment of blood cells and hemostatic function.

432. Clinical Immunology and Immunochemistry

Spring. 5(5-0) P: (MT 212 and BS 111 and BS 111L) (MT 422) RB: (PSL 250)

Cellular and humoral immunity and diseases of immunity. Clinical serology and immunology, blood group serology, and transfusion practices.

433. Clinical Immunology and Immunoematology Laboratory
Spring. 1(0-3) P: (MT 213 and MT 432 or concurrently) R: Open only to students in the Clinical Laboratory Sciences major.

Immunologic methods for disease detection. Methods of blood typing and pre-transfusion testing.

442. Education and Management in the Clinical Laboratory

Fall. 3(3-0) P: (MTH 116) or (MTH 103 and MTH 104) or (LBS 117) (STT 200 or STT 201 or STT 231 or STT 351 or STT 421) R: Open only to students in the Clinical Laboratory Sciences major.

Basic principles and concepts in education and management in clinical laboratories. Systematic approach to instructional design, delivery and evaluation. Principles of leadership, personnel management, fiscal management, and regulatory compliance.

454. Problem Solving Across Clinical Laboratory Disciplines (W)

Spring. 4(4-0) P: (MT 414 and MT 416 and MT 422 and MT 432 and MIC 463) RB: (MT 442) R: Open only to seniors in the Clinical Laboratory Sciences major.

Problem-oriented approach integrating topics from previous courses in clinical laboratory sciences. Emphasis on published primary research literature and its critical appraisal.

455. Integrating Clinical Laboratory Science Discipline (W)

Fall, Spring. 2(2-0) P: (MT 422 and MT 432 and MT 414 and MT 416 or concurrently and MIC 463 or concurrently) and completion of Tier 1 writing requirement. R: Open only to seniors in the Medical Technology major or LBS Medical Technology coordinate major.

Problem oriented approach integrating topics from Medical Technology courses with emphasis on writing experience in the major and on critical thinking skills.

471. Advanced Clinical Chemistry Laboratory

Fall, Spring, Summer. 3 credits. P: (MT 454)

Application and integration of theory and technical skills in clinical chemistry and biochemistry.

472. Advanced Clinical Chemistry

Fall, Spring, Summer. 1 credit. R: Open only to seniors in the Clinical Laboratory Sciences major. C: MT 471 concurrently.

Theoretical aspects of clinical chemistry, chemical and biochemical reactions, statistical analysis, and pathophysiologic relationships. Integration of cognitive material with clinical laboratory test results.

473. Advanced Clinical Hematology and Body Fluids Laboratory

Fall, Spring, Summer. 4 credits. P: (MT 454)

Application and integration of theory and technical skills in hematology, hemostasis, and body fluid analysis.

474. Advanced Clinical Hematology and Body Fluids

Fall, Spring, Summer. 1 credit. R: Open only to seniors in the Clinical Laboratory Sciences major. C: MT 473 concurrently.

Theoretical aspects of advanced hematology, hemostasis and body fluid analysis. Integration of cognitive material with clinical laboratory test results.

475. Advanced Clinical Immunology and Immunoematology Laboratory

Fall, Spring, Summer. 2 credits. P: (MT 454)

Application and integration of theory and technical skills in immunology and immunoematology.

476. Advanced Clinical Immunology and Immunoematology

Fall, Spring, Summer. 1 credit. R: Open only to seniors in the Clinical Laboratory Sciences major. C: MT 475 concurrently.

Theoretical aspects of immunology and immunoematology. Integration of cognitive material with clinical laboratory test results.

477. Advanced Clinical Microbiology Laboratory

Fall, Spring, Summer. 3 credits. P: (MT 454)

Application and integration of theory and technical skills in clinical microbiology and infectious disease.

478. Advanced Clinical Microbiology

Fall, Spring, Summer. 1 credit. R: Open only to seniors in the Clinical Laboratory Sciences major. C: MT 477 concurrently.

Theoretical aspects of clinical microbiology and infectious disease. Integration of cognitive material with clinical laboratory test results.

495. Directed Study

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to students in the Clinical Laboratory Sciences or Medical Technology major or LBS Medical Technology coordinate major.

Faculty directed study including assigned readings, reviews of appropriate scientific periodicals, research and laboratory experience.

801. Medical Technology Seminar

Spring. 1(1-0) A student may earn a maximum of 2 credits in all enrollments for this course. R: Open only to graduate students in Clinical Laboratory Sciences.

Current research topics in clinical laboratory sciences.

810. Research Planning in the Clinical Laboratory Sciences

Fall of odd years. 2(2-0) R: Open only to graduate students in Clinical Laboratory Sciences.

Directed reading and discussions on research methodology and research funding. Written and oral proposal presentations.

812. Advanced Clinical Chemistry

Spring of even years. 2(2-0) Interdepartmental with Pathology. P: BCH 462, MT 414, MT 416.

Biochemical basis of selected pathologic conditions including inborn errors of metabolism, endocrine and other genetic disorders. Emphasis on current diagnostic techniques.

820. Advanced Human Hematology

Fall of even years. 2(2-0) Interdepartmental with Pathology. P: MT 422.

Selected topics in hematology including pathogenesis, mechanisms and morphological pictures. Emphasis on laboratory tests and interpretation of results.

830. Concepts in Molecular Biology

Spring of odd years. 2(2-0) Interdepartmental with Pathology. P: One course in Biochemistry or concurrently.

Techniques and theories of molecular biology, nucleic acid synthesis and isolation, enzymatic digestion and modification, electrophoresis, hybridization, amplification, library construction, and cloning.

831. Clinical Application of Molecular Biology

Summer. 1(2-0) P: (MT 830)

The utilization of molecular biology principles and techniques as a tool to improving diagnostic outcomes within specific clinical laboratory science disciplines.

831L. Molecular Pathology Laboratory

Summer. 2(0-4) P: (MT 831 or concurrently)

Equipment operation, DNA extraction and measurement, electrophoresis, hybridization and transfers, amplification and detection including SSOP, ARMS, RFLP and SCP as well as automated sequencing will be covered with specific emphasis on clinical applications.

840. Advanced Hemostasis

Fall of odd years. 2(2-0) Interdepartmental with Pathology. P: BCH 462, MT 422.

Physiology, pathophysiology, and laboratory evaluation of hemostatic disorders.

890. Selected Problems in Clinical Laboratory Science

Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in Clinical Laboratory Sciences.

Non-thesis research for Plan B master's students.

899. Master's Thesis Research

Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Open only to graduate students in Clinical Laboratory Sciences.

MEDICINE

MED

Department of Medicine College of Human Medicine

608. Internal Medicine Clerkship

Fall, Spring, Summer. 2 to 18 credits. A student may earn a maximum of 42 credits in all enrollments for this course. P: FMP 602. R: Open only to graduate-professional students in College of Human Medicine.

Community hospital clerkship. Interviewing skills, history, physical examination. Problem solving and therapy. Care of the whole patient leading to independence in patient management.