 MLS: Medical Laboratory Science Courses

Courses

MLS 3031  Introduction to Clinical Laboratory Science
2 sh (may not be repeated for credit)
Survey course in clinical laboratory sciences. Introduction to the profession, scope of practice, state/federal laws and regulations, code of ethics, and career opportunities. Classroom instruction and field trips to various sections in a clinical laboratory: hematology, clinical chemistry, diagnostic microbiology, immunohematology, serology, and molecular diagnostics.

MLS 3194  Clinical Genetics
3 sh (may not be repeated for credit)
Prerequisite: BSC 1085 AND BSC 1086 AND BSC 2010 AND CHM 2046
This course introduces the student to prokaryotic and eukaryotic genomes and their genetic analysis. The course will look at human disease and principles of inheritance as well as mechanisms of antibiotic resistance in bacteria. The course introduces methodologies used in clinical laboratories to evaluate disease.

MLS 3621  Clinical Biochemistry
3 sh (may not be repeated for credit)
Prerequisite: CHM 2210
The course is a first in a series of Clinical Chemistry courses for the Medical Laboratory Sciences student. The course is divided into 5 major sections. Nucleic acids, their composition and production; Carbohydrates, their composition and production; Lipids, their composition and function; Proteins, their composition and function. Each macromolecule section will include discussions about diseases associated with deficiencies or derangements. The methods section deals with principles of instrumentation used in the clinical laboratory, such as spectrophotometry, fluorescence, nephelometry, HPLC, electrophoresis, immunoassay, PCR, and mass spectrometry.

MLS 3905  Directed Study
1-12 sh (may not be repeated indefinitely for credit)

MLS 4191  Molecular Diagnostics
3 sh (may not be repeated for credit)
Prerequisite: BCH 3033 AND PCB 3063
Co-requisite: MLS 4191L
This course offers fundamentals of clinical diagnosis and management of disease by molecular biology laboratory methods. Two broad areas in the current state of the art will be addressed: molecular diseases/variants and molecular methods to diagnose and monitor disease. Disorders due to inherited or acquired molecular defects such as errors of metabolism, hemoglobinopathies, leukemia, and cystic fibrosis are discussed. Principles and procedures for the diagnosis and management of infectious diseases by molecular methods are also included. The discussion of molecular approaches to diagnosing and monitoring these diseases will span the conventional methods of PCR, gel electrophoresis and Southern Blotting to semi-automated methods of TMA, LCR and Real-time PCR. A survey of molecular diagnostic methods currently available in various sections of a clinical laboratory is included. Material and Supply Fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.

MLS 4191L  Molecular Diagnostics Laboratory
1 sh (may not be repeated for credit)
Prerequisite: MLS 4625 AND MLS 4630
Co-requisite: MLS 4191
Methods for specimen collection and handling, contamination control, amplification and detection of genetic material from humans and microorganisms. Methodologies include conventional PCR, electrophoresis for DNA and proteins, real time PCR, densitometry, Southern Blot and Western Blot techniques. Material and Supply fee will be assessed. Equipment fee will be assessed. Permission is required.

MLS 4193C  Molecular Diagnostics for the MLT to MLS track
4 sh (may not be repeated for credit)
Prerequisite: BCH 3033 AND PCB 3063
This course covers the fundamentals of clinical diagnosis and management of disease by molecular biology laboratory methods. Two broad areas in the current state of the art are addressed: molecular diseases/variants and molecular methods to diagnose and monitor disease. Disorders due to inherited or acquired molecular defects such as errors of metabolism, hemoglobinopathies, leukemia, and cystic fibrosis are discussed. Principles and procedures for the diagnosis and management of infectious diseases by molecular methods are also included. The discussion of molecular approaches to diagnosing and monitoring these diseases will span the conventional methods of PCR, gel electrophoresis and Southern Blotting to semi-automated methods of TMA, LCR and Real-time PCR. A survey of molecular diagnostic methods currently available in various sections of a clinical laboratory is included. Students will perform virtual laboratory activities and interpret laboratory data. Permission is required.

MLS 4220  Urinalysis/Body Fluids I
1 sh (may not be repeated for credit)
Co-requisite: MLS 4220L
Teaches the entry level clinical laboratory scientist the physiology, routine testing and interpretation for the following body fluids: urine, cerebrospinal fluid, semen, sweat, serous fluids (peritoneal, pleural, pericardial, synovial), and dialysates. Correlation of lab findings to various disease conditions is stressed. Material and Supply Fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.
MLS 4220L  Urinalysis/Body Fluids I
1 sh (may not be repeated for credit)
Co-requisite: MLS 4220

Corresponding Lab for Urinalysis / Body Fluids I.

MLS 4221C  Urinalysis/Body Fluids for the MLT to MLS track
3 sh (may not be repeated for credit)
Prerequisite: BSC 1085 AND BSC 1086

This course teaches the physiology, routine testing and interpretation for the following body fluids: urine, cerebrospinal fluid, semen, sweat, serous fluids (peritoneal, pleural, pericardial, synovial), and dialysates. Correlation of lab findings to various disease conditions is stressed. Students will perform virtual laboratory activities and interpret laboratory data. Permission is required.

MLS 4305  Hematology I
3 sh (may not be repeated for credit)
Prerequisite: PCB 2131
Co-requisite: MLS 4305L

Study of production, maturation and morphology of normal and abnormal human blood cells. Pathological changes in morphology, cytochemistry and distribution of cells in peripheral blood and bone marrow. Manual and automated methods for blood cell counts, hemoglobin measurement and other hematology parameters. Purpose, principle and clinical value of routine and special procedures. Quality control and quality assurance processes in a clinical hematology laboratory. Material and Supply Fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.

MLS 4305L  Hematology I Lab
1 sh (may not be repeated for credit)
Co-requisite: MLS 4305

Corresponding lab for Hematology I.

MLS 4306C  Hematology for the MLT to MLS track
4 sh (may not be repeated for credit)
Prerequisite: BSC 1086 AND MLS 3194

Study of production, maturation and morphology of normal and abnormal human blood cells. Pathological changes in morphology, cytochemistry and distribution of cells in peripheral blood and bone marrow. Discussion and interpretation of manual and automated methods for blood cell counts, hemoglobin measurement and other hematology parameters. Purpose, principle and clinical value of routine and special procedures. Quality control and quality assurance processes in a clinical hematology laboratory. Correlation of lab findings to various disease conditions is stressed. Students will perform virtual laboratory activities and interpret laboratory data. Permission is required.

MLS 4334C  Hemostasis and Thrombosis for the MLT to MLS track
3 sh (may not be repeated for credit)
Prerequisite: MCB 3020/L
Co-requisite: MLS 4334L

Role of blood vessels, platelets and coagulation factors in normal hemostasis. Platelet morphology and function, laboratory tests for evaluation of platelets, and platelet disorders. Study of coagulation factors, coagulation pathways, and inherited and acquired coagulation disorders. Normal fibrinolysis and disorders of fibrinolysis. Physiologic and pathologic coagulation inhibitors and their role in normal and abnormal hemostasis. Diagnosis and management of hemorrhagic diseases. Thrombotic disorders and their management by anticoagulant therapy and fibrinolytic therapy. Material and Supply Fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.

MLS 4334L  Hemostasis and Thrombosis Lab
1 sh (may not be repeated for credit)
Co-requisite: MLS 4334

Corresponding lab for Hemostasis and Thrombosis.

MLS 4335C  Hemostasis and Thrombosis for the MLT to MLS track
3 sh (may not be repeated for credit)
Prerequisite: MCB 3020/L
Co-requisite: MLS 4334L

Role of blood vessels, platelets and coagulation factors in normal hemostasis. Platelet morphology and function, laboratory tests for evaluation of platelets, and platelet disorders. Study of coagulation factors, coagulation pathways, and inherited and acquired coagulation disorders. Normal fibrinolysis and disorders of fibrinolysis. Physiologic and pathologic coagulation inhibitors and their role in normal and abnormal hemostasis. Diagnosis and management of hemorrhagic diseases. Thrombotic disorders and their management by anticoagulant therapy and fibrinolytic therapy. Correlation of lab findings to various disease conditions is stressed. Students will perform virtual laboratory activities and interpret laboratory data. Permission is required.

MLS 4460  Diagnostic Microbiology I
3 sh (may not be repeated for credit)
Prerequisite: MCB 3020/L
Co-requisite: MLS 4460L

Study of bacteria associated with infectious diseases. Includes microbial taxonomy, physiology, genetics and host-parasite relationships as they apply to clinical microbiology. Pathogens of particular organ systems, pathogenesis of infectious disease, clinical manifestations, etiology and epidemiology of disease are covered. Interpretation of test results and clinical relevance are taught utilizing case studies. Permission is required. Equipment Fee will be assessed.

MLS 4460L  Diagnostic Microbiology I Laboratory
1 sh (may not be repeated for credit)
Prerequisite: MCB 3020/L
Co-requisite: MLS 4460

Methods for specimen collection, handling and processing of human tissues and body fluids for isolation and identification of bacteria. Conventional and rapid identification methods for clinically significant bacteria, principles of automation, susceptibility testing, infection control, and quality assurance procedures are included. Material and supply fee will be assessed. Permission is required.
MLS 4461C   Diagnostic Microbiology for the MLT to MLS track
4 sh (may not be repeated for credit)
Prerequisite: MCB 3020
Study of bacteria associated with infectious diseases. Includes microbial taxonomy, physiology, genetics and host-parasite relationships as they apply to clinical microbiology. Pathogens of particular organ systems, pathogenesis of infectious disease, clinical manifestations, etiology and epidemiology of disease are covered. Students will perform virtual laboratory activities and interpret laboratory data. Permission is required.

MLS 4462   Medical Microbiology
3 sh (may not be repeated for credit)
Prerequisite: MCB 3020/L
Co-requisite: MLS 4462L
Study of medical microbiology covering areas of clinical parasitology, mycobacteriology, clinical virology, clinical mycology, and miscellaneous and emerging pathogens. Material and Supply Fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.

MLS 4462L   Medical Microbiology Lab
1 sh (may not be repeated for credit)
Co-requisite: MLS 4462
Corresponding lab for Medical Microbiology.

MLS 4463C   Medical Microbiology for the MLT to MLS track
4 sh (may not be repeated for credit)
Prerequisite: MCB 3020
Study of medical microbiology covering areas of clinical parasitology, mycobacteriology, clinical virology, clinical mycology, and miscellaneous and emerging pathogens. Students will perform virtual laboratory activities to identify parasites, fungi, and to interpret laboratory data. Permission is required.

MLS 4505   Clinical Immunology
3 sh (may not be repeated for credit)
Prerequisite: BCH 3033 AND PCB 3063
Co-requisite: MLS 4505L
The course is divided into 3 major sections. The immune system and its components, complement, antibody and antigens, cellular and humoral immunity are described. Immune-mediated diseases, such as AIDS, Hemolytic Disease of the Newborn and Lupus Erythematos are discussed. Diseases that are diagnosed using serologic methods, such as syphilis, infectious mononucleosis, and measles are discussed. Current methodologies used in the medical serology and immunodiagnostic laboratory are reviewed. Students will perform virtual laboratory activities and interpret serologic and immunologic results, such as agglutination, precipitation, immunofluorescence, ELISA, and antibody elution and detection methods. Permission is required.

MLS 4505L   Clinical Immunology Lab
1 sh (may not be repeated for credit)
Co-requisite: MLS 4505
The laboratory section is a co-requisite to Clinical Immunology. The course reinforces laboratory safety and sample collection and processing, and gives the student practical experience using serologic and immunologic techniques, such as agglutination, precipitation, immunofluorescence, ELISA, and antibody elution and detection methods. Material and Supply Fee will be assessed. Equipment Fee will be assessed. Permission is required.

MLS 4506C   Clinical Immunology for the MLT to MLS track
4 sh (may not be repeated for credit)
Prerequisite: MLS 3194 AND MLS 3621
The course is divided into 3 major sections. The immune system and its components, complement, antibody and antigens, cellular and humoral immunity are described. Immune-mediated diseases, such as AIDS, Hemolytic Disease of the Newborn and Lupus Erythematos are featured. Diseases that are diagnosed using serologic methods, such as syphilis, infectious mononucleosis, and measles are discussed. Current methodologies used in the medical serology and immunodiagnostic laboratory are reviewed. Students will perform virtual laboratory activities and interpret serologic and immunologic results, such as agglutination, precipitation, immunofluorescence, ELISA, and antibody elution and detection methods. Permission is required.

MLS 4550   Immunohematology I
3 sh (may not be repeated for credit)
Co-requisite: MLS 4550L
Fundamentals of blood group immunology. Pre-transfusion testing of patient blood and donor blood for compatibility. Antigens, antibodies and their properties in clinically significant blood group systems. ABO & RH typing, compatibility testing and special tests. Antibody screen and identification. Autoimmune Hemolytic Anemia and Hemolytic Disease of the Newborn. Transfusion therapy, hazards of transfusion and investigation of transfusion reactions. Donor selection, collection of donor blood and testing for infectious agents. Preparation, storage and utilization of blood components. Regulations, medicolegal and ethical aspects of transfusion services. Material and Supply Fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.

MLS 4550L   Immunohematology I Lab
1 sh (may not be repeated for credit)
Co-requisite: MLS 4550
Corresponding lab for Immunohematology I.

MLS 4552C   Immunohematology for the MLT to MLS track
4 sh (may not be repeated for credit)
Prerequisite: BCH 3033 AND PCB 3063
MLS 4625  Clinical Chemistry I  
2 sh (may not be repeated for credit)  
Prerequisite: BCH 3033  
Co-requisite: MLS 4625L  
Introduction to the basic principles and procedures of clinical chemistry. Lecture and lab devoted to chemical analysis of blood and other body fluids. Lab safety, specimen collection/handling/storage; lab mathematics, basic lab instrumentation and automation, data management, reference range determination and quality control monitoring will be stressed throughout the course. This class will discuss the pathophysiology and diagnostic testing related to the metabolism of carbohydrates and lipids, assessments of diabetes and diabetic risk, assessments of cardiac risk and monitoring and prognosis following myocardial infarction. Methodologies discussed include spectrophotometry, immunodiagnostics and computer generated analyses. Students will participate in class discussions about recent research in clinical chemistry which will be presented in the forms of abstracts, research papers and figures. Material and Supply fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.

MLS 4625L  Clinical Chemistry I Lab  
1 sh (may not be repeated for credit)  
Co-requisite: MLS 4625  
Lab devoted to the chemical analysis and interpretation of blood and other bodily fluids. Selected experiments in diabetes and cardiovascular disease risk assessment and monitoring. Safety, instrumentation and quality control will be stressed. Methodologies discussed include spectrophotometry, immunodiagnostics, and computer generated analyses. Material and Supply fee will be assessed. Permission is required.

MLS 4626C  Clinical Chemistry I for the MLT to MLS  
3 sh (may not be repeated for credit)  
Prerequisite: BCH 3033 AND CHM 2210  
Review of the basic principles and procedures of clinical chemistry. Lecture and case studies devoted to chemical analysis of blood and other body fluids. Lab safety, specimen collection/handling/storage, lab mathematics, basic lab instrumentation and automation, data management, reference range determination and quality control monitoring will be stressed throughout the course. This class will discuss the pathophysiology and diagnostic testing related to the metabolism of carbohydrates and lipids, assessments of diabetes and diabetic risk, assessments of cardiac risk and monitoring and prognosis following myocardial infarction. Methodologies discussed include spectrophotometry, immunodiagnostics and computer generated analyses. Students will participate in class discussions about recent research in clinical chemistry, which will be presented in the forms of abstracts, research papers and figures. Students will perform virtual laboratory activities and to interpret laboratory data. Permission is required.

MLS 4630  Clinical Chemistry II  
2 sh (may not be repeated for credit)  
Prerequisite: MLS 4625/L  
Co-requisite: MLS 4630L  
This course continues where Clinical Chem I left off, discussing kidney function, electrolytes, blood gases, acid-base balance, mineral metabolism, enzyme measurement, liver function studies, and pancreatic function assessment. It also includes the more esoteric tests involved in testing endocrine function, therapeutic drug monitoring, toxicology, tumor markers, and testing during pregnancy. Methodology is primarily immunoassay, potentiometry and spectrophotometry. Reading and disseminating research in the discipline is emphasized in the format of a journal club. Material and Supply fee will be assessed for corresponding lab. Equipment Fee will be assessed. Permission is required.

MLS 4630L  Clinical Chemistry II Lab  
1 sh (may not be repeated for credit)  
Prerequisite: MLS 4625/L  
Co-requisite: MLS 4630  
This course covers laboratory procedures evaluating kidney and liver function, electrolytes, acid-base balance, mineral metabolism, enzyme measurements, toxicology and testing during pregnancy. Methodology is primarily immunoassay, potentiometry and spectrophotometry. Material and Supply fee will be assessed. Permission is required.

MLS 4631C  Clinical Chemistry II for the MLT to MLS  
3 sh (may not be repeated for credit)  
Prerequisite: MLS 4625  
This course covers laboratory procedures evaluating kidney and liver function, electrolytes, blood gases, acid-base balance, mineral metabolism, enzyme measurement, liver function studies, and pancreatic function assessment. It also includes the more esoteric tests involved in testing endocrine function, therapeutic drug monitoring, toxicology, tumor markers, and testing during pregnancy. Methodology is primarily immunoassay, potentiometry and spectrophotometry. Reading and disseminating research in the discipline is emphasized in the format of a journal club.

MLS 4704  Clinical Management Portfolio for the MLT to MLS track  
3 sh (may not be repeated for credit)  
Prerequisite: MLS 4625  
Fundamentals of clinical laboratory management, research and educational methodologies are covered. Students are introduced to clinical laboratory operations including financial and human resource management, marketing of laboratory services, communication with other health care professionals, laboratory information systems, research design and compliance with regulatory agencies. The student will provide evidence of adequate training or work experience in Hematology, Clinical Chemistry, Microbiology and Blood Bank equivalent to an MLS clinical internship and produce this in a professionally developed portfolio. The student will produce a professionally written case study that is suitable for publication. Meets Gordon Rule Writing Requirement.
MLS 4705   Special Clinical Topics
1 sh (may not be repeated for credit)
Fundamentals of clinical laboratory management, supervision and educational methodologies are covered. Students are introduced to clinical laboratory operations in areas of financial and human resource management, marketing of laboratory services, communications with other health care professionals, laboratory information systems and regulatory compliance with applicable regulatory agencies. Other special clinical topics related to education and training, lab safety, HIV / AIDS, prevention of medical errors, professional ethics and career planning are presented.

MLS 4820L   Clinical Chemistry III
4 sh (may not be repeated for credit)
Prerequisite: MLS 4625 AND MLS 4630
Application of clinical chemistry principles and techniques presented in Clinical Chemistry I and II. Supervised practice in the hospital laboratory. Permission is required.

MLS 4821L   Diagnostic Microbiology II
4 sh (may not be repeated for credit)
Prerequisite: MLS 4460 AND MLS 4462
Application of clinical microbiology principles and techniques presented in MLS 4460. Supervised practice in an affiliated hospital laboratory. Includes manual and automated identification and susceptibility testing, specimen collection and processing, quality assurance, and laboratory organization. Permission is required.

MLS 4822L   Hematology II
4 sh (may not be repeated for credit)
Prerequisite: MLS 4305/L
Application of Hematology I. Advanced practical training in automated hematology instrumentation, routine and special procedures in hematology lab, and practice of quality control methods, maintenance and trouble shooting of clinical hematology equipment. Training includes all aspects of clinical lab medicine in a modern hematology / coagulation lab and prepares the student to assume responsibility as a medical technologist. Permission is required.

MLS 4823L   Immunohematology II
4 sh (may not be repeated for credit)
Prerequisite: MLS 4550/L
Continuation of Immunohematology I, at one of the affiliate hospitals. Advanced practical training in modern blood banking and transfusion services at the hospital. Training includes practice and performance, under supervision, of all the procedures involving pre-transfusion tests on patient's blood, selection of donor blood, compatibility determination, problem solving, release of suitable blood/blood components for transfusion therapy. Permission is required.

MLS 4824L   Special Clinical Methods
2 sh (may not be repeated for credit)
Supervised practice in a hospital laboratory. Special methods in clinical laboratory sciences, including non-routine (special) chemistry procedures and methods in immunodiagnostics, mycobacteriology and clinical mycology. Permission is required.

MLS 4825L   Urinalysis/Body Fluids II
2 sh (may not be repeated for credit)
Supervised practice in a hospital laboratory in the analysis of urine and other body fluids; techniques in parasitology and phlebotomy procedures. Permission is required.

MLS 4905   Directed Study
1-12 sh (may be repeated indefinitely for credit)