

Course Descriptions

MLS401 - Clinical Laboratory Skills (2.5): Lecture includes theoretical aspects of phlebotomy including the anatomy and physiology of the vascular system and practical techniques; principles and applications of ethical practice and professionalism including professional behavior when dealing with patients, families, and employees and co-workers in the healthcare environment; theoretical and practical basis of analytical techniques; laboratory mathematics and data handling; principles of laboratory instrumentation and methodologies; quality control, quality assurance and quality improvement including pre-analytical, analytical, and post-analytical factors that impact the quality of laboratory services, statistical and non-statistical quality control, and systems of continuous performance improvement; and safety including the use of personal protective equipment, universal precautions, and regulatory requirements and standards. Students review analytical skills and concepts necessary for accurate laboratory analysis through lectures, self-instructional modules and competency assessment exercises. Laboratory experience provides the opportunity to perform phlebotomy and apply analytical techniques.

MLS402 - Chemistry (5.0), MLS403 - Clinical Chemistry (3.5): Lecture categories include analytical chemistry and physiological biochemistry. Normal and abnormal physiology, test interpretation, statistical quality control and interpretation, principles of methodologies, test development and performance of assays are included. Laboratory sections address performance of assays, test result interpretation, problem-solving, troubleshooting, and mechanisms for continuous assessment of laboratory performance. Laboratory rotations provide intensive study of test procedures and practical application of lecture topics. Areas of instruction and student participation include manual chemistry, spectrophotometry, flame photometry, radioisotope techniques, electrophoresis, single and multi-channel discrete analysis systems, blood gas analysis, drug monitoring and computer controlled instrumentation. This clinical rotation may also include immunology practicum.

MLS404 - Clinical Lab Techniques (1.0): Clinical practicum addressing phlebotomy principles and practice. Students review theoretical and technical information in this area and participate in an intense clinical rotation which focuses upon achievement of clinical competency in phlebotomy. Some other general lab procedures such as specimen processing may also be addressed on a site specific basis.

MLS406 - Microbiology (5.0), MLS407 - Clinical Microbiology (4.5): Lecture includes study of bacteria that are pathogenic or potentially pathogenic to humans with emphasis on principles of testing methodologies, techniques for isolation, identification, and clinical relevance by body site. The course focuses on the identification of routine cultures by body site including associated problem-solving of discrepant culture results and troubleshooting of unexpected assay performance. The course also includes lectures on viruses, chlamydia, rickettsiae, and general bacteriology, including methods for antibiotic susceptibility testing, sterilization and proper collection and transport of specimens as well as the gram stain. The laboratory rotations involve in-depth study of the different techniques and methods used for the isolation and identification of bacteria, fungi and parasites considered to be of human pathogenic significance. Testing for antibiotic susceptibility of bacteria, preparation of culture media, quality control, performance improvement, and the safety procedures in the lab to inhibit the spread of infection are emphasized. This clinical rotation may also include immunology practicum.

MLS410 - Parasitology (2.5): Lecture and laboratory sessions cover the major groups of medically important parasites, including amoebae, helminthes and blood protozoa. Emphasis is placed on morphologic identification of pathogenic organisms and the ability to distinguish these from non-pathogenic genera.

MLS411 - Mycology (2.0): Lecture and laboratory sessions cover the medically important fungi including yeast, dermatophytes, and opportunistic and dimorphic fungi. Emphasis is placed on morphologic identification, both macroscopically and microscopically, of pathogenic organisms as well as saprophytes which are commonly encountered in clinical specimens.

MLS412 - Hematology (5.0), MLS413 - Clinical Hematology (3.5): This course is an in depth study of the formation of blood cells and the pathogenesis and mechanisms of hematologic disorders. Topics include: hematopoiesis, proliferative disorders, normal and abnormal hemoglobins, anemias and leukemias. Analytical methodologies, as well as the correlation of tests with disease state, hematopoiesis and identification of the maturation sequence as seen in peripheral blood and bone marrow, maintenance and quality control of instrumentation as well as back up manual methods are all part of this course sequence. Emphasis is placed on the performance of routine assays as well as the problem-solving of discrepant results and troubleshooting of methodologies. This clinical rotation also includes urinalysis, coagulation and body fluid practicum. Emphasis is placed on instrument maintenance, statistical quality control, and result interpretation. Practice with routine workflow, specimen processing, reading of differential morphology and data interpretation are attained during this rotation.

MLS416 - Coagulation (2.5): This course is an in depth study of the hemostatic mechanism. Clinical practice includes study of coagulation in the intrinsic and extrinsic systems, as well as platelet and vessel function. Analytical methodologies for the detection of abnormalities is studied for all systems.

MLS417 - Immunology/Serology (2.5): This course includes basic immunology, the theory of immunodiagnostics and immunopathology, and the theory of molecular diagnostics and its practical applications. Principles of methodologies in relationship to clinical diagnosis and correlation with human disease are stressed. Assays are performed as they relate to the diagnosis of various clinical processes. Problem solving of discrepant results and troubleshooting of assay performance is stressed through case simulations.

MLS419 - Immunohematology (6.0), MLS420 - Clinical Immunohematology (3.5): Lectures deal with the theoretical aspects of blood group serology. Topics include: human blood groups and their significance, transfusion, donor selection and blood components, antibody detection and identification, quality control, current transfusion practices and recent advances in immunohematology. The laboratory addresses all routine testing in a hospital/blood center setting such as donor screening, blood collection, donor care, processing and storage of blood, proper care and use of equipment and materials, performance of blood group determinations, compatibility testing, antibody identification, pre and post-natal testing of newborns and mothers, follow up of transfusion reactions. Problem-solving and troubleshooting as it relates to patient test results and assay performance is reinforced through case simulations. Interpretation of clinical procedures and results that underlay most student laboratory procedures are studied.

MLS421 - Urinalysis (2.0): Renal anatomy and physiology relating to the formation and content of urine in health and disease. Laboratory experience includes the microscopic and chemical analysis of urine, correlations with normal and abnormal physiology, maintenance and use of instrumentation, and disease correlation.

MLS423 - Body Fluids (1.0): Anatomy and physiology of body sites from which fluids for analysis come (cell counts and differentials, chemical and microbiological). Topics include cerebrospinal fluid, serous fluids, synovial fluid and semen. Laboratory experience includes hematologic analysis of a variety of body fluids, including operation of instrumentation and disease correlation.

MLS424 – Capstone Project - Research (1.0): Activities in research introduce the student to basic techniques in laboratory research including the formulation of research questions and research design and practices. A series of group activities assist students in becoming informed consumers of research. The capstone project in research requires that students formulate a research question, performs a literature search using appropriate reference materials and pursues a pilot project that could serve as a design for a larger research study. The research process culminates in a research poster presented in a formal venue for peers in the clinical laboratory community.

MLS425 – Capstone Project - Management and Supervision (1.5): Students learn basic management theory and the principles and practices of supervision. Topics covered include basic management and health care theory including those aspects of healthcare delivery that most impact laboratory services, basic human resource management, the role and responsibilities of supervision, interpersonal and interdisciplinary communication skills, team building, technical writing, laboratory scheduling and workflow, and financial management. This course culminates in a team directed capstone project in which small groups of students must apply management principles to problems in a simulated lab setting. Student management groups present their findings to a team of managers drawn from the laboratory community.

MLS426 – Capstone Project - Education (1.0): The basics of education for the laboratory professional who may be instructing other lab employees and students, or doing in-service presentations are presented in this course. Students learn to set goals, write objectives, determine content and delivery, write and perform assessments and evaluate instruction. For the capstone project in education, each student must present an educational in-service to a group of practicing laboratory professionals in a clinical setting while demonstrating sound educational principles and design of instruction.

MLS430 - Knowledge Review (1.5): This course serves as a review of clinical laboratory science for the individual preparing for national certification examinations. The major categories of laboratory medicine are addressed and students review major concepts through mini-lectures, case reviews and mock exams.