

Course Descriptions

Summer Semester

MLAB400 – Hematology I: This course presents the structure and function of red blood cells, leukocytes and platelets, and the concepts of hematopoiesis and cell maturation. Basic testing methods including cell and reticulocyte counts, hemoglobin and hematocrit, sedimentation rates, and complete blood count (CBC) reports and indices calculations are covered. Emphasis is on normal differential morphology and its correlation with the CBC report. (Summer 2.5 - Eq. Sem. Hr.)

MLAB401 – Clinical Laboratory Skills: The course covers principles and applications of ethical practice and professionalism, analytical techniques, laboratory mathematics and data handling, laboratory instrumentation and methodologies, specimen collection and handling, safety regulations, quality control, quality assurance and quality improvement including pre-analytical, analytical, and post-analytical factors are also covered. Learners work with statistical and non-statistical quality control within systems of continuous performance improvement; utilize analytical skills and concepts necessary for accurate laboratory analysis, and apply pre-analytical techniques to laboratory case situations within a quality framework. (Summer 3.0 - Eq. Sem. Hr.)

MLAB403 – Chemistry I: Lecture sessions include an introduction to analytical procedures used in chemistry and the physiological chemistry of renal function, water balance, electrolytes, acid base balance and point-of-care techniques. Normal and abnormal physiology, test interpretation, statistical quality control and interpretation, principles of methodologies, test development and performance of assays are included. Laboratory sessions address performance of assays, test result interpretation, problem solving, troubleshooting, and mechanisms for continuous assessment of laboratory performance. (Summer – 1.0 Eq. Sem. Hr.)

MLAB406 – Microbiology I: Lecture sessions include the theoretical and technical aspects of the major categories of medically important bacteria, their relationship to both normal human flora, and the pathogenic organisms found in the clinical setting. The course covers principles of sample preparation and evaluation, rapid testing methods, and basic techniques used in clinical microbiology laboratories. Laboratory sessions cover basic antibiotic susceptibility testing, sterile technique, collection and transport of specimens, gram stain testing and interpretation, and the identification of the major classes of medically important aerobic organisms. (Summer - 2.0 Eq. Sem. Hr.)

MLAB421 – Urinalysis: Lecture sessions cover renal anatomy and physiology as it relates to the formation and content of urine in health and disease. Laboratory experiences include the chemical and microscopic analysis of urine, correlations with normal and abnormal physiology, maintenance and use of instrumentation, and disease correlation. (Summer – 1.5 Eq. Sem. Hr.)

Fall Semester

MLAB407 – Microbiology II: The lecture series emphasizes pathogenic and potentially pathogenic bacteria in humans as well as principles of testing methodologies, techniques for isolation, identification, and clinical relevance by body site. Laboratory techniques focus on the identification of pathogens in routine aerobic and anaerobic cultures including associated problem solving of discrepant culture results and troubleshooting of unexpected assay performance. Advanced antimicrobial susceptibility testing and molecular methods for the detection of pathogenic organisms are also covered. (Fall – 6.5 Eq. Sem Hr.)

MLAB409 – Parasitology: Lecture sessions cover the major groups of medically important parasites, including amoebae, helminths and blood and tissue protozoa. Emphasis is on morphologic identification of pathogenic organisms and the ability to distinguish these from non-pathogenic genera. Newer molecular methods for the detection of parasites is also included. (Fall 1.0 Eq. Sem Hr.)

MLAB410 – Mycology: Lecture sessions cover the medically important fungi including yeast, dermatophytes, opportunistic and dimorphic fungi. Emphasis is on morphologic identification, both macroscopically and microscopically, of pathogenic organisms as well as the saprophytes encountered in clinical specimens. (Fall – 1.0 Eq. Sem Hr.)

MLAB411 – Parasitology and Mycology Laboratory: Laboratory sessions focus on laboratory techniques used in the identification of parasites and fungus. Students learn laboratory related identification procedures through the assignment and work-up of unknowns. (Fall – 1.0 Eq. Sem. Hr.)

MLAB413 – Hematology II: This course is an in depth study of the formation of abnormal blood cells and the pathogenesis and mechanisms of hematologic disorders. Lecture topics include hematopoiesis, proliferative disorders, normal and abnormal hemoglobin disorders, anemias and leukemia. 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 on the performance of routine assays as well as the problem solving of discrepant results and troubleshooting of methodologies. (Fall 3.0 Eq. Sem Hr.)

MLAB415 – Coagulation: This course is an in depth study of the hemostatic mechanism, including study of coagulation in the intrinsic and extrinsic systems, as well as platelet and vessel function, and hypercoagulability. Analytical methodologies for the detection of abnormalities are studied for all systems. Laboratory sessions provide application of the principles of analytic testing methods used in the clinical laboratory. (Fall – 2.0 Eq. Sem. Hr.)

MLAB416 – Immunology, Serology, & Molecular Diagnostics: This course covers the theory of immunodiagnostics and immunopathology, and its practical applications as well. Principles of serologic and molecular methods in relationship to clinical diagnosis and correlation with human disease are reviewed. 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 review of case simulations. Pre-requisite coursework: A college level course in immunology and molecular biology. (Fall 2.0 Eq. Sem Hr.)

MLAB417 – Immunohematology: Introductory theoretical and technical skills are addressed including quality control, blood group serology, human blood groups and their significance, antibody detection and identification, current transfusion practices, and component transfusion. Advanced theoretical and technical course work continues in the second half of this course and covers hemolytic disease of the newborn and complex transfusion service problem-solving, as well as donor screening and care, donor blood collection, and processing and storage of blood components. (Fall – 4.0 Eq. Sem Hr.)

MLAB420 – Chemistry II: Lecture sessions include units of instruction on endocrinology, liver function, cardiac function, lipid metabolism, protein analysis and electrophoresis, therapeutic drug monitoring and drugs of abuse, and chemistry automation. Laboratory sessions address testing methods and quality control analysis in each of the major areas of clinical chemistry. Laboratory data interpretation is enhanced through laboratory reports and clinical case analysis. (Fall – 3.0 Eq. Sem Hr.)

MLAB423 – Body Fluids: Lecture sessions and exercises cover body fluid cell counts and differentials, as well as chemical analysis of fluids as well as the anatomy and physiology of body sites including cerebrospinal fluid, serous fluids, synovial fluid and semen. Laboratory experience cover hematologic analysis of a variety of body fluids, operation of instrumentation, and disease correlation. (Fall – 1.0 Eq. Sem Hr.)

MLAB424 – Research – Capstone Project: Activities in this course introduce the student to basic techniques in laboratory research including the formulation of research questions and the process of research design and practices. A series of group activities assist students in becoming informed consumers of research. This capstone project requires that students formulate a research question, complete a literature search using appropriate reference materials, produce a research paper, and propose a pilot project that could serve as the basis for a larger research study. Research groups may elect to perform a “hands on” laboratory project. The research process culminates in a research paper that is the basis of poster session presented in a formal venue for peers in the clinical laboratory community. (Spring 1.0 Eq. Sem Hr.)

MLAB425 – Management – Capstone Project: Students learn basic management theory and the principles and practices of supervision. Topics include basic management and health care theory and 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 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. (Spring – 1.5 Eq. Sem Hr.)

MLAB426 – Education – Capstone Project: This course covers the basics of education for the laboratory professional who may be instructing other lab employees and students, or providing in-service presentations. 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 while demonstrating sound educational principles and design of instruction. (Fall – 1.0 Eq. Sem Hr.)

Spring Semester

MLAB412 – Clinical Practice: The practicum in Clinical Practice addresses the pre-analytical phase of specimen collection and processing and its importance in laboratory quality assurance. Students participate in a rotation experience in molecular diagnostics and complete activities related to current molecular diagnostic techniques. (Spring – 1.0 Eq. Sem. Hr.)

MLAB405 – Clinical Chemistry: The clinical practicum in Clinical Chemistry provides experience with automated test procedures and high volume workflow. Areas of instruction and student participation include automated analysis using spectrophotometric and immunochemical single and multichannel discrete analysis systems, blood gas analysis, therapeutic drug monitoring, hormone assessment and computer controlled instrumentation. This clinical practicum includes colorimetric, kinetic and enzymatic analysis, the use of immunoassay and molecular techniques. (Spring – 3.5 Eq. Sem. Hr.)

MLAB408 – Clinical Microbiology: The practicum in Clinical Microbiology involves an in-depth study of techniques and methods used for the isolation and identification of bacteria, fungi and parasites considered to be of human pathogenic significance. Testing includes preparation of culture media and the interpretation of culture results by body site and antibiotic susceptibility of bacteria. Emphasis is placed on quality control and performance improvement methods, and safety procedures used in the modern clinical laboratory. (Spring – 3.5 Eq. Sem Hr.)

MLAB414 – Clinical Hematology: The practicum in Clinical Hematology places emphasis on instrument maintenance, quality control, and result interpretation. Practice occurs during this course with routine and emergency testing procedures and workflow, specimen processing, reading of differential morphology and data interpretation. This practicum also includes the analysis of body fluid. (Spring – 3.5 Eq. Sem Hr.)

MLAB419 – Clinical Immunohematology: The practicum in Clinical Immunohematology addresses routine testing in a hospital/blood center setting: the 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. Students also learn appropriate follow up of transfusion reactions, result interpretation, problem solving and troubleshooting as it relates to patient test results. (Spring – 3.5 Eq. Sem Hr.)

MLAB430 – Body of Knowledge Review: This course serves as a review of medical laboratory science concepts. This course serves as a review of laboratory principles during clinical practicums and as preparation for national certification examinations. The major categories of laboratory medicine are addressed and students review major concepts through mini-reviews, case reviews, and comprehensive assessments. (Spring – 2.0 Eq. Sem. Hr.)

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