

# Medical Laboratory Science (MLS)

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## Courses

### **MLS 115. Solving Medical Mysteries. 3 Hours.**

This course is intended to answer commonly asked questions about human health and disease. An overview will briefly describe healthy human biology and function which will be contrasted with the abnormal functioning seen in major diseases. Actual clinical lab results will be presented in case stories that offer a glimpse into "what is going on inside" the diseased patient. Armed with this type of information, students can become more active and effective consumers within the healthcare system. Course Information: This course fulfills a general education requirement at UIS in the area of Life Science without a Lab.

### **MLS 131. Introduction to Forensic Science. 3 Hours.**

Introduces the scientific basis of forensics investigations. Discusses basic procedures for investigation of crime scenes through deductive reasoning, case history/problem-solving approach. Topics include fingerprints, soil/imprints, toxicology, ballistics, blood/body fluid analysis, DNA fingerprints, and PCR technology. Course Information: Same as CHE 131. This course fulfills a general education requirement at UIS in the area of Physical Science without a Lab.

### **MLS 132. Introduction to Forensic Science Laboratory. 1 Hour.**

Lab illustrates basic scientific procedures/analyses used in forensic science labs. Exercises: fingerprinting, hair/fiber analysis, soil/glass analysis, PCR/DNA profiling, toxicology, blood spatter analysis, field tests for blood, semen, drugs. Optional lab to be taken with MLS 131. Course Information: Same as CHE 132. This course, with MLS 131, fulfills a general education requirement at UIS in the area of Physical Science with a Lab. IAI Code: P1903). 420228.

### **MLS 201. Introduction to Medical Laboratory Science. 1 Hour.**

An introduction to health care in general and the medical laboratory profession in particular. Students will create a plan for pursuing a health career. Students will also learn how to be better consumers of medical laboratories.

### **MLS 225. Nutrition. 3 Hours.**

Provides a foundation in the basic principles of human nutrition in maintaining and promoting health. Application of basic biological concepts such as cell function and heredity, as well as personal and societal applications of nutrition will enable students to make informed decisions. Course Information: This course fulfills a general education requirement at UIS in the area of Life Science without a Lab.

### **MLS 301. Foundations in Medical Laboratory Science. 1 Hour.**

An introduction to the MLS program and career. Laboratory practice is discussed to include preanalytical, analytical and postanalytical factors. Professionalism, ethics, professional development and education are discussed. Introduction to research and critique of scientific literature are included.

### **MLS 311. Laboratory Operations. 2 Hours.**

This is an introductory course for basic laboratory operations necessary for Medical Laboratory Science (MLS). This is a lecture/laboratory course that will focus on lab skills as well as general laboratory knowledge. Emphasis will be placed on laboratory skills such as pipetting and phlebotomy. Students will learn to use math skills to solve problems in laboratory science, to include the design and analysis of QC charts.

### **MLS 321. Seminar in Medical Laboratory Science. 2 Hours.**

A writing-intensive course which serves as an introduction to the medical laboratory science program. Professionalism, ethics, and adult learning are discussed. Introduction to research and critique of scientific literature are included. Instruction and experience in blood collection techniques are included.

### **MLS 325. Evidence-Based Research Concepts. 3 Hours.**

This course will focus on outlining the foundation of evidence-based practice in health sciences. The students will gain a basic understanding of principles in evidence-based practice and how to incorporate those principles into clinical practice. Course Information: Same as EXR 325.

### **MLS 331. Evidence-Based Inquiry. 2 Hours.**

This course develops knowledge of evidence-based inquiry methods and their application in professional practice. Content includes: research methods, study design, evidence-based practice, and ethics in research. Course Information: Prerequisites: MLS 301.

### **MLS 341. Physiologic Processes. 3 Hours.**

This course teaches the normal physiology, as well as selected diseases, of the human body at a level required for clinical medicine. Concepts are taught using a combination of lectures and exercises with case studies.

### **MLS 347. Medical Bacteriology. 4 Hours.**

Concise overview of pathogenic bacteriology. Includes discussion of techniques for culturing and identifying bacteria and an introduction to epidemiology. Required of medical laboratory science students. Offered fall semester. Course Information: Same as BIO 347. Prerequisites: BIO 345 and BIO 346.

### **MLS 382. Hematology I. 3 Hours.**

Course emphasizes basic hematologic and hemostasis principles. Manual and semi-automated procedures are performed. Basic morphology and routine procedures are introduced. Case studies involving normal and abnormal clinical applications are discussed.

### **MLS 383. Medical Microbiology I. 4 Hours.**

Concise overview of pathogenic bacteriology, focusing on human disease. Includes discussion of techniques for culturing and identifying bacteria and an introduction to epidemiology. Course Information: Prerequisites: BIO 346.

### **MLS 384. Clinical Chemistry I. 4 Hours.**

Lecture/laboratory course focusing on clinical significance and methodology of measurement of carbohydrates, proteins, lipids, enzymes, electrolytes, and other important clinical chemistry analytes in blood and urine. Focus on function and pathology of all major organs in the human body. Special emphasis on quality control and its use in the clinical chemistry laboratory. Course Information: Prerequisites: MLS 341.

### **MLS 400. Applied Research. 1-4 Hours.**

Directed research in procedure development or in-depth investigation of a specific area in medical laboratory science. Topic approved and hours assigned by instructor. Written report required. Course Information: May be repeated to a maximum of 4 hours.

### **MLS 401. Clinical Chemistry I. 2 Hours.**

Lecture/laboratory course focusing on clinical significance and methodology of carbohydrates, proteins, lipids, enzymes, electrolytes, blood gases, acid-base balance, liver function, kidney function, and endocrinology. Emphasis on quality control as it applies to selected clinical chemistry procedures. Course Information: Prerequisites: CHE 433 or equivalent.

**MLS 402. Introduction to Hematology. 2 Hours.**

Lecture/laboratory course that emphasizes basic hematologic principles. Manual and automated procedures are performed. Emphasis on morphology and clinical applications. Course Information: Prerequisites: MLS 448 or equivalent.

**MLS 403. Introduction to Immunohematology. 2 Hours.**

Lecture/laboratory course emphasizing immunohematologic concepts and properties underlying scientific principles of blood banking. Includes theory and practical applications of blood-group systems, antibody identification and compatibility testing, hemolytic disease of the newborn, autoimmune hemolytic anemia, and donor procurement and processing. Course Information: Prerequisites: MLS 448 or equivalent.

**MLS 404. Introduction to Hemostasis. 1 Hour.**

Lecture/laboratory course that emphasizes components in the blood related to hemostatic mechanisms. Includes principles of procedures involved and their relationship to diagnosis and treatment of disease. Course Information: Prerequisites: BIO 141 or equivalent.

**MLS 405. Introduction to Urinalysis. 2 Hours.**

Lecture/laboratory course emphasizing qualitative, quantitative, and microscopic examination of urine. Includes special analytical procedures and their relationship to diagnosing and monitoring disease and health. Course Information: Prerequisites: BIO 141 or equivalent and CHE 141 or equivalent.

**MLS 411. Health Care Management. 3 Hours.**

Explores the health care community and groups affected by health care delivery in the United States. Emphasis is on management, including personnel issues, financial issues, regulatory issues, and educational principles using the example of the medical laboratory. This course is open to non-MLS majors.

**MLS 421. ECCE: Clinical Chemistry Practicum. 1-5 Hours.**

Learn to apply chemical and immunologic theory and practice to clinical chemistry procedures, toxicology, therapeutic drug monitoring, urinalysis. Includes: immunologic procedures; instruction and experience in the use, standardization, and maintenance of sophisticated laboratory analyzers. Course Information: Prerequisites: Sr. in MLS. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

**MLS 422. ECCE: Clinical Hematology Practicum. 1-4 Hours.**

Experience in clinical hematology, includes advanced instrumentation using automated hematology and coagulation analyzers. Includes microscopic examination of blood smears. Laboratory data is interpreted in light of various disease states and disorders. Course Information: Prerequisites: Senior in Medical Laboratory Science program. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

**MLS 423. ECCE: Clinical Microbiology Practicum. 1-4 Hours.**

Isolation and identification of clinically important microorganisms from a variety of body sites. Includes antibiotic susceptibility testing. Course Information: Prerequisites: Senior in Medical Laboratory Science program. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

**MLS 424. ECCE: Clinical Immunohematology Practicum. 1-3 Hours.**

Blood typing, antibody screening and identification, compatibility testing, and other immunohematologic procedures are included. Emphasis is on operation and problem-solving in a modern transfusion service. Course Information: Prerequisites: Senior in Medical Laboratory Science program. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

**MLS 442. Hematology II. 4 Hours.**

Course focusing on advanced principles of hematologic testing leading to improved interpretive skills in hematology. Emphasis on morphology and correlation of data with disease states and disorders. Case studies and discussion used to illustrate the pathophysiology of hematological disorders. Course Information: Prerequisites: MLS 382.

**MLS 443. Medical Microbiology II. 3 Hours.**

The 2nd course in the Medical Microbiology series includes more intensive study of Medical Microbiology, specific evaluation of human pathogenic bacteriology, and evaluation of mixed cultures. This course will study the taxonomy, morphology, and pathogenesis of human microbes including bacteria, parasites, fungi, and viruses, including practical application of diagnostic laboratory procedures. Course Information: Prerequisites: MLS 383.

**MLS 444. Clinical Chemistry II. 3 Hours.**

Lecture course focusing on clinical significance and methodology of measurement of important clinical chemistry analytes. Focus on function and pathology of select major organs in the human body. Special emphasis on case studies with critical thinking to interpret the case studies. Course Information: Prerequisites: MLS 384.

**MLS 447. Medical Mycology, Parasitology and Virology. 4 Hours.**

Overview of medically significant fungi, parasites, and viruses. Emphasis will be placed on pathogenesis, modes of transmission, and identification. Laboratory techniques used in isolation, cultivation, and identification will be used. Also included will be discussions of epidemiology and host response regarding these microorganisms. Course Information: Prerequisites: BIO 141 or equivalent.

**MLS 448. Introduction to Immunology. 3 Hours.**

Immunologic principles, concepts, and techniques will be discussed, including components of the immune system, cellular and humoral immune response, and antigen-antibody reactions. Human diseases related to compromised immunity will be introduced. Course Information: Same as BIO 448. Prerequisites: BIO 141 or equivalent.

**MLS 449. Introductory Immunology Lab. 1 Hour.**

Basic immunology and serology procedures with emphasis on medical laboratory diagnostic procedures. Course Information: Same as BIO 449. Prerequisites: BIO 141 or equivalent, MLS 448 or concurrent.

**MLS 451. Advanced Concepts in Immunohematology. 2 Hours.**

Lecture/laboratory focusing on problem-solving and special techniques used in antibody identification and compatibility testing. Also includes a discussion of donor requirements, blood component preparation and therapy, and quality assurance in the blood bank/transfusion service. Course Information: Prerequisites: MLS 403.

**MLS 452. Advanced Concepts in Hematology. 2 Hours.**

Lecture/laboratory focusing on advanced principles of hematologic testing leading to improved interpretative skills in hematology. Emphasis on correlation of data with disease states and disorders. Case studies and discussion used to illustrate the pathophysiology of hematological dysfunction. Course Information: Prerequisites: MLS 402.

**MLS 454. Advanced Concepts in Clinical Chemistry. 2 Hours.**

Lecture/laboratory focusing on clinical significance and methodology of trace elements, vitamins, therapeutic drug monitoring, and toxicology. Newer testing methods used to identify diseases/disorders will be discussed. Emphasizes instrument selection and method validation process. Course Information: Prerequisites: MLS 401.

**MLS 456. Clinical Correlations. 2 Hours.**

Use of problem-based case studies to analyze clinical situations and correlate laboratory data. Course Information: Prerequisites: Senior in Medical Laboratory Science Program.

**MLS 468. Immunohematology. 4 Hours.**

Lecture/laboratory course emphasizing concepts, properties and scientific principles of Immunohematology. Includes theory and practical applications of: blood-group systems; antibody identification; compatibility testing; hemolytic disease of the fetus and newborn; donor evaluation and processing; blood component preparation and therapy; and quality assurance in the blood bank/transfusion service. Course Information: Prerequisites: MLS 449 or equivalent.

**MLS 471. Emerging Diseases. 3,4 Hours.**

Examines the global emergence of previously unknown or re-emergent infectious diseases. Historical and current diseases will be discussed by integrating the perspectives of medical science and public health in contexts of social systems, economics, politics, and geography. Challenges and remedies in an interdependent but unequal world will be discussed. Course Information: Same as MPH 471.

**MLS 477. Molecular Diagnostics. 2 Hours.**

This course offers an introduction into the principles, utility, and diversity of molecular testing in the medical laboratory. Central concepts include: nucleic acid extraction, amplification and detection; mutations and polymorphisms; DNA sequencing; molecular microbiology; inherited disease; molecular oncology; pharmacogenetics; and quality assurance and control in the molecular diagnostic laboratory. Course Information: Prerequisites: MLS 444.

**MLS 480. Topics in Medical Laboratory Science. 1-4 Hours.**

Selected topics of interest in current Medical Laboratory Science. Topic(s) for a semester will be stated in the class schedule. Course may include laboratory. Course Information: Prerequisites: Dependent on topic. May be repeated if topics vary.

**MLS 481. Education and Management. 2 Hours.**

Explores how education and management of laboratory personnel can influence health care delivery in the United States. This course covers processes and practices of health care management, including personnel issues, financial issues, regulatory issues and educational principles.

**MLS 487. ECCE: Practicum I. 6 Hours.**

Encompasses clinical experiences integrated with theory, in a dynamic healthcare setting where students experience the collaborative nature of MLS and healthcare. Students work with MLS, performing tests to diagnose and treat patients. #1 of 2 courses to include 2 of 4 major areas of study. Course Information: Prerequisites: MLS Senior. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

**MLS 488. ECCE: Practicum II. 6 Hours.**

Encompasses clinical experiences integrated with theory, in a dynamic healthcare setting where students experience the collaborative nature of MLS and healthcare. Students work with MLS, performing tests to diagnose and treat patients. #2 of 2 courses to include 2 of 4 major areas of study. Course Information: Prerequisites: MLS Senior. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

**MLS 496. Special Topics Practicum. 1-6 Hours.**

Course is designed to provide MLS students an opportunity for directed research and/or observational experiences in alternative MLS practice areas. Students may also participate in service learning. Topics and sites must be approved and written reports are required. Course Information: May be repeated to a maximum of 6 hours if topics vary. Prerequisites: MLS Senior.

**MLS 497. Senior Seminar I. 2 Hours.**

This is the first course in the two-part MLS senior capstone series. Content includes: the MLS senior research project, simulation exams, student-centered remediation planning, study plan development, case studies, and peer discussions of clinical learning experiences. Course Information: Prerequisites: MLS 331.

**MLS 498. Senior Seminar II. 2 Hours.**

This is the second course in the two-part MLS senior capstone series. Content includes: exam preparation (e.g. simulation exams, student-centered remediation planning, study plan development, student bowl practice, analytical exam content breakdown), case studies, and peer discussions of clinical learning experiences. Course Information: Prerequisites: MLS 497.

**MLS 499. Tutorial. 1-4 Hours.**

Intended to supplement, not supplant, regular course offerings. Students interested in a tutorial must secure the consent of the faculty member concerned before registration and submit any required documentation to him or her. Course Information: May be repeated to a maximum of 4 hours if topics vary.