Medical Lab Science (MLS)

MLS 1113. Foundations of Medical Lab Science. 3 Hours.
An overview of the principles and practices governing the operations and testing performed in contemporary medical laboratories including quality assessment and quality control, safety and specimen acquisition and processing. In the lab, students learn to perform a variety of protocols and basic test procedures using manual methods and automated laboratory technology. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of the course, students will be able to: 1. Demonstrate knowledge of all standards governing patient and employee safety, including standard precautions. 2. Follow standard operating procedures to collect and prepare blood, body fluids, and tissue specimens for analysis. 3. Apply basic knowledge of healthcare delivery systems and use common medical terminology to effectively communicate and collaborate as a member of interdisciplinary healthcare teams providing exemplary patient care. 4. Perform appropriate test procedures within the medical laboratory assistant scope of practice. 5. Use information systems necessary to accomplish job functions. Course fee required. SP.

MLS 2890R. Laboratory Internship. 1-4 Hours.
For students who intend to seek professional certification as a medical laboratory assistant, this course is an internship that provides practical experience emphasizing application of knowledge and skills to perform the functions of a laboratory assistant in a contemporary accredited laboratory and further develop discipline-specific competencies. Repeatable up to 4 credits subject to graduation and program restrictions. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Perform and/or assist with a variety of waived and point-of-care laboratory tests, procedures, and protocols appropriate to the scope of practice of a career-entry medical laboratory assistant. 2. Communicate effectively and appropriately in the laboratory workplace. 3. Apply knowledge of infection control, governmental regulations, and safety practices to laboratory work situations. 4. Project an image of professionalism, respect the feelings and needs of others, protect the confidence of patient information, and never allow personal concerns and biases to interfere with the welfare of patients nor the work of colleagues. Prerequisite: MLS 1113 (Grade C or higher within the last 2 years or can be concurrently enrolled) and instructor permission required. SP.

MLS 3310. Immunohematology I. 5 Hours.
Required course for students in the Bachelor of Science Medical Laboratory Science Professional Program. Comprehensive study of the science and applied concepts of blood banking and transfusion service practices. The study of blood groups, their antigens and antibodies, is discussed in detail as are test methods and transfusion protocols, including donor selection, component preparation, quality management and compliance issues. In lab, students learn to perform a variety of tests that are prerequisite to the transfusion of blood and blood products. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Apply knowledge of sample collection techniques, transportation, and handling requirements to assess with explanation the acceptability of a specimen for analysis in the blood bank laboratory. 2. Competently perform a full range of routine testing done in a contemporary blood bank laboratory including but not limited to blood typing, detection and identification of antibodies, compatibility testing, and quality control testing. 3. Adapt knowledge of immunohematology and contemporary blood banking and transfusion practices and skills learned in this course to clinical training in a contemporary blood bank laboratory. 4. Use conventional medical terminology and units of measure to accurately report test results. 5. Determine the priority of workflow in the contemporary blood bank laboratory based on competing blood product orders, testing orders, and inventory requirements. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. SP.

MLS 3312. Clinical Immunology. 4 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. A comprehensive study of the human immune system and the medical laboratory techniques used to assess immune responsiveness in health and during times of illness and disease. Lectures focus on innate and adaptive immunity, antibody structure and function, and the role of the complement system and cytokines in immune responsiveness. The immunologic manifestation of infectious disease, hypersensitivity, autoimmune diseases, transplantation immunity, tumor immunology, and immunodeficiency diseases will be discussed in detail. Using serological methods, electrophoresis, and molecular techniques, students test samples and correlate results with states of health and disease. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Comply with established lab safety and governmental regulations and standards applicable to the clinical immunology laboratory. 2. Perform accurate laboratory testing of body fluids, cells, and other substances. 3. Evaluate and interpret laboratory test data while recognizing factors that affect procedure and results. 4. Demonstrate written and oral communication skills that ensure accurate reporting of test results. 5. Explain the different immune related pathologies such as hypersensitivity, autoimmunity, tumor immunology and immunodeficiencies. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 3314. Diagnostic Microbiology I. 5 Hours.
Required course for students in the BS in Medical Laboratory Science professional program. Comprehensive topical study introduces students to clinically significant bacteria including epidemiology, pathogenicity, and procedures for the traditional laboratory identification and antimicrobial testing. Clinically significant pathogens of interest include: Staphylococcus, Streptococcus, Neisseria, Gram-Positive Bacilli, Enterobacteriaceae, Gram-Negative non-fermentors and other miscellaneous bacteria. The laboratory exercises focus on traditional and evolving methods of identification of bacteria of medical interest. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Judge the acceptability of quality control and test result data. 2. Choose the correct laboratory approach, including compliance with safety regulations, and demonstrate proper technique to study, culture, identify and work with microbes studied in this course. 3. Demonstrate effective written and oral communication skills that ensure accurate reporting of test results in the medical microbiology laboratory. 4. Recognize, describe, and differentiate select microbe phenotypes studied in the course by accurately interpreting, when applicable, gram stain reactivity, select biochemical test results, microscopic morphology, and growth characteristics on routine primary and selective culture media. 5. Determine the acceptability of a specimen for testing by diagnostic microbiology methods. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 3330. Clinical Chemistry. 5 Hours.
Required course for students in the Bachelor of Science Medical Laboratory Science professional program. : Basic concepts and techniques in clinical chemistry and quality control utilizing manual and automated laboratory procedures. Instrumentation background and use will be discussed. Emphasis on blood and body fluid assessments of carbohydrates, bilirubin, non-protein nitrogen testing, electrolytes, acid/base balance, lipids, hemoglobin, and electrophoresis. Laboratory section will facilitate student learning by students applying theory to laboratory assays. This course requires a Differential Tuition Rate which is an additional fee of $147 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Demonstrate effective written and oral communication skills that ensure accurate reporting of test results in the clinical chemistry laboratory. 2. Skillfully perform and interpret manual and automated clinical chemistry tests studied in this course on blood, serum, plasma, and other body fluids. 3. Comply with safety and governmental regulations and standards applicable to clinical chemistry laboratory. 4. Evaluate correctly the acceptability of quality control and test result data. 5. Perform a variety of mathematical calculations and apply statistical functions to interpret test results associated with clinical chemistry testing. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. FA.

MLS 3555. Research Seminar. 2 Hours.
Required course for students in the Bachelor of Science program in Medical Laboratory Science. Addresses research methods in the clinical sciences and reviews accepted policies from the National Institutes of Health on informed consent, institutional review boards, and clinical trials. Students will read and interpret studies in the clinical laboratory sciences, comment on problems with studies, and note the further work needed in the respective area of research. Students will present a study, highlighting the research questions answered, methods employed, and relevance to other studies. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Apply the power of statistics in research study to critic published research and compare various research studies and to evaluate correctly the acceptability of quality control and test result data. 2. Present a published research study highlighting research question, methods, results, and limitations of the study. 3. Plan and implement a research project including budget, background, methods, and hypothesis. 4. Write an original research paper on a topic directly related to Medical Laboratory Science. 5. Write and submit an abstract based on a research project performed in class. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 3850. Urinalysis and Body Fluids. 2 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. In-depth study of the physiology, formation and composition, and medical laboratory analysis of urine and other body fluids including cerebrospinal fluid, seminal fluid, serous fluids, synovial fluid, amniotic fluid, bronchoaveolar lavages and bronchial washings, and vaginal secretions. In lab, students learn to perform macroscopic (physical and chemical) and microscopic analysis on clinical samples, interpret test results, and correlate results with states of human health and disease. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Follow through with appropriate lab testing quality assurance activities, including quality control protocols and safety practices, as a foundation for exemplary patient care. 2. Correctly use conventional medical terminology and nomenclature to report test results of body fluids' analyses including but not limited to urine, cerebrospinal fluid, synovial fluid, and semen analyses. 3. Judge the acceptability of each of the following body fluid specimens submitted for analysis by medical laboratory methods: urine, seminal fluid, vaginal secretions, and cerebrospinal fluid. 4. Competently perform a wide range of analyses on urine, cerebrospinal fluid, synovial fluid, semen, vaginal secretions, and serous fluids to aid diagnosis of disease, screen asymptomatic populations for undetected disorders, and monitor the progress of disease and the effectiveness of therapy. 5. Correlate test results, from the analysis of urine and other body fluids, with pathophysiologic processes to recommend additional tests that may aid a diagnosis, confirm a prognosis, and/or affirm therapy. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 4110. Laboratory Management/Edu. 2 Hours.
Students will learn managerial problem solving, finance, and budgeting, Lean and Six Sigma techniques, leadership styles, and education/training relevant to the clinical laboratory. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Recommend laboratory process improvements based on patient/customer needs and cost benefit analysis. 2. Uphold professional standards of conduct as a member and an advisor within multidisciplinary healthcare teams. 3. Adapt effective communication and leadership styles to challenging medical laboratory work situations. 4. Identify and evaluate elements that impact the effective management of medical laboratory staffing resources. 5. Use knowledge of educational methodologies and terminology to construct and effectively deliver an educational unit to users and providers of laboratory services. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. FA.

MLS 4200. Clinical Chemistry and Molecular Diagnostics. 4 Hours.
Required course for students admitted to the BS in Medical Laboratory Science professional program. Second of two courses covering essential practices related to the pre-analytical, analytical, and post-analytical components of the clinical chemistry laboratory service. Lectures focus on the pathophysiology of a variety of diseases including diabetes, liver disease, kidney disease, various endocrine disorders including thyroid disease, and on the specialized services of the clinical chemistry lab including toxicology, therapeutic drug monitoring, and molecular diagnostics. The use of molecular techniques with interest in instrumentation and evolving technology are discussed in detail. Laboratory exercises facilitate student skill development performing assays and correlating test results to states of health and disease. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Use effective written and oral communication skills that ensure accurate reporting of test results in the clinical chemistry laboratory. 2. Adhere to the safety and governmental regulations and standards applicable to clinical chemistry laboratory. 3. Perform appropriate quality control measures for instrumentation and evaluate correctly the acceptability of quality control and test result data. 4. Demonstrate competency performing a select range of tests studied in this course. 5. Demonstrate a working knowledge of the principles of molecular biology and identify molecular techniques used in contemporary clinical chemistry laboratory. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 4300. Clinical Hematology. 5 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. Lecture and laboratory coverage of the theories, concepts and practical aspects central to the study of blood and blood forming tissues by medical laboratory methods. Lectures topics of focus include hematopoiesis, blood cells' structure, function, kinetics, senescence and destruction. Hematologic diseases including the etiology and pathophysiology of anemia, and neoplastic and nonmalignant leukocyte disorders are discussed in detail. In lab, students use manual methods and automation to analyze clinical samples and correlate results with states of health and disease. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Follow through with appropriate hematology laboratory quality assurance activities, including quality control protocols and safety practices, as a foundation for exemplary patient care. 2. Correctly use conventional clinical hematology terminology and nomenclature to report test results. 3. Distinguish each erythrocyte and leukocyte disorder discussed in lecture according to etiology, pathophysiology, clinical presentation, key laboratory findings, and treatment options. 4. Appraise, with explanation, a specimen as acceptable for testing in a contemporary hematology laboratory. 5. Competently perform a range of hematology tests and procedures, including the differential analysis of blood cells, essential to the diagnosis, prognosis, and monitoring of therapy for the hematologic diseases and conditions discussed in class. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. SP.

MLS 4320. Hemostasis. 4 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. Theories and concepts of hemostasis are presented, including plasma and cell-based models of normal coagulation and fibrinolysis. Hemorrhagic diseases and thrombotic disorders will be covered and laboratory tests critical to the diagnosis, prognosis, and to monitoring treatment of these conditions are discussed in detail. In the lab, students use manual methods and technology to analyze clinical samples to detect, differentiate, and quantify coagulation abnormalities. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Relate knowledge of the physiology of hemostasis to the laboratory evaluation and monitoring of congenital and acquired bleeding and thrombotic conditions and diseases in terms of key lab tests, test principles, specimen requirements, and tests' reference ranges. 2. Distinguish each hemorrhagic and thrombotic condition and disease studied in the course according to etiology, pathophysiology, clinical presentation, key laboratory findings, and treatment options. 3. Justify the use of molecular techniques in the diagnosis, prognosis and monitoring of the treatment of hemostatic disorders. 4. Competently perform a range of basic tests and procedures, including accurately interpreting and reporting results used to evaluate hemostasis and anticoagulant therapy. 5. Analyze various anticoagulant therapy scenarios to recommend appropriate lab tests to monitor therapy, recognize appropriate testing frequency, and identify test results indicating inappropriate dosing. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 4330. Clinical Chemistry Practice (ALPP). 4 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. Practical experience emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical chemistry/immunology laboratory and further develop discipline-specific competency. This course is designated as an Active Learning Professional Practice (ALPP) course. This course allows students to explore and apply content learned in the course in a professional experience away from the classroom. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Competently perform a full range of testing in the clinical chemistry laboratory encompassing pre-analytical, analytical, and post-analytical phases of testing and, to the extent available, testing in the area of immunology. 2. Show responsibility for analysis and decision-making and demonstrate proficiency to problem-solve, troubleshoot, interpret and accurately report results using statistical approaches to evaluate test data including quality control results. 3. Adeptly use technology to accurately report test results. 4. Follow safety and governmental regulations and standards as applied to the work performed in a clinical chemistry laboratory, including protecting the confidence of patient information. 5. Project an image of professionalism in word, action, and appearance, effectively communicating with members of the laboratory, and when appropriate, members of the healthcare team and the public. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 4400. Immunohematology II. 4 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. Continued study of the science of antigen and antibody reactions and blood group systems, emphasizing decision-making and problem-solving skill development with application to blood banking practices and transfusion therapy services. Lab fee required. Science professional program. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Follow through with appropriate quality assurance activities, including quality control protocols and safety practices, as a foundation for exemplary patient care. 2. Correctly use conventional medical terminology and immunohematology-specific nomenclature to effectively report test results. 3. Evaluate quality control data and use the results to validate blood bank testing outcomes. 4. Question inconsistent test data in order to ensure reporting of valid results. 5. With minimal supervision, competently perform a full range of assays, procedures and protocols that facilitate the safe, timely, and effective transfusion of blood and/or blood products. 6. Synthesize knowledge of immunohematology and transfusion practices, from basic facts, policies, protocols, and procedures to complete theories, to analyze case studies and propose valid solutions to complex antibodies problems. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 4410. Blood Banking Practice (ALPP). 4 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. Practical experience emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary blood bank and further develop discipline-specific competency. This course is designated as an Active Learning Professional Practice (ALPP) course. This course allows students to explore and apply content learned in the course in a professional experience away from the classroom. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. With minimal supervision, safely competently perform a broad range of routine testing in accordance with standard transfusion service protocols and procedures in a contemporary blood bank and transfusion service. 2. Accept responsibility for analysis and decision-making about testing performed in a contemporary blood bank and transfusion service. 3. Follow through with applicable regulations and standards of practice that define quality improvement/performance within a contemporary blood bank laboratory and transfusion service. 4. Project and maintain an image of professionalism in word and action, and perform work with focused attention on safety, accuracy, and quality. 5. Demonstrate the ability to work autonomously and cooperatively with others, effectively manage time, and prudently use available resources to deliver cost-effective, value-added, accurate, and timely blood bank lab test results. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 4414. Clinical Microbiology Practice (ALPP). 4 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. Practical experience emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary medical microbiology laboratory and further develop discipline-specific competency. This course is designated as an Active Learning Professional Practice (ALPP) course. This course allows students to explore and apply content learned in the course in a professional experience away from the classroom. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Competently perform a full range of testing in the clinical microbiology laboratory encompassing pre-analytical, analytical, and post-analytical phases of testing in bacteriology and, to the extent available, testing in the areas of parasitology, mycology and virology. 2. Show responsibility for analysis and decision-making and demonstrate proficiency to problem-solve, troubleshoot, interpret and accurately report results using statistical approaches to evaluate test data including quality control results. 3. Adeptly use technology to accurately report test results. 4. Follow safety and governmental regulations and standards as applied to the work performed in a clinical microbiology laboratory, including protecting the confidence of patient information. 5. Project an image of professionalism in word, action, and appearance, effectively communicating with members of the laboratory, and when appropriate, members of the healthcare team and the public. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 4423. Clinical Hematology Practice. 4 Hours.
Required course for students admitted to the Bachelor of Science in Medical Laboratory Science professional program. Practical experience emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical hematology/hemostasis laboratory and further develop discipline-specific competency. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Competently perform a full range of testing encompassing the pre-analytical, analytical, and post-analytical phases of testing in hematology, hemostasis, and urinalysis. 2. Show responsibility for analysis and decision-making and demonstrate proficiency to problem-solve, troubleshoot, interpret and accurately report results using statistical approaches to evaluate test data including quality control results. 3. Adeptly use technology to accurately report test results. 4. Follow safety and governmental regulations and standards as applied to the work performed in a clinical hematology laboratory, including protecting the confidence of patient information. 5. Project an image of professionalism in word, action, and appearance, effectively communicating with members of the laboratory, and when appropriate, members of the healthcare team and the public. Prerequisite: Admission to the Utah Tech University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 4600. Diagnostic Microbiology II. 4 Hours.
Required course for students admitted to the BS in Medical Laboratory Science professional program. Continued comprehensive study of diagnostic microbiology focusing on clinically significant pathogens including Anaerobes, Spirochetes, Chlamydia, Mycobacteria, medically important fungi, viruses and parasites. Student will further develop competency using traditional manual microbiological methods and evolving techniques, including molecular assays, to identify and aid the diagnosis, prognosis, and therapy monitoring of infections caused by the microbes discussed in this course. This course requires a Differential Tuition Rate which is an additional fee of $151 charged per credit hour. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Demonstrate written and oral communication skills that ensure accurate reporting of test results. 2. Perform accurate laboratory testing of body fluids, cells, and other substances. 3. Comply with established lab safety regulations. 4. Evaluate correctly acceptability of quality control and test result data. 5. Demonstrate competency using traditional manual microbiological methods and evolving techniques, including molecular assays, to identify and aid the diagnosis, prognosis, and therapy monitoring of infections caused by the microbes discussed in this course. Course fee required. Prerequisite: Admission to the Utah Tech University Bachelor of Science in Medical Laboratory Science professional program. FA.