Medical Laboratory Science

Taylor Health Science Bldg. (2nd Floor)
(435) 879-4971
http://health.dixie.edu/mls/

To find faculty & staff phone numbers and email addresses, please consult the University Directory (http://www.dixie.edu/directory/directory.php).

Program Director
Cara Calvo, MS, MT(ASCP)SH

Health Science Advisor
Esther Pugmire

Interim Dean
Patricia Wintch RDH, MSDH

Administrative Specialist
Taylor Shimbeck

Program Description

Dixie State University offers a course of study leading to a Bachelor of Science in Medical Laboratory Science degree. During the first two years or pre-professional phase of study, a student completes a minimum of 59 semester hours of coursework. The coursework includes but is not limited to: a) general education courses, including a statistic course; b) biology requisites that must include a course in microbiology and courses in human anatomy and physiology; c) cognates in chemistry; and, d) the institutional requirement in computer literacy. After completion of the pre-professional phase of study and, through a competitive application process, a student may be selected to enter the final two years of study or the MLS professional program. Admission selection decisions are made without regard to race, ethnicity, color, national origin, age, status as a person with a disability, religion, sexual orientation, gender identity/expression, and protected veteran’s status.

The MLS professional program is admission-limited meaning that, through a competitive application process, one cohort of no more than 12 students is admitted to the professional program per year. The start date for the program is the first day of classes of the DSU fall semester. Admitted students spend three semesters completing MLS-specific courses on the DSU campus. Upon successful completion of these courses, students are then assigned to one or more program-affiliated medical laboratories to complete a semester-long clinical internship. During this internship, students spend 40-hours per week advancing their knowledge and skills performing a wide variety of medical lab tests in a contemporary accredited medical laboratory under the supervision of professionally credentialed Medical Laboratory Scientists. Graduates are eligible to take the Medical Laboratory Scientist (MLS) national certification examination offered by the American Society for Clinical Pathology (ASCP).

Our vision is that the Dixie State University Medical Laboratory Science Program be a model of excellence in medical laboratory science education, graduating MLS who meet the workforce demands of today and tomorrow.

The mission of the Dixie State University Medical Laboratory Science Program is to graduate professionally accomplished MLS scholars, committed to life-long learning and prepared to meet current and future workforce needs in medical laboratory science.

The goals of the DSU MLS program are to:

1. Provide a curriculum that meets current and emergent pedagogical and professional development needs of students.
2. Establish and sustain partnerships with local and regional community medical laboratories that provide exceptional learning experiences for our MLS students.
3. Innovate learning experiences and provide opportunities that maximize every program student’s potential to achieve MLS career entry-level competencies.
4. Graduate knowledgeable and skilled Medical Laboratory Scientists who meet the workforce needs of our local community, Utah, and the under-served regions of the country.
5. Help advance MLS pedagogy and growth of the MLS profession.

Essential Requirements

The DSU MLS program has established non-academic standards of performance defined as essential requirements. Through their professional conduct, program students represent Dixie State University and more importantly the MLS profession and the MLS Program. Accordingly, DSU MLS program students must possess knowledge, skills, attitudes to work in a wide-ranging variety of settings where laboratory testing is performed. Consequently, to be admitted and maintain enrollment, participate in, and successfully complete the MLS program, a student must meet the program's essential requirements. They are as follows:

Expectations of Mastery and Skill in Information Acquisition and Communication
A MLS professional program student must demonstrate the ability to acquire and to effectively communicate information in written and in spoken English. Specifically, a MLS program student must be able to:

1. Read for comprehension and follow verbal and written instructions, and thus demonstrate mastery of MLS coursework content at a level expected of a career-entry MLS.
2. Competently utilize technology to research, investigate, acquire and present information obtained by observation and experimentation.
3. Use strategies that minimize miscommunication.
4. At all times and in all circumstances, follow established procedures to safeguard protected patient information communicated by non-electronic and electronic means.

**Expectations of Motor and Sensory Functions**

A MLS professional program student must demonstrate sufficient motor and sensory function to execute movements required to carry out work assignments in the preanalytical, analytical, and postanalytical phases of laboratory testing. Specifically, a MLS program student must be able to:

1. Distinguish the physical attributes, including color, shape, and size, of objects both macroscopically and microscopically.
2. Demonstrate sufficient dexterity to manipulate specimens, laboratory tools, equipment and instrumentation including but not limited to computer touch-screens, keyboards and handheld calculators, necessary to obtain and to report test results by non-electronic and electronic means.
3. Show adequate mobility to attend to duties in the various locations of the medical laboratory work environment.
4. Use sensory skills to acquire and apply information presented by various means and media, including but not limited to tactile, visual and non-visual.
5. Perform sustained, often repetitive physical activity that may require sitting, standing and/or walking for prolonged periods of time.
6. Accurately read and record numbers, letters and symbols displayed in print whether transmitted through non-electronic, electronic or other technological media.
7. Demonstrate proficiency performing a wide range of tests in areas of the contemporary medical laboratory including but not limited to hematology, clinical chemistry, immunohematology, microbiology, molecular and emerging diagnostics.

**Expectations of Professionalism**

A MLS professional program student must be able to demonstrate an image of professionalism through behavior, speech, and grooming. Specifically, a program student must be able to:

1. Always adhere to medical laboratory safety protocols when working with various sample types including blood, urine, and other body fluids and tissues, with infectious organisms, and with hazardous chemicals.
2. Demonstrate the ability to work with focused attention on safety and accuracy whatever the work environment circumstances, and to objectively evaluate information and take responsibility for subsequent decisions when mistakes may have a high impact on patient care.
3. Adapt to changing work environments, maintain a professional demeanor, and remain focused despite distracting situations.
4. Demonstrate attributes that include integrity, responsibility, and tolerance.
5. Speak, act and perform all work in an ethical manner.
6. Show respect for self and others.
7. Work independently as well as actively engage cooperatively with others, performing professional obligations in a timely, responsible manner.
8. Prioritize tasks and accept responsibility for work performed independently and as a team member.
9. Assess his or her work performance, willingly accept constructive criticism, and look for ways to improve both knowledge and skill.

**Accreditation**

The Medical Laboratory Science program is accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS). NAACLS can be contacted at:

NAACLS # 5600 N. River Road, Suite 720 # Rosemont, IL 60018
TEL: (773) 714-8880 # www.naacls.org (http://www.naacls.org)

**Facilities**

The Dixie State University MLS Program office and classroom laboratories are located on the second floor of the Russell C. Taylor Health Science Building, located at 1526 E. Medical Center Drive, St. George, UT.

**Clubs**

Admitted program students may choose to join a number of professional societies including the American Society for Clinical Laboratory Science (ASCLS) and the American Society for Clinical Pathology (ASCP).

**Course Prefixes**

- MLS
Degrees

- Bachelor of Science in Medical Laboratory Science (catalog.dixie.edu/programs/medicallaboratoryscience/bachelor_of_science_in_medical_laboratory_science)
- Associate of Applied Science in Medical Laboratory Science (on hiatus)

“Our vision is that the Dixie State University Medical Laboratory Science Program be a model of excellence in medical laboratory science education, graduating medical laboratory scientists who meet the workforce demands of today and tomorrow.” To that end, the Medical Laboratory Science program has been revised, focusing resources on the B.S. in Medical Laboratory Science degree program. Consequently, effective December 6, 2016, the MLS program suspended the A.A.S. in MLS degree program admissions and is not accepting applications for admission to this program until further notice.”

To be admitted to the MLS Professional Program, a student must, at a minimum:

1. be admitted to DSU as a degree-seeking student and have completed a minimum of 59 semester credits
2. have a cumulative GPA of 2.50
3. have a GPA of 2.00 for all math and science courses
4. complete all MLS professional program prerequisites BEFORE the fall term start date. The prerequisites are as follows:

- Completed DSU general education requirements; NOTE: A previously earned degree may fulfill the DSU general education requirements, but per Utah Board of Regents policy, courses must be equivalent to DSU’s minimum General Education standards in English, Mathematics, and American Institutions.
- Completed the DSU computer literacy requirement unless the student has previously completed a BS, BA, AS, AA, or AAS from a regionally accredited institution;
- Completed two college-level math classes one of which must be statistics;
- Completed 16-semester credits (or 24-quarter credits) in college-level Biology classes which must include at a minimum: 1) a microbiology course; the microbiology course must include a laboratory component either integral to the course or taken separately; and 2) a human anatomy and/or physiology course; the course(s) must include a laboratory component either integral to the course(s) or taken separately; and,
- Completed a minimum of 10-semester credits (or 15-quarter credits) in college-level Chemistry classes which must include one course in organic or biochemistry with a lab component either integral to the course or taken separately.

**NOTE:** Program prerequisites do not have to be completed to APPLY to the MLS professional program.

Program Learning Outcomes*

Upon successful completion of the DSU MLS program, graduates will be able to:

1. Competently perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services, including hematology, chemistry, microbiology, urinalysis, body fluids, molecular diagnostics, phlebotomy, and immunohematology;
2. Proficiently problem-solve, troubleshoot, and interpret results, and use statistical approaches when evaluating data;
3. Actively participate in the development, implementation, and evaluation of test methods;
4. Take responsibility for analysis and decision-making;
5. Adhere to safety and governmental regulations and standards as applied to medical laboratory practice; and,
6. Project an image of professionalism, respecting the feelings and needs of others, protecting the confidence of patient information, and never allowing personal concerns and biases to interfere with the welfare of patients nor the work of colleagues and members of the healthcare team caring for patients.

Additionally, graduates will possess relevant experience in:

1. Interpersonal and interdisciplinary communication interactions with members of healthcare teams, external relations, customer service and patients;
2. Medical laboratory finance, operations, marketing and human resource management;
3. Using information technology to effectively and accurately report laboratory-generated information; and,
4. Research design and practice.

* Modified to align with the NAACLS Standards for Accredited & Approved Programs, Unique Standards for MLS: "Description of the Medical Laboratory Scientist Profession" and "Curricular Requirements", revised 11/2016.
Career Information
Career Opportunities
Medical laboratory Scientists (MLS, B.S.) and Medical Laboratory Technicians (MLT, A.A.S)

What is a medical laboratory science professional?*

“Medical laboratory science professionals, often called medical laboratorians, are vital healthcare detectives, uncovering and providing laboratory information from laboratory analyses that assist physicians in patient diagnosis and treatment, as well as in disease monitoring or prevention (maintenance of health). We use sophisticated biomedical instrumentation and technology, computers, and methods requiring manual dexterity to perform laboratory testing on blood and body fluids. Laboratory testing encompasses such disciplines as clinical chemistry, hematology, immunology, immunohematology, microbiology, and molecular biology. Medical laboratory science professionals generate accurate laboratory data that are needed to aid in detecting cancer, heart attacks, diabetes, infectious mononucleosis, and identification of bacteria or viruses that cause infections, as well as in detecting drugs of abuse. In addition, we monitor testing quality and consult with other members of the healthcare team.

The medical laboratory science profession has more than one career track based on level of education: medical laboratory technician (2 years) and medical laboratory scientist (4 to 5 years). Medical laboratory technicians are competent in the collection, processing and analysis of biological specimens, the performance of lab procedures, the maintenance of instruments, and relating lab findings to common diseases/conditions. Medical laboratory scientists have a more extensive theoretical knowledge base. Therefore they not only perform laboratory procedures including very sophisticated analyses, but also evaluate/interpret the results, integrate data, problem solve, consult, conduct research and develop new test methods.”

LEARN MORE

• How do I become a medical laboratory professional (http://www.ascls.org/careers-ascls/how-do-i-become-a-laboratory-professional)
• American Society for Clinical Pathology (https://www.ascp.org/content/functional-nav/career-center) (ASCP)


From 2014 to 2024, employment for medical laboratory technologists and technicians is expected to grow 16%, which is consistent with the average for all occupations. However, regional variations in need can increase that percentage.

Salary Range*

The top 10 percent of medical laboratory technologists earn more than $84,300 and the bottom 10 percent earn less than $41,510; their median annual wage is $60,520. On the other hand, the top 10 percent of medical laboratory technicians earn more than $60,810, and the bottom 10 percent earn less than $25,890. The median annual wage for technicians is $38,970.

* From the American Society for Clinical Laboratory Science (ASCLS) Career Center web page.
** From the US Department of Labor's Occupational Outlook Handbook

Courses

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. Lab fee required. Prerequisite: Admission to the Dixie State 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. Lab fee required. Prerequisite: Admission to the Dixie State 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. Lab fee required. Prerequisite: Admission to the Dixie State University Bachelor of Science Program in Medical Laboratory Science. FA.

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. Lab fee required. Prerequisite: Admission to the Dixie State University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 3355. 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. Prerequisite: Admission to the Dixie State 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. Lab fee required. Prerequisite: Admission to the Dixie State University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 4020. MLS Capstone. 1 Hour.
Students will learn resume writing and take a mock registry examination in preparation for Board of Certification Exam by the American Society for Clinical Pathology. Prerequisite: Admission to the Dixie State University Bachelor of Science Program in Medical Laboratory Science. 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. Prerequisite: Admission to the Dixie State 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. Lab fee required. The course will be taught for the first time fall semester 2018. Prerequisite: Admission to the Dixie State 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 hematopoiensis, 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. Lab fee required. Prerequisite: Admission to the Dixie State 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. Lab fee required. Prerequisite: Admission to the Dixie State University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 4330. Clinical Chemistry 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 chemistry/immunology laboratory and further develop discipline-specific competency. Prerequisite: Admission to the Dixie State 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 will be taught for the first time fall 2018. Prerequisite: Admission to the Dixie State University Bachelor of Science in Medical Laboratory Science professional program. FA.

MLS 4410. Blood Banking 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 blood bank and further develop discipline-specific competency. Prerequisite: Admission to the Dixie State University Bachelor of Science Program in Medical Laboratory Science. SP.

MLS 4414. Clinical Microbiology 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 medical microbiology laboratory and further develop discipline-specific competency. Prerequisite: Admission to the Dixie State 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. Prerequisite: Admission to the Dixie State 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. Lab fee required. This course will be taught for the first time in fall 2018. Prerequisite: Admission to the Dixie State University Bachelor of Science in Medical Laboratory Science professional program. FA.