MEDICAL LABORATORY TECHNOLOGY (FORMERLY CLINICAL LABORATORY SCIENCE)

The Medical Laboratory Technology Degree program prepares the student for positions in a medical laboratory. As a graduate, the student will play a vital role in patient care by performing a wide range of medical laboratory procedures used in the detection, diagnosis, and treatment of disease. The MLT curriculum provides general education courses and introductory MLT courses in the first year, then career-related courses and practical experience in the second year. The first year courses are open to students wishing to enter the MLT program. The second year MLT courses are restricted to those MLT majors that have maintained a C+ or higher in all BIO, MLT, CHE and MAT courses during the first year curriculum. During the course of study, students will develop skills and competencies as they analyze specimens for bacteria, parasites, and other microorganisms; analyze the chemical and cellular content of body fluids; match blood for transfusions; and test for drug levels in the blood to show how a patient is responding to treatment. Medical Laboratory Technicians also collect and prepare patient specimens. They generate, analyze and relay important laboratory results to the physician treating the patient. The modern medical laboratory uses increasingly sophisticated instrumentation interfaced with computer technology.

MEDICAL LABORATORY TECHNOLOGY (MLT)

Prepare to play a vital role in patient care by performing a wide range of clinical laboratory procedures used in the detection, diagnosis, and treatment of disease. The MLT curriculum provides general education courses and introductory MLT courses in the first year, then career-related courses and practical experience in the second year. The first year courses are open to students wishing to enter the MLT program. The second year MLT courses are restricted to those MLT majors that have maintained a C+ or higher in all BIO, MLT, CHE and MAT courses during the first year curriculum. Clinical laboratory technicians analyze specimens for bacteria, parasites, and other microorganisms; analyze the chemical and cellular content of body fluids; match blood for transfusions; and test for drug levels in the blood to show how a patient is responding to treatment. Clinical laboratory technicians also collect and prepare patient specimens. The important laboratory results generated by this testing are then analyzed and relayed to physicians. The modern clinical laboratory uses increasingly sophisticated instrumentation interfaced with computer technology. The MLT program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), 5600 North River Road, Suite 720, Rosemont, Illinois 60018, telephone 773-714-8880. Graduates of the MLT program are eligible to take a national certification examination, such as that offered by the Board of Certification of the American Society for Clinical Pathology.

Year 1

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Summer</td>
<td>BIO 113 or 109</td>
<td>Life Science for Allied Health (formerly BIO 099) (or Biology I)</td>
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<td></td>
<td>MAT 162</td>
<td>Introduction to Functions Modeling (Formerly MAT 134) (or higher)</td>
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<td>Fall</td>
<td>ENG 101</td>
<td>College Writing I</td>
<td>3</td>
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<tr>
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<td>BIO 204</td>
<td>Anatomy and Physiology II</td>
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<td></td>
<td>MLT 103</td>
<td>Introduction to Medical Laboratory Technology I</td>
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<tr>
<td></td>
<td>CHE 107</td>
<td>General Chemistry I</td>
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<td>Spring</td>
<td>ENG 102</td>
<td>College Writing II</td>
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<tr>
<td></td>
<td>BIO 205</td>
<td>Microbiology</td>
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<td></td>
<td>MLT 105</td>
<td>Introduction to Medical Laboratory Technology II</td>
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<td>MLT 106</td>
<td>Phlebotomy and Urinalysis Practicum for pre-MLT Students</td>
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<td></td>
<td>Social Science Elective</td>
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<td>Humanities Elective</td>
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<tr>
<td>Year 2</td>
<td>Fall</td>
<td>Clinical Hematology and Hemostasis</td>
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<td>MLT 221</td>
<td>Clinical Practicum I - Hematology</td>
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<tr>
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<td>MLT 222</td>
<td>Clinical Immunohematology</td>
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<td>MLT 223</td>
<td>Clinical Practicum II - Immunohematology</td>
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<td>Spring</td>
<td>MLT 224</td>
<td>Clinical Microbiology</td>
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<td>MLT 225</td>
<td>Clinical Practicum III - Microbiology</td>
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<td></td>
<td>MLT 226</td>
<td>Clinical Chemistry</td>
<td>5</td>
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<td></td>
<td>MLT 227</td>
<td>Clinical Practicum IV - Clinical Chemistry</td>
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<td>Total Credits:</td>
<td>71-72</td>
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</table>
Students must earn a C+ or better in BIO, CHE, MAT, and MLT (or CLS) courses.

Social Science Electives: See Elective Courses by Abbreviation (http://catalog.mwcc.edu/associateddegreesandcertificatelistandotheroptions/#electivecoursesbyabbreviation). NOTE: Can be taken any first year semester.

Humanities Electives: See Elective Courses by Abbreviation (http://catalog.mwcc.edu/electivecoursesbyabbreviation). Note: Can be taken any first year semester.

See the Medical Laboratory Technology general information for program student learning outcomes and technical standards.

**CAMPUS**

MLT courses are offered in Gardner.

**Helpful hints**

Success in this field requires attention to detail, flexibility to multitask and change tasks when interrupted, a strong concern for order, sound judgment and ability to conduct laboratory procedures accurately and when under pressure.

Technology is integrated into all aspects of attending college in the 21st century. Students are expected to have proficient computer skills and the ability to access the internet via desktop/laptop computer or tablet. Internet access may be from home or through a public site, such as a local public library, public college or at any Mount Wachusett Community College campus.

**Transfer options**

For transfer options, please click here. (http://catalog.mwcc.edu/academicresources/#transferinformation) It is recommended that you also consult with your academic advisor.

**Special requirements**

Students who satisfy the prerequisites are eligible to enroll in the first-year courses of the MLT program.

Students must supply the following information before the course begins:

- Health examination conducted within the past two years by a licensed healthcare provider, given to Health Services on MWCC’s Report of Medical History form
- Proof of current immunizations, given to Health Services office (978-630-9136, for more information):
  - Tuberculosis screening (2 step PPB OR TB Spot Test) within 1 year
    - If positive, negative chest X-ray and annual TB questionnaire
  - Measles, Mumps and Rubella: series of 2 or a positive antibody titer
  - Hepatitis B: series of 3 **AND** a positive antibody titer for Hepatitis B
  - Tetanus, Diptheria, Pertussis (Tdap) within 10 years
  - Chicken Pox: 2 vaccines or a positive antibody titer
  - Influenza vaccine (current season)
  - Release Form
- Bloodborne pathogen training certificate (done as part of the MLT 103 Introduction to Medical Laboratory Technology I (Formerly CLS103) course)
- Liability Insurance of $1,000,000/$3,000,000 coverage is required. Students will be covered under the college’s liability insurance policy, which will be billed through student fees.
- All health profession students must participate in the Massachusetts Community College Health Insurance Plan or provide accurate information regarding comparable coverage.
- CORI/SORI. As part of the coursework in the MLT program, students are required to complete practical hours in clinical facilities working with patients under the supervision of licensed providers. Clinical sites require the student obtain certain background
checks (state/federal criminal or sexual offender or fingerprinting) before participating in the clinical experience. Cost for drug testing is the responsibility of the student.

- Drug testing. Drug testing should be done two weeks before clinical placement. Information and procedure will be given to students in MLT 105 Introduction to Medical Laboratory Technology II (Formerly CLS105). The cost for drug testing is the responsibility of the student.

- Refusing to participate in these background checks or drug testing will result in inability to progress in the program. A positive background check or drug test may also result in the inability to progress in the program. The criminal background check may also be required for future employment and/or licensure and/or certification.

The prospective student is encouraged to discuss any concerns with the program director prior to beginning the MLT program. This information is given to you now just to forewarn you of the potential additional cost and responsibilities.

Students must earn a C+ or better in BIO, CHE, MLT and MAT courses to remain in good standing and continue through the MLT course sequence. Clinical placement within the second year of the program is not guaranteed, but the MLT program director will attempt to secure alternate training as soon as possible.

Career options/Earning potential
For career options, please click here. (https://mwcc.emsicareercoach.com/#action=loadOccupationSearchResults&Search=Medical+lab+tech&SearchType=occupation)

PROGRAM STUDENT LEARNING OUTCOMES FOR MLT

Upon graduation from this program, students shall have demonstrated the ability to:

- Procure laboratory test samples in an efficient, timely manner.
- Produce accurate laboratory test results within acceptable limits of quality control.
- Correlate and interpret laboratory test data.
- Disseminate laboratory test information to clinicians in a timely manner.
- Consult with more experienced team members when necessary.
- Exhibit knowledge of laboratory tests and standards.
- Exhibit basic knowledge of professional ethics, laws and regulations.
- Demonstrate continued competency in the field at least annually.
- Maintain membership in a professional organization.
- Perform multi-functional tasks.
- Actively participate in continuing education.

TECHNICAL STANDARDS ¹ FOR MLT

¹ For general information about technical standards and accommodation, see Technical Standards. (http://catalog.mwcc.edu/academicresources/academicandgradingpolicies/technicalstandards)

Students entering the MLT program must be able to demonstrate the ability to:

- Comprehend textbook material at a college level.
- Communicate and assimilate information either in spoken, printed, signed, or computer voice format.
- Gather, analyze, and draw conclusions from data.
- Stand for a minimum of two hours.
- Walk for a minimum of six hours, not necessarily consecutively.
- Stoop, bend, and twist for a minimum of 30 minutes at a time and be able to repeat this activity at frequent intervals.
- Differentiate colors as assessed by standard color blindness evaluation.
- Differentiate by touch, hotness/coldness, wetness/dryness, and hardness/softness.
- Use the small muscle dexterity necessary to do such tasks as gloving, gowning, and operating controls on laboratory instrumentation.
- Respond to spoken words, monitor signals, and instrument alarms.
MLT 103. Introduction to Medical Laboratory Technology I (Formerly CLS103). 4 Credits.
This introductory course provides students with the theory and laboratory skill that serve as the foundation for clinical coursework in the hospital laboratory. An overview of the role of the clinical laboratory scientist in health care in general and patient care in particular is emphasized. Basics of laboratory equipment, measurement, and lab math, along with use of information systems are covered. Learning and understanding of the quality assurance process and safety in the lab prepares the student for introduction to specialized departments within the laboratory. Students will be introduced to basic immunology, serology and the use of antigen/antibody reactions in the medical laboratory. In addition, a brief introductory survey of selected topics in hematology, clinical chemistry and immunohematology will be presented. Prerequisites: ENG 098, FYE 101, MAT 092, RDG 098, or placement; BIO 113 (preferred) or BIO 109; CHE 107 recommended. Fall.

MLT 105. Introduction to Medical Laboratory Technology II (Formerly CLS105). 3 Credits.
This introductory course expands on the student's knowledge gained in MLT 103, and concentrates on the analysis of selected body fluids and the proper collection of peripheral blood samples. The course covers the production of selected body fluids (e.g., urine, semen, synovial fluid and feces); their normal characteristics and pathological changes will be discussed within the practice of acceptable quality assurance. A description of the laboratory tests used in the clinical evaluation of body fluids will also be presented. Throughout this course, special emphasis is placed on the correlation of laboratory results with the patient's probable condition. The course also provides theory in phlebotomy and practical instruction in skills needed to obtain acceptable blood samples by venipuncture, capillary (dermal) puncture, or other techniques. Students will learn to safely and proficiently collect various types of blood specimen for laboratory analysis. NOTE: Students must pass both the UA/Body Fluids and Phlebotomy component with a grade of “C+” (77 percent) or better to maintain an acceptable performance level to progress in the pre-MLT program. If a student fails to achieve at least a “C+” (77 percent) in either UA/Body Fluids or Phlebotomy, their final grade for the course will be the lower of the two grades. THE STUDENT WILL NOT BE ALLOWED TO CONTINUE IN SEQUENCE TO MLT 106 OR PROGRESS TO THE MLT PROGRAM CLINICAL YEAR IF THEY FAIL TO ACHIEVE A “C+” (77 PERCENT) OR HIGHER IN ANY LABORATORY OR LECTURE (UA/BODY FLUIDS AND PHLEBOTOMY) COMPONENT IN THE CURRICULUM. Prerequisites: MLT 103; BIO 204 recommended (or corequisite). Spring.

MLT 106. Phlebotomy and Urinalysis Practicum for pre-MLT Students. 1 Credit.
This course provides practical experience (37.5 scheduled hours of urinalysis and drawing blood) for the student to apply the knowledge, attitudes, and skills of clinical laboratory practice in specimen collection, phlebotomy and urinalysis that were gained in MLT 105. This knowledge is integrated into the clinical laboratory through the practice of phlebotomy and urinalysis, utilizing appropriate resource management, communications, quality assurance, safety, and information systems. Placement by arrangement. Prerequisites: MLT 103 and MLT 105. Summer.

MLT 220. Clinical Hematology and Hemostasis. 5 Credits.
This course is designed to develop medical laboratory technician skills that will be used in the Hematology and Hemostasis laboratories in a hospital setting. The course details the formation, function, and morphology of the blood's normal cellular elements as well as the systems involved in coagulation and fibrinolysis. Students will apply their knowledge and skills using theoretical knowledge, principles and procedures of hematology and coagulation testing, identify sources of error, and relate clinical significance of laboratory results to human disease. Students will learn to correlate laboratory findings with the patient's clinical signs and symptoms using case studies, homework and practical exams. Prerequisites: MLT 103, MLT 105, MLT 106, MAT 143, CHE 107, BIO 204 and BIO 205 with a C+ or higher. Fall.

MLT 221. Clinical Practicum I - Hematology. 3 Credits.
This course is the clinical practicum experience in Hematology and Hemostasis, which takes place in a local hospital. The practicum is scheduled as 3 weeks long, 5 days/week, 40 hours/week by arrangement with MLT clinical coordinator. Students will apply the knowledge and skills using principles and procedures of hematology and coagulation testing, identifying sources of error and relate the clinical significance of results to human disease. Students are to be able to correlate a patient's laboratory findings with the patient's diagnosis or other laboratory results. The students must receive a passing grade (representing a C+ or higher) in order to progress through the program. Prerequisites: C+ or higher in MLT 220 and MLT 222. Fall.

MLT 222. Clinical Immunohematology. 5 Credits.
This course is designed to develop medical lab science skills in Immunohematology. Theoretical concepts underlying blood group biochemistry, genetics, and serology as they relate to blood donation and transfusion therapy practices are presented. An understanding of the role of both humoral and cellular immunity in defense against disease is investigated as they relate to common immunoassays. Students will apply their knowledge and skills using principles and routine blood bank and serology procedures.
including donor selection, compatibility testing, detection and identification of antibodies, and component preparation and handling. Prerequisites: MLT 103, MLT 105, MLT 106, MAT 143, CHE 107, BIO 204 and BIO 205 with a C+ or higher. Fall.

**MLT 223. Clinical Practicum II - Immunohematology. 3 Credits.**
This course is the clinical practicum experience in Immunohematology, which takes place in a local hospital. The practicum is scheduled as 3 weeks long, 5 days/week, 40 hours/week by arrangement with MLT clinical coordinator. Students will apply their knowledge and skills using principles and routine blood bank and serology procedures including donor selection, compatibility testing, detection and identification of antibodies, and component preparation and handling. Prerequisites: A C+ or better in MLT 220 and MLT 222. Fall.

**MLT 224. Clinical Microbiology. 5 Credits.**
This course is designed to introduce students to the role of microbes in the pathology of human infectious diseases. Students will apply their knowledge and skills using conventional microscopic, culture, and biochemical techniques to isolate, differentiate, identify, quantitate, and determine the antimicrobial susceptibility of medically relevant pathogenic microorganisms. The course emphasizes bacteria, viruses, parasites, and fungi found in clinical specimens. Prerequisites: C+ or better in MLT 220, MLT 221, MLT 222, MLT 223. Spring.

**MLT 225. Clinical Practicum III - Microbiology. 3 Credits.**
This course is the clinical practicum experience in Microbiology, which takes place in a local hospital. The practicum is scheduled as 3 weeks long, 5 days/week, 40 hours/week by arrangement with MLT clinical coordinator. Students will apply their knowledge and skills using conventional microscopic, culture, and biochemical techniques to isolate, identify, quantify, differentiate, and determine the antimicrobial susceptibility of medically relevant microbial pathogens including bacteria, a few viruses, parasites, and fungi found in clinical specimens. Prerequisites: C+ or higher in MLT 224 and MLT 226. Spring.

**MLT 226. Clinical Chemistry. 5 Credits.**
This course is designed to interrelate human disease with the biochemistry of human physiology and metabolism. In addition to learning the chemical principles underlying the laboratory procedures, students will understand the operating principles, sources of error, and routine maintenance of the instrumentation. Prerequisites: C+ or better in MLT 220, MLT 221, MLT 222, MLT 223. Spring.

**MLT 227. Clinical Practicum IV - Clinical Chemistry. 3 Credits.**
This course is the clinical practicum experience in Clinical Chemistry, which takes place in a local hospital. The practicum is scheduled as 3 weeks long, 5 days/week, 40 hours/week by arrangement with MLT clinical coordinator. Students will apply their knowledge and skills using principles and procedures of clinical chemistry to operate instrumentation that generates results used to detect various diseases. In addition to learning the chemical principles underlying the laboratory procedures, students will understand the operating principles, sources of error, and routine maintenance of the instrumentation. Prerequisite: C+ or better in both MLT 224 and MLT 226. Spring.