
Medical Laboratory Science

Faculty and Fields of Interest

Medical Laboratory Science Major BS degree

In medical laboratory science, both the clinical laboratory science option and the cytotechnology option, provide students with the concepts, professional attitudes, scientific theory and skills essential for practicing clinical laboratorians. Medical laboratory science leads students to understand the health care delivery system and the role of the clinical laboratory scientist and cytotechnologist in that system, to function as professionals, and to gain the skills and attitudes needed to enter their practice. All graduates are eligible for national certification and licensure.

Students use state-of-the-art equipment and laboratory methods in the new, modern-design laboratory facility. The medical laboratory science faculty are professional laboratory scientists and leaders in local, regional, and national professional and scientific organizations who influence the practice of the profession by serving on committees and as consultants.

Dorothy A. Bergeron immunohematology, health education, professional issues

Brenda Bouchard coagulation, serology, science education

Lynne Brodeur medical laboratory science

Eileen Carreiro-Lewandowski clinical chemistry, biochemistry, laboratory regulation

Mary Lou Frias human ecology, pathophysiology

Thom Goodwin medical laboratory science

James T. Griffith (chairperson) microbiology, antimicrobial agents, health legislation

Susan J. Leclair hematology, health planning

Frank J. Scarano molecular epidemiology, clinical microbiology

Entrance to Medical Laboratory Science

In addition to the general course requirements for admission, the Department of Medical Laboratory Science more specifically requires 3 units of Natural Science and 3 units of College Preparatory Mathematics which must include 2 units of algebra.

Admission of Transfer Students and Certified Clinical Laboratory Technicians

Credits earned at another institution will be evaluated for transferability and equivalency to existing UMass Dartmouth courses. All required Medical Laboratory Science courses must be taken at the University of Massachusetts at Dartmouth, unless approved by the department.

Health Policies

Students admitted to medical laboratory science programs are expected to have a complete physical examination and the appropriate immunizations as outlined by the department.

Medical Laboratory Science Major

Clinical Laboratory Science Option

The option in clinical laboratory science is an integrated program, accredited by the National Accrediting Agency for Clinical Laboratory Sciences, 8410 West Bryn Mawr Avenue, Suite 670, Chicago, IL 60631-3415. The program officials are David K. Rubin, MD (Medical Advisor), and Dorothy A. Bergeron, MS (Program Director). Academic and technical competence are developed in the major areas of clinical laboratory practice: hematology, clinical chemistry, clinical microbiology and immunohematology. The clinical laboratory theory and methods integrated throughout the four-year curriculum culminate with a clinical practicum in an affiliated hospital during the second semester of the senior year. Laboratory instrumentation, use of computers in laboratories, and quality assurance are emphasized throughout.

Careers are available in hospital, independent, public health, industrial, pharmaceutical, and private laboratories as scientists and researchers, and some clinical laboratory scientist work as educators, administrators, and consultants. By presenting a diverse background in science, analytical skills, and problem-solving, medical laboratory science prepares students for post-graduate studies in the sciences (including chemistry, microbiology, pathology), administration (including human resource management, health service administration, and business administration) and professional schools (including medical, osteopathy, and physician assistant).

After completion of this program, the graduate will be able to demonstrate entry level competencies in the following areas of professional practice:

- collect and process biological specimens for analysis;
- perform analytical tests on body fluids, cells, and other samples;
- make critical judgments by integrating and relating data generated by the various clinical laboratory departments;
- evaluate quality control results and institute corrective procedures;
- perform preventive and corrective maintenance on equipment and instruments or refer to appropriate source for repair;
- evaluate new techniques and procedures in terms of usefulness and practicality within the context of a given laboratory's resources;
- demonstrate concern for the patient and cooperate with laboratory personnel and

other health care professionals;

- communicate effectively and in a professional manner with patients, laboratory personnel, other health care professionals, and the public;
- assume responsibility for continuing professional development and competence;
- assume leadership to effect positive change in the profession;
- apply principles of safety, management and supervision, education methodologies, and current information systems.

Entrance to the Upper Division of the Option in Clinical Laboratory Science

The Committee on Advanced Standing meets each year to evaluate the academic and professional progress of sophomore students who have completed sophomore-level requirements. After reviewing the records, the committee recommends to the department faculty those students to be admitted to the upper division of the option in clinical laboratory science. Conditional acceptance with academic qualifications is possible in unusual circumstances.

Admission to the upper division of the option in clinical laboratory science requires:

1. completion of all prerequisites in the first two years as outlined in the requirements;
2. a minimum cumulative science grade point average of 2.0 in all **completed** courses required by the major;
3. evidence that the student is making progress toward satisfying degree requirements and certification requirements;
4. evidence that the student is able to meet the following non-academic criteria (technical standards)
 - Observation. The student must be able to participate actively in laboratory exercises and clinical experiences.
 - Communication. The student must be able to communicate with fellow students, faculty, staff and members of a health care team.
 - Motor. The student must have sufficient motor skills to perform basic diagnostic tests.
 - Intellectual/Conceptual, Integrate and Quantitative Abilities. The student must be able to problem solve and comprehend spatial relationships of structures.

Clinical Practicum

The faculty assigns the students to the clinical practicum at the following affiliates: Charlton Memorial Hospital (Fall River, MA), Massachusetts General Hospital (Boston, MA), Morton Hospital and Medical Center (Taunton, MA), New England Medical Center (Boston, MA), Roger Williams Medical Center (Providence, RI), St. Anne's Hospital (Fall River, MA), St. Luke's Hospital (New Bedford, MA), and South Shore Hospital (South Weymouth, MA). Students may be assigned to a rotation at enrichment sites: Rhode Island Blood Center (Providence, RI) and State Laboratory Institute, Massachusetts Department of Public Health (Jamaica Plain, MA).

See requirements on next page.

Requirements

		Semester Credits	
		First	Second
First Year			
MLS 115, 116	Introduction to Medical Laboratory Science I, II	2	
MLS 315	Human Genetics		3
MLS 317	Human Genetics Laboratory		1
CHM 151, 152	Principles of Modern Chemistry I, II	3	3
CHM 161, 162	Introductory Applied Chemistry I, II	1	1
MTH 104	Fundamentals of Statistics		3
ENL 101, 102	Critical Writing and Reading I, II	3	3
	General Education/Distribution Requirements	6	3
		15	17
Second Year			
MLS 226	Pathophysiology		3
MLS 228	Pathophysiology Laboratory		1
MLS 360	Clinical Chemistry Applied to Diagnostic Techniques		3
MLS 362	Clinical Chemistry Applied to Diagnostic Techniques Laboratory		1
BIO 111	Introduction to Human Physiology	4	
CHM 251	Organic Chemistry I	3	
CHM 263	Bio-Organic Chemistry Laboratory	1	
	General Education/Distribution Requirements	6	9
		14	17
Integrated Program			
Third Year			
MLS 301	General Microbiology	4	
MLS 309	General Microbiology Laboratory	1	
MLS 302	Medical Bacteriology		3
MLS 304	Medical Bacteriology Laboratory		1
MLS 305	Clinical Immunobiology	3	
MLS 307	Clinical Immunobiology Laboratory	1	
MLS 322	Fundamentals of Clinical Hematology		2
MLS 324	Fundamentals of Clinical Hematology Lab		1
MLS 449	Special Laboratory I Lecture		2
MLS 451	Special Laboratory I		1
PHL 317	Ethics and Health Care Professionals		3
	Free Electives	3	
		12	13
Fourth Year			
MLS 401, 402	Clinical Microbiology I, II	5	4
MLS 409, 410	Immunohematology I, II	2	2
MLS 419, 420	Clinical Biochemistry I, II	5	4
MLS 429, 430	Hematology I, II	3	3
MLS 439	Clinical Microscopy	2	
MLS 450	Special Laboratory II		2
		17	15
	Total Credits		120

General Education Departmental Requirements

Students majoring in the Clinical Laboratory Science option will meet their departmentally-controlled General Education requirements as follows:

Area E: Satisfied by PHL 317

Area I, Tier 2: Satisfied by MLS 362, 449, 451, 419, and 450

Area W, Tier 2: Satisfied by ENL 266

Area O: Satisfied by MLS 307 and 450

Medical Laboratory Science Major
Cytotechnology Option

Medical Laboratory Science
Courses

Requirements

Cytotechnology, a specialty in the clinical laboratory, evaluates cells microscopically to detect morphologic changes related to benign and malignant disease. The first three years are spent on campus building a foundation in biology, chemistry, math, and medical laboratory science, followed by a one year clinical practicum in an accredited hospital program. A strong sense of responsibility, ability to concentrate, and an interest in natural science are necessary qualities for a cytotechnologist. Career opportunities are excellent. Cytotechnologists are employed as laboratory managers, educators, medical sales representatives, technical representatives, and scientists in private and hospital-based laboratories, state, federal or industrial laboratories, research laboratories and veterinary laboratories. Graduate study possibilities include pathology, anatomy, or genetics.

Entrance to the Option in Cytotechnology

Students interested in this option are encouraged to discuss cytotechnology with the department chairperson as early as possible to select the most appropriate courses. Application for this option should be made during the spring semester of the sophomore year and no later than the fall semester of the junior year. Generally, students apply for admission to the accredited hospital program in the spring semester of the junior year.

General Education Departmental Requirements

Students majoring in the Cytotechnology option will meet their departmentally-controlled General Education requirements as follows:

Area E: Satisfied by PHL 317

Area I, Tier 2: TBD

Area W, Tier 2: TBD

Area O: TBD

1. A minimum of 20 semester hours of approved courses in biological and laboratory science.
 2. A minimum of 8 semester hours of chemistry.
 3. All requirements of the university and the College of Arts and Sciences for a B.S. degree.
 4. Free electives to bring the total to 90 credits, preceding the fourth year.
 5. Successful completion of an accredited hospital cytotechnology program.
- Each hospital cytotechnology program determines the number of credits in a specific course based on the nature of the laboratory and the range of case presentations.

A minimum of thirty credits from the courses listed below are granted at the completion of the hospital cytotechnology program.

- | | |
|---------|----------------------------------|
| MLS 461 | Introduction to Cytotechnology |
| MLS 462 | Special Topics in Cytotechnology |
| MLS 463 | Cytopathology |
| MLS 464 | Medical Cytology |
| MLS 465 | Cytotechnology Seminar |
| MLS 466 | Applied Cytotechnology |
| MLS 467 | Cytology Practicum |
| MLS 468 | Cytology Practicum II |

All students must be recommended by the department chairperson to the approved hospital program. The university cannot guarantee placement in an approved hospital program.

Clinical fees are established by the hospital program. Students are required to pay this fee in addition to the usual university fees.

MLS 105 three credits
Contemporary Topics in Human Ecology I

Medical-social problems as they relate to modern society. Contemporary topics such as human inheritance and eugenics, factors affecting I.Q., basic human physiology, the disease state, birth control and abortion. This course satisfies the science distribution requirement.

MLS 106 three credits
Contemporary Topics in Human Ecology II

Continuation of MLS 105. This course satisfies the science distribution requirement.

MLS 111 one credit
Medical Laboratory Science Seminar

A basic orientation to the field of laboratory medicine. The specialty areas of medical laboratory science, manpower problems, upward mobility, professional organizations, accreditation, certification, the team concept and professionalism are discussed.

MLS 113 one credit
Introduction to Clinical Laboratory Techniques

An introduction to the fundamental techniques used in the clinical laboratory. Topics shall include qualitative and quantitative testing on body fluids, safety and quality control.

MLS 115 one credit
Introduction to Medical Laboratory Science I

Specialty areas, professional issues, career mobility and an introduction to the university and its facilities presented in lectures, field trips and laboratory experiences. Fundamentals of clinical laboratory techniques will be interspersed with lectures and discussions. Library, computer and Student Resource Center facilities will be utilized during class time.

MLS 116 one credit
Introduction to Medical Laboratory Science II

Continuation of MLS 115.

MLS 226 three credits
Pathophysiology

Prerequisite: BIO 111 or permission of instructor

The selection, generation, and translation of basic information for the diagnosis, prognosis and management of clinical samples. Health screen vs. diagnostic and prognostic profiles will be discussed.

College of Arts and Sciences

Gen Ed note: Medical Laboratory Science courses satisfy the Natural Science and Technology requirement. Those marked S below are appropriate for non-science/engineering majors.

MLS 228 one credit
Pathophysiology Laboratory
Corequisites: MLS 116, 226
Prerequisite: MLS 116 or permission of instructor
A laboratory correlated with MLS 226.

MLS 298 one to six credits
Experiential Learning
Prerequisites: At least sophomore standing; permission of the instructor, department chairperson, and college dean
Work experience at an elective level supervised for academic credit by a faculty member in an appropriate academic field. Conditions and hours to be arranged. Graded CR/NC. For specific procedures and regulations, see section of catalogue on Other Learning Experiences.

MLS 301 four credits
General Microbiology
Prerequisite: MLS 360 or permission of instructor
This course presents the basic concepts of physiology, genetics, morphology, ecology, systematics and control of microorganisms.

MLS 302 three credits
Medical Bacteriology
Prerequisite: MLS 301
The theoretical basis for an in-depth understanding of organisms of medical importance. Stress shall be placed on bacterial physiology as it relates to disease. Quality control, statistical methods, and current literature shall be analyzed.

MLS 304 one credit
Medical Bacteriology Laboratory
Corequisite: MLS 302
Prerequisite: MLS 309 or permission of instructor
A laboratory correlated with MLS 302.

MLS 305 three credits
Clinical Immunobiology
The emerging concepts of immunobiology. Topics will include immunogens, immunoglobulins, autoimmunity, infection and immunity, immunohematology, and tumor biology.

MLS 307 one credit
Clinical Immunobiology Laboratory
Corequisite: MLS 305
A laboratory correlated with MLS 305.

MLS 309 one credit
General Microbiology Laboratory
Corequisite: MLS 301
A laboratory correlated with MLS 301.

MLS 311 one to three credits
Medical Laboratory Science Seminar I
Prerequisite: Junior or senior standing or permission of instructor
Selected topics shall be presented, determined by current interests and developments in clinical laboratory science.

MLS 312 one to three credits
Medical Laboratory Science Seminar II
Prerequisites: Junior or senior standing and permission of chairperson
Selected topics shall be presented by both faculty and students. Topics shall be submitted from affiliated hospitals.

MLS 315 three credits
Human Genetics
An intensive survey of genetic mechanisms emphasizing the effect on human inheritance and disease.

MLS 317 one credit
Human Genetics Laboratory
Corequisite: MLS 315
A laboratory correlated with MLS 315.

MLS 319 three credits
Health Care Legislation
Major, recent, and pending health care legislation and its impact on the provider will be discussed. Possible topics include: Medicare, Medicaid, health manpower, accreditation, licensure, professional standards review, health systems agencies, and national health insurance.

MLS 322 two credits
Fundamentals of Clinical Hematology
Prerequisites: MLS 226, 228, 315, 317; or permission of instructor
Introduction to the pathophysiology of anemias, leukocyte dyscrasias and disorders. Topics may include bone marrow activity, cell energetics, testing protocols and examples of various modalities of therapy.

MLS 324 one credit
Fundamentals of Clinical Hematology Laboratory
Corequisite: MLS 322
Prerequisites: MLS 226, 228, 315, 317; or permission of instructor
Introduction to the morphology and biochemical testing of cells involved in anemias, leukocyte dyscrasias and other disorders. Topics may include bone marrow morphology, peripheral blood morphology and cytochemical testing protocols.

MLS 360 three credits
Clinical Chemistry Applied in Diagnostic Techniques
Prerequisites: CHM 152, 162; or permission of instructor.
Medically relevant carbohydrates, proteins, lipids, hormones, nonprotein nitrogenous substances, and enzymes will be discussed.

MLS 362 one credit
Clinical Chemistry Applied in Diagnostic Techniques Laboratory
Corequisite: MLS 360
A laboratory correlated with MLS 360.

MLS 449 two credits
Special Laboratory I Lecture
Prerequisite: MLS 360 or perm. of instructor
Study of special areas of the clinical laboratory. Intensive study of special topics in such areas as analytical instrumentation, electronics, urinalysis, endocrinology, microbiology, and nuclear medicine.

MLS 451 one credit
Special Laboratory I
Corequisite: MLS 449
Prerequisite: MLS 362
Laboratory course correlated with MLS 449.

Senior-Level Courses: Option in Clinical Laboratory Science

The following courses are presented on campus and at affiliated hospitals for an academic year that may exceed the regular academic year. This year will consist of 40 hours per week on campus and/or in affiliated hospital(s). Lecture and laboratory hours shall comply with the standards set by the National Accrediting Agency for Clinical Laboratory Sciences. These are open only to medical laboratory science students or by permission of the Department:

MLS 401 five credits
Clinical Microbiology I
Prerequisites: MLS 302, 304
The principles or practice of diagnostic microbiology such as specimen collection and handling, quality control, and laboratory safety. Clinical correlation, immunology and hospital surveillance will be included.

MLS 402 four credits
Clinical Microbiology II
Prerequisite: MLS 401
Continuation of MLS 401.

MLS 409 two credits
Immunohematology I

The principles of blood banking, including the preparation and storage of blood and its components, donor evaluation, transfusion, required record keeping, and processing of frozen blood. Clinical correlation, quality control and laboratory safety will be included.

MLS 410 two credits
Immunohematology II

Prerequisite: MLS 409
Continuation of MLS 409.

MLS 419 five credits
Clinical Biochemistry I

Prerequisites: MLS 449, 451
Principles of the physical and chemical analysis of medically significant organic and inorganic substances found in human body fluids and tissues. Laboratory instrumentation and electronics, metabolic screening, specimen collection, clinical correlation, quality control and laboratory safety will be emphasized.

MLS 420 four credits
Clinical Biochemistry II

Prerequisite: MLS 419
Continuation of MLS 419.

MLS 429 three credits
Hematology I

Prerequisites: MLS 322, 324
Subjects include the analysis and clinical correlation of quantitative and qualitative variations in blood. Blood cell and other formed element morphology, the dynamics of coagulation, processing and evaluation of human bone marrow, quality control and laboratory safety will be studied.

MLS 430 three credits
Hematology II

Prerequisite: MLS 429
Continuation of MLS 429.

MLS 439 two credits
Clinical Microscopy

Prerequisites: MLS 305, 307
The applied principles of the clinical evaluation of the physical and chemical constituents and formed elements of kidney filtrate. Quality control, laboratory safety and clinical correlation shall be covered.

MLS 450 two credits
Special Lab II

Prerequisites: MLS 402, 410, 420, and 430; or permission of the instructor.
Intensive, integrated study of selected topics

in clinical laboratory science including management.

Senior-Level Courses: Option in Cytotechnology

MLS 461 one to three credits
Introduction to Cytotechnology

Prerequisite: Permission of chairperson
A review of cell structure, principles of microscopy, and staining techniques. Anatomy and physiology of the female reproductive system and study of the non-malignant cytology of the female genital tract will be covered.

MLS 462 one to three credits
Special Topics in Cytotechnology

Prerequisite: Permission of chairperson
Special projects in cytology, cytopathology or cytotechnology are investigated or reviewed and reported by the student. Written or oral presentation is required.

MLS 463 one to four credits
Cytopathology

Prerequisite: Permission of chairperson
Cytopathology and clinical aspects of cervical dysplasia, carcinoma-in-situ and invasive squamous cell carcinoma. Consideration of endometrial and endocervical carcinoma, other genital tract cancers and radiation effect.

MLS 464 one to four credits
Medical Cytology

Prerequisite: Permission of chairperson
Benign and malignant cytology of the respiratory and gastrointestinal tracts will be correlated with anatomy and physiology. Benign, atypical, and malignant exfoliative cells from the urinary tracts, serous effusion, cerebrospinal fluid and breast secretions will be studied.

MLS 465 one to two credits
Cytotechnology Seminar

Prerequisite: Permission of chairperson
Presentation, discussion and interpretation of benign, suspicious, and hormonal conditions. The cytological diagnostic criteria of malignant tumors from various body sites and their histopathological correlation will be studied.

MLS 466 one to three credits
Applied Cytotechnology

Prerequisite: Permission of chairperson
The microscopic evaluation and screening of cytological smears from various body sites. Effects of radiation and of chemotherapy;

diagnosis of suspicious and hormonal conditions; cytological observations in pregnancy. Cell research techniques. Epidemiology and current concepts related to cytotechnology.

MLS 467 one to eight credits
Cytology Practicum I

Prerequisite: Permission of chairperson
The microscopic evaluation and screening of benign cytological smears and smears from cervical dysplasia; carcinoma-in-situ, and invasive malignant tumors of the female genital tract.

MLS 468 one to eight credits
Cytology Practicum II

Prerequisite: Permission of chairperson
The microscopic evaluation and screening of cytological smears from the respiratory tract, gastrointestinal tract, urinary tract and from body fluids. Continuing evaluation of cytological smears from the gynecological tract.

Senior-Level Courses Not limited as to option

MLS 495 one to four credits
Independent Study

Prerequisites: Upper-division standing; permission of instructor, department chairperson, and college dean
The student selects a topic for in-depth study. Readings and reports are supervised by a member of the faculty.

MLS 196, 296, 396, 496 three credits
Directed Study

Prerequisites: Permission of the instructor, department chairperson, and college dean
Study under the supervision of a faculty member in an area covered in a regular course not currently being offered. Conditions and hours to be arranged.

MLS 497 two credits
Research Project

4 hours per credit hour per week.
Prerequisite: Permission of instructor
The student initiates a proposal on a selected research topic. The research is done under the supervision of the appropriate faculty member. A completed paper is required.

MLS 498 one to four credits
Research Project

Continuation of MLS 497.