

## MEDICAL LABORATORY SCIENCE

<http://www.uvm.edu/cnhs/bhsc>

### OVERVIEW

The Master of Science in Medical Laboratory Science (MMLS) program is designed to provide students with the knowledge and skills required for leadership roles in management, education, and research related to advanced clinical practice in the medical laboratory profession.

Individuals may enter the program via two tracks, depending on their background:

- Track 1 is for individuals with a Bachelor's Degree who are not certified in medical laboratory science but desire a career in the clinical laboratory sciences. Upon completion of the program, these students will be eligible to take the national certification exam in medical laboratory science offered by the American Society of Clinical Pathology (ASCP).
- Track 2 is for medical laboratory science-certified graduates who seek advanced training and expertise in evidence-based practice, scientific research, health care management and leadership. Track 2 also includes an accelerated Master's option for current UVM Medical Laboratory Science students (we are currently not accepting applications for Track 2).

Both Track 1 and Track 2 involve a research-based capstone project that will engage students in hands-on research methodology, experimental practice, and scientific communication. The capstone project provides students with the opportunity to develop important skills in evidence-based practice and clinically-related research.

Our faculty offer advanced practice courses in molecular methods, clinical laboratory correlations, emerging diagnostic technologies, healthcare leadership and management, quality, evidence-based practice, research design and methods; and research experiences to prepare graduates of both tracks to become future leaders in the profession.

Students in Track 1 will complete a semester-long clinical practicum at one of our clinical affiliate hospitals as part of the core NAACLS-accredited program.

Degrees

- Medical Laboratory Science AMP
- Medical Laboratory Science M.S.

### FACULTY

**Amiel, Eyal;** Associate Professor, Department of Biomedical and Health Sciences; PHD, Dartmouth College

**Deming, Paula;** Associate Professor, Department of Biomedical and Health Sciences; PHD, University of North Carolina at Chapel Hill

**Frietze, Seth;** Associate Professor, Department of Biomedical and Health Sciences; PHD, Harvard University

**Fung, Mark K.;** Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Alabama School of Medicine

**Krementsov, Dimitry N.;** Associate Professor, Department of Biomedical and Health Sciences, PHD; University of Vermont

**Moreau, Katrina;** Clinical Associate Professor, Department of Biomedical and Health Sciences; M.A.T., MLS, Tufts University

**Scheiber, Melissa;** Clinical Assistant Professor, Department of Biomedical and Health Sciences, PHD: Medical University of South Carolina

### Biomedical and Health Sciences Courses

#### **BHSC 5440. Gr Immunology Lab. 1 Credit.**

Provides laboratory experiences in immunology and serology. Designed to reinforce and expand the practical understanding of immunology by providing students with laboratory experiences dealing with cellular and humoral immunity, B cells and T cells, autoimmunity, and other disorders typically diagnosed in the clinical immunology laboratory. Pre/Co-requisites: BHSC 3420 or MMG 3230; or Medical Laboratory Science Graduate student.

#### **BHSC 5810. Gr Applied Molecular Bio. 3 Credits.**

Explores the fundamental principles underlying molecular biological applications used in basic biomedical research and in clinical diagnostics at the graduate level. Covers the structure and function as well as the extraction of key biomolecules, including nucleic acids and proteins. Prerequisite: Medical Laboratory Science Graduate student.

#### **BHSC 5820. Gr Applied Molec Bio Lab. 1 Credit.**

The practical concepts of molecular applications will be experienced in the laboratory. Introduces basic methods used in DNA technology including plasmid isolation, polymerase chain reaction, restriction enzyme use, and related assays. Students will gain experience in various molecular biology techniques that are commonly used to monitor and diagnose human health and disease. Prerequisite: Medical Laboratory Science Graduate student. Co-requisite: BHSC 5810.

#### **BHSC 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **BHSC 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **BHSC 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **BHSC 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BHSC 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BHSC 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**BHSC 6995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**Medical Laboratory Science Courses****MLS 5100. Gr Clinical Chemistry I. 4 Credits.**

This is part one of a two semester series in Clinical Chemistry. Prepares students to work in the clinical chemistry laboratory to analyze patient samples, assess whether or not lab data is accurate, think critically, and problem solve. Prerequisite: Medical Laboratory Science Graduate student or Instructor permission.

**MLS 5110. Gr Clinical Chemistry II. 3 Credits.**

Clinical Chemistry is the discipline of pathology that is concerned with the detection and measurement of biochemical changes in disease, and helps to investigate for the presence of disease with panels of biochemical tests for renal disease, electrolyte disturbances, drug levels and toxic agents, blood gas and acid-base status, bone disease, diabetes, etc. Prerequisites: MLS 5100; Medical Laboratory Science Graduate student; or Instructor permission.

**MLS 5200. Gr Hematology. 3 or 4 Credits.**

Lecture and laboratory that integrates theory with application of hematology and hemostasis diagnostic procedures, interpretation, problem solving and correlation of laboratory findings with disease states. Covers the fundamentals of blood cell development, structure, function, biochemistry, cell and molecular biology. Prerequisite: Medical Laboratory Science Graduate student.

**MLS 5300. Gr Clinical Micro II. 3 Credits.**

Comprehensive study of non-bacterial pathogenic microorganisms and their disease states in humans. Includes medical mycology, parasitology and virology. Focus on understanding the biology of these organisms and learning about evaluation, diagnosis, and treatment of diseases caused by these pathogens. Prerequisite: Medical Laboratory Science Graduate student.

**MLS 5400. Gr Immunohematology. 4 Credits.**

Combines lecture and laboratory experiences to provide knowledge in regulations, quality and compliance in Immunohematology and transfusion medicine. Provides an overview of donor blood collection, processing, testing and storage as well as the understanding of cellular therapy in the hospital transfusion service. Prerequisites: BHSC 3420 or MMG 3230; or Medical Laboratory Science Graduate student.

**MLS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MLS 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MLS 6000. Certification Review. 1 Credit.**

Certification review of the Medical Laboratory Science Body of Knowledge. It is designed to provide a challenging self directed assessment of practical and theoretical knowledge and will prepare students to successfully pass the ASCP certification exam in Medical Laboratory Science. Prerequisites: MLS 3300, MMG 3230, MLS 3100, MMG 3220, MLS 3110, MLS 3200, MLS 3400. Pre/Co-requisite: MLS 6700.

**MLS 6100. Advanced Immunobiology. 3 Credits.**

Advanced survey of key current topics in immunology. Focus on understanding the key concepts and experimental approaches in the major areas in immunology, with an emphasis on applications to human disease. Prerequisites: Cell Biology and Biochemistry recommended.

**MLS 6200. Clinical Correlations. 3 Credits.**

Advanced, graduate-level education in medical laboratory testing. The appropriate utilization of laboratory tests for screening, diagnosis, monitoring and determining prognosis of various human diseases will be discussed.

**MLS 6300. Emerging Diag. Technologies. 3 Credits.**

Provides advanced, graduate-level education in medical laboratory testing. Using the scientific literature, students will review and discuss historical and emerging medical laboratory strategies that relate to human health and disease and the clinical environment.

**MLS 6500. Research and Design II. 3 Credits.**

Provides students with a foundation in how to read the primary literature, understanding the major sections of a primary literature reports, and instruction on writing their own reports to facilitate their success for their capstone project. Prerequisite: MLS 6400.

**MLS 6600. Research Capstone. 1-3 Credits.**

The third course in a three-course research series. Complete the capstone project under the guidance of the research mentor or the Graduate Program Director/Course Instructor. Communicate the findings both through a formal oral presentation and a written research paper. Prerequisites: NH 6899, MLS 6400, MLS 6500.

**MLS 6700. Clinical Practicum. 12 Credits.**

Clinical Practicum involves a semester long directed clinical practice in Hematology, Chemistry, Microbiology, Immunohematology, and Molecular Biology at assigned clinical affiliate sites. Prerequisites: MLS 3300, MMG 3230, MLS 3100, MMG 3220, MLS 3110, MLS 3200, MLS 3400.

**MLS 6900. Clinical Leadership & Mgt. 3 Credits.**

Focuses on the fundamentals of clinical leadership and management, with particular emphasis on organizational design, problem solving, communication and change theories. Strategies for human resource management, project management, quality improvement, increasing productivity, and ensuring financial viability are covered.

**MLS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MLS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.