Medical Laboratory Science

The student majoring in Medical Laboratory Science (formerly called Clinical Laboratory Science or Medical Technology) is provided with a broad base of theoretical and practical knowledge which will qualify him or her either for an immediate career in medical laboratory science or biomedical research or for further education in graduate or professional school. Medical laboratory scientists are vital healthcare detectives, uncovering and providing key medical information from laboratory analyses that assist physicians and other healthcare providers in making patient diagnoses and managing 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, transfusion medicine, microbiology, and molecular biology.

Description of the Program

Medical laboratory scientists perform, develop, evaluate, correlate, and assure validity of laboratory information, direct and supervise medical laboratory resources and operations, and collaborate in the diagnosis and treatment of patients. Medical laboratory scientists practice in a variety of settings including hospitals, private laboratories, research and development laboratories, public health laboratories, and regulatory agencies. They also find positions in health care education and management.

Accreditation

The Idaho State University Medical Laboratory Science program is accredited by:

- National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)
  5600 N. River Rd., Ste. 720
  Rosemont, IL 60018-5119

Degree Alternatives

The Medical Laboratory Science Program at Idaho State University offers two degree alternatives at the baccalaureate level:

1. B.S. in Medical Laboratory Science
2. A second B.S. in Medical Laboratory Science for students who have completed degree requirements in related disciplines from accredited institutions, have all required prerequisites, and complete the Idaho State University program’s 38-credit professional block of courses.

Medical Laboratory Science Program Prerequisites

Minimum of 16 credits of chemistry to include: CHEM 1111, General Chemistry, CHEM 1112, General Chemistry, and additional credits such as Organic, Biochemistry, Analytical Chemistry, or Instrumental Analysis.

Minimum of 16 credits of biology to include: Microbiology, Anatomy and Physiology, Immunology, Cell Biology, Genetics and Introduction to Pathobiology OR Human Pathophysiology.

Statistics is highly recommended.

Certification as a Medical Laboratory Scientist (formerly Clinical Laboratory Scientist or Medical Technologist)

Certification by a national credentialing examination (Board of Certification) qualifies the graduate to practice as a medical laboratory scientist in hospitals and other practice venues where credentialing is required. Successful completion of the 32 academic credits and a minimum of 6 practicum credits of the Medical Laboratory Science professional block (total 38 credits) will permit the graduate to be eligible to sit for the national credentialing exam in Medical Laboratory Science.

The B.S. degree in Medical Laboratory Science may be awarded with the minimum number of credits in clinical laboratory practicum (1 credit hour) as long as the 120 total credit hour graduation requirement is satisfied. Such a degree could be of interest to students preparing for Medical Laboratory Science-related careers but not for employment in hospitals as medical/clinical laboratory scientists (medical technologists) where certification credentials are required.

Students planning to attend other professional schools after completing the degree in Medical Laboratory Science are strongly advised to check the requirements of those professional schools, particularly regarding requirements in physics, organic chemistry, and specific course prerequisites. Other professional programs may require different courses or prerequisites than outlined for the B.S. in Medical Laboratory Science.

Professional Block

The Medical Laboratory Science professional block is offered in live lecture/lab classes and via Moodle (course electronic delivery) in both Pocatello and Meridian (with the exception of the Practicum). With permission of the program director, the Medical Laboratory Science professional block may be taken online. The clinical laboratory practicum experience is arranged by Idaho State University Medical Laboratory Science faculty through clinical-affiliated hospitals and clinic sites throughout Idaho and adjacent states.

Admission to the Medical Laboratory Science courses that make up the professional block is by application to the program.

Faculty

Program Director

Rachel Hulse,* Program Director, Assistant Professor, Medical Laboratory Sciences. B.S. 2006, University of Utah; M.S. 2012, Brigham Young University; M.S. 2015, University of Utah; (ASCP)CM. (2015)

Clinical Associate Professor

Galindo, Susan E., Clinical Associate Professor, Biological Sciences, Medical Laboratory Sciences. B.S. 1974, University of Nevada, Las Vegas; B.S. 1976, University of Nevada, M.S. 1979, University of Oklahoma Health Science Center. (2002)

Clinical Assistant Professor

Marjorie Montanus, Clinical Assistant Professor, Medical Laboratory Sciences. B.S. 1985, Illinois State University, M.S. 1992, University of Illinois at Chicago. (2017)

Professor Emeritus

Spiegel, Kathleen, Clinical Professor, Clinical Laboratory Science. 1991-2007

Admission Criteria

Admissions are competitive. The deadline for priority admissions to the Medical Laboratory Science professional block of 38 credits for a start of the fall semester is February 28. At that time, up to 20 students at the Meridian and Pocatello campuses, and up to 10 students at the Idaho Falls campus will be selected. The qualified alternates, along with any late applicants, will be evaluated by August 1 for inclusion in the class if additional seats become available. Progression
in the program is dependent upon successful academic progress as determined by Medical Laboratory Science faculty evaluation in December and May of the program year. Application materials, including criteria for selection and progression, are available from the School of Health Professions and may be downloaded from the Medical Laboratory Science website at http://www.isu.edu/mls. A program of study to permit progression through the Medical Laboratory Science curriculum over two years or online may be arranged with permission of the program director.

**Bachelor of Science in Medical Laboratory Science**

The B.S. in Medical Laboratory Science prepares students as medical/clinical laboratory scientists or medical technologists and for graduate level programs in medical laboratory science or related disciplines. Students develop a strong background in the broad areas of microbiology, molecular biology, chemistry, hematology, transfusion medicine, biotechnology, and their medical and/or clinical applications. Medical Laboratory Science students gain the ability to carry out standard microbiological, molecular, biological and clinical techniques in the laboratory and to participate in research development, planning, and implementation. The B.S. in Medical Laboratory Science prepares students to have a reasonable expectation of passing a national qualifying exam for the medical laboratory profession and prepares students to be qualified to work at the professional experience level in a variety of settings. The General Education Requirements (http://coursecat.isu.edu/undergraduate/academicinformation/generaleducation) (all Objectives--36 credits minimum) and Total University Credit Requirements must be met. A minimum of 120 credits are required for graduation; 36 of these must be upper division credits.

A student may be awarded a B.S. degree in Medical Laboratory Science by fulfilling the following requirements:

A minimum of 120 semester credit hours to include:

1. Completion of the university General Education Requirements (8 out of 9 Objectives are required--see the General Education Requirements (http://coursecat.isu.edu/undergraduate/academicinformation/generaleducation) in the Academic Information section of this catalog). The following Objective courses also satisfy specific program requirements: 1) Objective 3, MATH 1153, Introduction to Statistics; 2) Objective 5 is met by the program's biology and chemistry requirements.

2. Completion of the following required courses:

   - **MATH 1143** College Algebra 3
   - **BIOL 2206** Cell Biology 4
   - **& BIOL 2207** and Cell Biology Laboratory 4
   - **BIOL 2235** General Microbiology 4
   - **& 2235L** and General Microbiology Lab 4
   - **BIOL 3301** Anatomy and Physiology 4
   - **& 3301L** and Anatomy and Physiology Lab 4
   - **BIOL 3358** Genetics 3
   - **BIOL 4451** Immunology 3
   - **BIOL 4463** Human Pathophysiology 3-4
   - or **BIOL 3305** Introduction to Pathobiology

   In addition, enough additional credits of Chemistry courses to reach 16 credits of Chemistry, which may include organic, inorganic, biochemistry, and/or analytical chemistry.

3. Completion of the Medical Laboratory Science Professional degree requirements (38 credits).

4. Completion of elective courses. Elective courses should be selected according to the student’s interests and career needs, in conjunction with a faculty advisor. The total number of elective credit hours may include course prerequisites for general education requirements.

5. Credits earned in the required prerequisites or Medical Laboratory Science professional block with a grade of lower than a “C-” will not be counted towards the Medical Laboratory Science requirement, but will be calculated in the total credit calculation toward graduation.

A minimum of 120 credits is required for graduation. Students who have completed the requirements for a B.S. degree in a related discipline at an accredited university, with preparation similar to that described above for the B.S. in Medical Laboratory Science degree may apply to the program and, if accepted, complete the Medical Laboratory Science Professional Block, which would result in the award of a second B.S. degree. Completion of the minimum of a B.S. degree and the professional block will qualify the student to sit for national certification exams. Credit may be given for experience and coursework at the discretion of the Medical Laboratory Science program director. Students whose preparation does not include the required courses listed under the B.S. in Medical Laboratory Science may be required to take additional courses outside the professional block at the discretion of the Medical Laboratory Science program director. University policy requires a minimum of 32 additional credits earned beyond the first B.S. degree in order to award a second B.S. degree. Credits used to satisfy the requirements for the first degree may not be used toward the second degree’s 32 credit requirement.

**Required Courses:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MLS 4410</td>
<td>Phlebotomy Practicum</td>
<td>1</td>
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<tr>
<td>MLS 4412</td>
<td>Urinalysis and Body Fluids</td>
<td>1</td>
</tr>
<tr>
<td>MLS 4414</td>
<td>Hematology and Hemostasis</td>
<td>3</td>
</tr>
<tr>
<td>MLS 4416</td>
<td>Medical Microbiology I</td>
<td>3</td>
</tr>
<tr>
<td>MLS 4418</td>
<td>Medical Chemistry and Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>MLS 4420</td>
<td>Medical Immunology</td>
<td>2</td>
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<tr>
<td>MLS 4422</td>
<td>Basic Concepts in Transfusion Medicine</td>
<td>2</td>
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<tr>
<td>MLS 4424</td>
<td>Medical Laboratory Fundamentals</td>
<td>1</td>
</tr>
<tr>
<td>MLS 4431</td>
<td>Medical Microbiology II</td>
<td>3</td>
</tr>
<tr>
<td>MLS 4433</td>
<td>Medical Laboratory Science</td>
<td>2</td>
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<td></td>
<td>Management and Education</td>
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<tr>
<td>MLS 4435</td>
<td>Molecular Diagnosis</td>
<td>3</td>
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<tr>
<td>MLS 4437</td>
<td>Critical Analysis of Lab Information</td>
<td>3</td>
</tr>
<tr>
<td>MLS 4439</td>
<td>Advanced Concepts in Transfusion Medicine</td>
<td>2</td>
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<tr>
<td>MLS 4441</td>
<td>MLS Research</td>
<td>1-3</td>
</tr>
<tr>
<td>MLS 4455</td>
<td>MLS Student Laboratory Practices</td>
<td>2</td>
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<tr>
<td>MLS 4490</td>
<td>General Site Practicum</td>
<td>1-6</td>
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<tr>
<td>MLS 4491</td>
<td>Microbiology Practicum</td>
<td>2</td>
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<tr>
<td>MLS 4492</td>
<td>Hematology and Urinalysis Practicum</td>
<td>2</td>
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<tr>
<td>MLS 4493</td>
<td>Transfusion Blood Bank Practicum</td>
<td>1</td>
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<tr>
<td>MLS 4494</td>
<td>Chemistry and Automation Practicum</td>
<td>1</td>
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</tbody>
</table>

**Total Credits:** 39-46

1 This is a 1-credit course that may be taken for up to 3 credits.

A total of 6 credits of Practicum experiences (minimum of 480 hours) is required to be eligible to take Board of Certification (BOC) national examinations. One (1) credit of Practicum experience (80 hours) is required for a B.S. in Medical
Labs but the graduate will NOT be eligible for BOC national certification.

**Courses**

**MLS 4410 Phlebotomy Practicum: 1 semester hour.**
Introduction to the theory and procedures for the practice of phlebotomy and simple laboratory testing. Part of the Medical Laboratory Science Core Curriculum, also suited for other health care providers. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4412 Urinalysis and Body Fluids: 1 semester hour.**
Fundamental principles of urine and body fluid analysis with correlation of laboratory methods and practice. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4414 Hematology and Hemostasis: 3 semester hours.**
Theoretical and applied aspects of medical hematology and hemostasis with emphasis on recognition and correlation of abnormal laboratory observations with pathological conditions. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4416 Medical Microbiology I: 3 semester hours.**
Study and identification of medically important bacteria, viruses, fungi, chlamydiae, rickettsiae, and parasites as applicable to laboratory and infection control settings. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4418 Medical Chemistry and Instrumentation: 3 semester hours.**
Theoretical and applied aspects of medical chemistry with emphasis on test development, validation, and use in diagnosis and management of pathological conditions. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4420 Medical Immunology: 2 semester hours.**
Practical aspects of immunology with emphasis on pathological conditions and laboratory practice. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4422 Basic Concepts in Transfusion Medicine: 2 semester hours.**
Practical aspects and theoretical considerations of major blood groups with respect to transfusion therapy. Oral and written project presentation required for graduate credit. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4424 Medical Laboratory Fundamentals: 1 semester hour.**
Theory and application of basic techniques and instruments used in all areas of medical laboratories. PREREQ: Acceptance into the Medical Laboratory Science Program. F

**MLS 4431 Medical Microbiology II: 3 semester hours.**
Advanced topics in medical microbiology including application of laboratory techniques to the identification and evaluation of medically important pathogens and correlations with disease states. PREREQ: MLS 4416 and acceptance into the Medical Laboratory Science Program. S

**MLS 4433 Medical Laboratory Science Management and Education: 2 semester hours.**
Advanced principles of current personnel, financial, regulatory issues, laboratory information systems, management, and education. Student presentations will be required. Students taking the course for graduate credit will prepare, conduct, and evaluate a project. PREREQ: Acceptance into the Medical Laboratory Science Program. S

**MLS 4435 Molecular Diagnosis: 3 semester hours.**
A comprehensive overview of the fundamental principles of medical molecular diagnostics and use of molecular techniques in the diagnosis of disease. Topics include: Nucleic acid structure and function, genetics, DNA chemistry, introduction to nucleic acid isolation, identification and amplification techniques. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program. S

**MLS 4437 Critical Analysis of Lab Information: 3 semester hours.**
Evaluation of clinical laboratory values with emphasis on advanced methods, specialized statistics, algorithm building, and clinical correlations. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program. S

**MLS 4439 Advanced Concepts in Transfusion Medicine: 2 semester hours.**
Advanced topics in Immunohematology. Application of laboratory techniques to the identification and evaluation of antibodies and antigens. Emphasis on transfusion therapy. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: MLS 4422 and acceptance into the Medical Laboratory Science Program. S

**MLS 4441 MLS Research: 1-3 semester hours.**
Individual theory and application of related topics associated with the medical laboratory. PREREQ: Acceptance into the Medical Laboratory Science Program. S

**MLS 4455 MLS Student Laboratory Practices: 2 semester hours.**
Directed practice in the advanced tests and techniques in common use in the medical laboratory (including molecular biology, microbiology, hematology, chemistry, blood bank). PREREQ: Acceptance into the Medical Laboratory Science Program. S

**MLS 4482 Independent Problems in MLS: 1-3 semester hours.**
Individual work under staff guidance. Research on specific educational problems of interest to majors in Medical Laboratory Science. Students are assigned to, or request assignment to, independent problems on the basis of interest and preparation. May be repeated for a maximum of 3 credits. D

**MLS 4490 General Site Practicum: 1-6 semester hours.**
Structured medical laboratory experiences as determined by Medical Laboratory Science faculty. PREREQ: Permission of Program Director. Graded S/U. F, S, Su

**MLS 4491 Microbiology Practicum: 2 semester hours.**
Structured medical laboratory experiences as determined by Medical Laboratory Science faculty. PREREQ: Permission of Program Director. Graded S/U. F, S, Su

**MLS 4492 Hematology and Urinalysis Practicum: 2 semester hours.**
Structured medical laboratory experiences as determined by Medical Laboratory Science faculty. PREREQ: Permission of Program Director. Graded S/U. F, S, Su

**MLS 4493 Transfusion Blood Bank Practicum: 1 semester hour.**
Structured medical laboratory experiences as determined by Medical Laboratory Science faculty. PREREQ: Permission of Program Director. Graded S/U. F, S, Su

**MLS 4494 Chemistry and Automation Practicum: 1 semester hour.**
Structured medical laboratory experiences as determined by Medical Laboratory Science faculty. PREREQ: Permission of Program Director. Graded S/U. F, S, Su

**MLS 4499 Experimental Course: 1-6 semester hours.**
This is an experimental course. The course title and number of credits are announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times with the same title and content.