

Master of Science in Medical Laboratory Science

Admission Requirements

Applicants must have a minimum 3.0 GPA for upper-division credits taken at the undergraduate level. Graduate School Admission GPA is calculated based on the last 60± semester undergraduate credits (90± quarter credits). The student must apply to and meet all criteria for admission to the Graduate School.

In addition, admission into the M.S. program will require the student to meet one of the two following conditions:

1. Professionals are already certified as Medical Laboratory Scientist (Board of Certification) and have completed a B.S. or B.A. degree in a related science from an accredited university or college. Note: Categorical certification as Medical Laboratory Scientist does not wholly satisfy this requirement; OR
2. Professionals seek entry-level M.S. completing certification requirements while pursuing the M.S. degree. Completion of a B.S. or B.A. degree from an accredited institution and completion of the following requirements during the M.S. program of study:
 - a. At least 16 semester hours of chemistry to include inorganic chemistry and some combination of organic, biochemistry, and analytical chemistry;
 - b. At least 16 semester hours of biology, to include at least one semester in microbiology, cell biology, genetics, immunology, anatomy and physiology, and human pathophysiology.
 - c. Completion of the ISU Medical Laboratory Science professional program, accredited by NAACLS (National Accrediting Agency for Clinical Laboratory Science). Completion qualifies the applicant to take the national credentialing examinations offered by Board of Certification (BOC) and this should be attempted within one year of finishing the MLS professional block and prior to completion of the MLS research thesis.

Core Curriculum Areas

The three core areas for Medical Laboratory Science that all students could include in their programs of study are:

1. Scientific subject core area including pathology, hematology, transfusion medicine (immunohematology), clinical chemistry, genetics, microbiology, or molecular biology.
2. Management core area including information management, statistics, Quality Assurance Programs (e.g., Westgard, 6 Sigma Lean), predictive value theory, personnel, financial, organizational, or regulatory concepts.
3. Educational core area including educational design and adult learning for professionals within and outside the medical laboratory setting.

Students are expected to have significant exposure to these core areas by the time they complete their degree requirements. Students coming in with MLS credentials have already demonstrated mastery of the core scientific subject area and those who do not have these credentials will be expected to demonstrate mastery by an examination administered by the program before they finish their M.S. studies.

Students may opt to gain expertise through a variety of mechanisms including independent readings, formal course work, seminars, or special projects. For those students who are not already credentialed, the 6 credits of the MLS

Practicum are at the undergraduate level. This does not count toward the 32 graduate credit requirements.

The Project Process

The MLS Thesis or Capstone Project process comprises the following steps:

1. Meet the minimum qualifications for starting a project
2. Identify a committee
3. Identify a capstone or thesis project
4. Submit a written project proposal describing the project to your faculty advisor
5. Upon approval of the proposal, enroll in capstone or graduate problem/thesis credits
6. Complete the project
7. Upon completion of the project, submit a final project report to your committee
8. Upon approval of the final report, make an oral defense of the project to your committee

Minimum Qualifications to be eligible to begin the graduate project:

- Route 1: Must have completed at least the 13 required MLS credits.
- Route 2: Must have completed the MLS Professional Block and clinical rotation credits.
- Be in good standing in the MLS program.
- The student must also be a classified degree-seeking student.

Faculty Advisor:

- Every project must have a faculty advisor. A project faculty advisor must be a member of the MLS faculty and must agree to serve in this role.
- The capstone route requires a faculty advisor and 2 additional faculty committee members.
- The thesis route requires a primary faculty advisor, 1-2 committee members, and a Graduate Faculty Representative (GFR) from outside the MLS department.

Identify a project:

- Students apply the knowledge gained throughout the program to complete an independent, mentored project.
- The capstone route project must consist of a literature search, and identify a problem or need, that is relevant to the MLS profession or program. This route does not need to be hypothesis-driven. The capstone process culminates in the capstone project being written in a final report and presented as PowerPoint in a defense setting. A viable project should comprise 100-300 working hours. If a student plans to complete the project in one 15-week semester, they should expect to spend approximately 15-20 hours per week actively working on the project.
- The thesis route project requires students to formulate a research question and identify a methodology for obtaining data to test a literature-driven hypothesis. A viable project should collect enough data to write a standard 5-chapter thesis, and draw conclusions about their research questions and hypothesis.

Proposal:

- A written proposal should be submitted to the MLS faculty advisor. The project proposal should include a cover page, proposed project description, proposed methodology, and project timeline. The MLS advisor should be given 2 weeks to modify and respond to the proposal. The MLS faculty may accept, accept with modification, or reject the proposal.

Enrolling in Capstone or Graduate Problems/Thesis credits

- Capstone route: After the approval of the capstone proposal, a student may enroll in 1-3 credits of the Capstone course. A minimum of 3 capstone credits is required for the capstone route degree. A student must be registered for a minimum of one capstone credit in the semester that they defend their project. If the project is not completed at the conclusion of 3 capstone credits, they may register for more than 3 credits. Grades will be submitted as an incomplete grade until after the oral defense, where grade changes will be submitted, if necessary.
- Thesis route: After the approval of the capstone proposal, a student may enroll in up to 4 credits of the Graduate Problems course, and up to 6 credits of the Thesis course. A minimum of 4 Graduate Problems and 6 Thesis credits is required for the thesis route degree. A student must be registered for a minimum of one thesis credit in the semester that they defend their project. If the project is not completed at the conclusion of their 10 required credits, they may register for more than 6 thesis credits. Grades will be submitted as an IP grade until after the oral defense, where grade changes will be submitted, if necessary.

Complete the project:

- The student should give their MLS faculty advisor regular updates on the progress of the project. It is important for the student to alert their advisor when problems or issues arise that could delay or prevent the completion of the project.

Final project report:

- The final report should consist of a cover page, executive summary, literature search, methodology, and a critical discussion of project and its implications. As appropriate, the student should draw conclusions and suggest future areas of research. The final project report needs to be submitted to the MLS committee two weeks prior to the oral defense. Thesis route students must complete a written thesis following the ISU Thesis and Dissertation Manual standards published by the Graduate School.

Oral defense:

- The final step in the project process is to make an oral defense of the project to the MLS committee.

Scheduling

Scheduling is coordinated by the student, and defenses must be scheduled at least a month in advance of the defense. However, the presentation cannot take place before the final report has been approved. Failure to get approval for your final report will result in the cancellation of the oral defense.

Time Limitation

Each defense presentation is limited to a total of 50 minutes including introduction, presentation, demonstrations (if any), and questions and answers by the committee. You must leave the last 10 minutes open for questions and answers by the committee, therefore the total time for the student's part of the presentation must be no more than 40 minutes.

Guests

The oral project defense is a public event and guests may be invited to attend the defense.

Presentation Content and Format

The oral presentation should be supported with acceptable presentation media that illustrate the major points of the project. The student is expected to explain the content of the slides, not to read the slides. The slides should focus on the key elements of the project.

Pass/Fail

At the conclusion of the oral defense, the MLS committee will vote for pass or fail of the capstone project and final report. To pass the student must get a pass vote from the majority, or 2 of the 3 MLS committee members.

Route 1 - Previously Certified Students**Thesis Track**

| Code | Title | Credits |
|--|--|----------|
| Route 1 - Certified | | |
| Select 3 of the following (minimum 9 credits) | | 9 |
| MLS 6640 | Advanced Topics in Hematology | 1-4 |
| MLS 6641 | Advanced Topics in Immunology and Transfusion Medicine | 1-4 |
| MLS 6642 | Advanced Topics in Medical Chemistry | 1-4 |
| MLS 6643 | Advanced Topics in Medical Laboratory Education | 1-4 |
| MLS 6644 | Advanced Topics in Medical Microbiology | 1-4 |
| MLS 6651 | Graduate Seminar | 2 |

Required Thesis Track Courses

| | | |
|--|-----------------------|-----------|
| MLS 6648 | MLS Graduate Problems | 4 |
| MLS 6650 | Thesis | 6 |
| Graduate electives 5000- or 6000-level | | 13 |
| Total Credits | | 32 |

Capstone Track

| Code | Title | Credits |
|---|--|-----------|
| Route 1 - Certified | | |
| Select 4 of the following (minimum 13 credits) | | 13 |
| MLS 6640 | Advanced Topics in Hematology | 1-4 |
| MLS 6641 | Advanced Topics in Immunology and Transfusion Medicine | 1-4 |
| MLS 6642 | Advanced Topics in Medical Chemistry | 1-4 |
| MLS 6643 | Advanced Topics in Medical Laboratory Education | 1-4 |
| MLS 6644 | Advanced Topics in Medical Microbiology | 1-4 |
| MLS 6651 | Graduate Seminar | 2 |

Required Capstone Track Courses

| | | |
|--|--------------|-----------|
| MLS 6647 | MLS Capstone | 3 |
| Graduate electives 5000- or 6000-level | | 16 |
| Total Credits | | 32 |

Route 2 - Certified Students**Thesis Track**

| Code | Title | Credits |
|----------------------------------|-------|---------|
| Route 2 - Uncertified | | |
| Year 1 | | |
| Professional Block - Fall | | |

| | | |
|--|--|-----------|
| MLS 5510 | Phlebotomy Practicum | 1 |
| MLS 5512 | Urinalysis and Body Fluids | 1 |
| MLS 5514 | Hematology and Hemostasis | 3 |
| MLS 5516 | Medical Microbiology I | 3 |
| MLS 5518 | Medical Chemistry and Instrumentation | 3 |
| MLS 5520 | Medical Immunology | 2 |
| MLS 5522 | Basic Concepts in Transfusion Medicine | 2 |
| MLS 5524 | Medical Laboratory Fundamentals | 1 |
| Professional Block - Spring | | |
| MLS 5531 | Medical Microbiology II | 3 |
| MLS 5533 | MLS Management and Education | 2 |
| MLS 5535 | Molecular Diagnostics | 3 |
| MLS 5537 | Critical Analysis of Lab Information | 3 |
| MLS 5539 | Advanced Concepts in Transfusion Medicine | 2 |
| MLS 5541 | MLS Graduate Research | 1-3 |
| MLS 5555 | MLS Student Laboratory Practices | 2 |
| Clinical Rotation - Summer | | |
| MLS 5591 | Microbiology Practicum | 2 |
| MLS 5592 | Hematology and Urinalysis Practicum | 2 |
| MLS 5593 | Transfusion (Blood Bank) Practicum | 1 |
| MLS 5594 | Chemistry Practicum | 1 |
| Year 2 (+) | | |
| Select 2 (6 cr) from the following courses: | | |
| MLS 6640 | Advanced Topics in Hematology | 1-4 |
| MLS 6641 | Advanced Topics in Immunology and Transfusion Medicine | 1-4 |
| MLS 6642 | Advanced Topics in Medical Chemistry | 1-4 |
| MLS 6643 | Advanced Topics in Medical Laboratory Education | 1-4 |
| MLS 6644 | Advanced Topics in Medical Microbiology | 1-4 |
| MLS 6651 | Graduate Seminar | 2 |
| Required Thesis Track Courses | | |
| MLS 6648 | MLS Graduate Problems | 1-9 |
| MLS 6650 | Thesis | 1-9 |
| Credit Hour Totals | | |
| Year 1 (5000 level) | | 31 |
| Year 2 (6000 level) | | 16 |
| Total Credits | | 47 |

* Does not count for graduate credit.

Capstone Track

| Code | Title | Credits |
|----------------------------------|----------------------------|---------|
| Route 2 - Uncertified | | |
| Year 1 | | |
| Professional Block - Fall | | |
| MLS 5510 | Phlebotomy Practicum | 1 |
| MLS 5512 | Urinalysis and Body Fluids | 1 |
| MLS 5514 | Hematology and Hemostasis | 3 |
| MLS 5516 | Medical Microbiology I | 3 |

| | | |
|--|--|-----------|
| MLS 5518 | Medical Chemistry and Instrumentation | 3 |
| MLS 5520 | Medical Immunology | 2 |
| MLS 5522 | Basic Concepts in Transfusion Medicine | 2 |
| MLS 5524 | Medical Laboratory Fundamentals | 1 |
| Professional Block - Spring | | |
| MLS 5531 | Medical Microbiology II | 3 |
| MLS 5533 | MLS Management and Education | 2 |
| MLS 5535 | Molecular Diagnostics | 3 |
| MLS 5537 | Critical Analysis of Lab Information | 3 |
| MLS 5539 | Advanced Concepts in Transfusion Medicine | 2 |
| MLS 5541 | MLS Graduate Research | 1-3 |
| MLS 5555 | MLS Student Laboratory Practices | 2 |
| Clinical Rotation - Summer | | |
| MLS 5591 | Microbiology Practicum | 2 |
| MLS 5592 | Hematology and Urinalysis Practicum | 2 |
| MLS 5593 | Transfusion (Blood Bank) Practicum | 1 |
| MLS 5594 | Chemistry Practicum | 1 |
| Year 2 (+) | | |
| Select 3 (9 cr) from the following courses: | | |
| MLS 6640 | Advanced Topics in Hematology | 1-4 |
| MLS 6641 | Advanced Topics in Immunology and Transfusion Medicine | 1-4 |
| MLS 6642 | Advanced Topics in Medical Chemistry | 1-4 |
| MLS 6643 | Advanced Topics in Medical Laboratory Education | 1-4 |
| MLS 6644 | Advanced Topics in Medical Microbiology | 1-4 |
| MLS 6651 | Graduate Seminar | 2 |
| Required Capstone Track Courses | | |
| MLS 6647 | MLS Capstone | 1-6 |
| Graduate electives 6000-level | | 4 |
| Credit Hour Totals | | |
| Year 1 (5000 level) | | 31 |
| Year 2 (6000 level) | | 16 |
| Total Credits | | 47 |

* Does not count for graduate credit.

The remaining credits are to be taken from graduate-level courses (a minimum of 16 at the 6000 level) in one or more of the core areas with the approval of the applicant's committee and MLS Program Director.

Three graduate-level courses (6 to 9 credits) approved by the graduate student's committee may be taken from outside the department (to be taken at Boise State University, Idaho State University, or another approved university) and may include adult education, management, and/or medical informatics.

The capstone project may be in a core scientific subject, management, education, or a combination thereof.