

DEPARTMENT *of*
MEDICAL AND MOLECULAR SCIENCES

MASTER OF SCIENCE
IN MEDICAL LABORATORY SCIENCE

Program Policies



Updated Summer 2026

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I. Program History and Purpose

The MS in MLS program is a 63-credit blended (having both online, hybrid and face-to-face instruction) master's degree for individuals holding a **Bachelor of Science in biology, chemistry, or a related major and who are not certified medical technologists or medical laboratory scientists but who desire a career in the clinical laboratory sciences**. Upon completion, these individuals are eligible to take a national examination for certification as a medical laboratory scientist. Through this degree, students gain specialized, in-depth professional hands-on skills and leadership competencies preparing them to succeed within the clinical laboratory sciences sector. The MS in MLS allows students to gain defined "bench-focused" technical competency, in addition to training in regulatory and fiscal affairs that impact laboratory management. Completion of this program, accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), prepares students to perform clinical laboratory testing and to complete the ASCP Board of Certification national certification examination in Medical Laboratory Science, MLS(ASCP). Following graduation, students can apply their knowledge to meet specific career goals in clinical laboratory practice or, with experience, in management.

Benefits of pursuing the MS in MLS include:

- Gaining a workforce ready, well-rounded and marketable set of technical skills geared for future employment
- Exposure to regulatory, fiscal and management aspects of laboratory practice
- Rapid and fixed time frame of degree completion (18 months for full-time students, part-time status will be considered on a case-by-case basis)
- Internships integrated into the curriculum offer a leg up in the job market upon graduation
- Preparation to sit for the medical laboratory scientist board of certification exam offered through the American Society for Clinical Pathology/BOC

II. Admission

Admission to the graduate program is competitive. Those who meet stated minimum requirements are not guaranteed admission, nor are those who fail to meet all of those requirements necessarily precluded from admission if they offer appropriate strengths.

The MS in Medical Laboratory Science program is not intended for those who are already certified medical technologists or medical laboratory scientists or who have completed a bachelor's degree in MLS or equivalent. Such individuals should consider enrolling in the MS in Medical and Molecular Sciences offered through the Department of Medical and Molecular Sciences, which is intended for those who have already completed a BS degree in a clinical laboratory-based discipline. Questions regarding which MS degree program is appropriate should be directed to the Program Director for the MS in MLS.

Admission Requirements

Admissions decisions are made by the Department of Medical and Molecular Sciences' Graduate Program Committee. Students will be admitted to the program based on enrollment availability

and their ability to meet the following minimum recommended entrance requirements:

- Successful completion of a Bachelor's degree, from an accredited academic institution, in a science-based discipline, including, but not limited to: Biology, Chemistry, Biochemistry, Nutrition or Exercise Science. Additional specific requirements include completion of math and science prerequisite course work to include: 16 credits of Biological Sciences including one semester of Microbiology; 12 credits of chemistry including one semester of organic chemistry; 3 credits of immunology required including a laboratory component; and 3 credits of college level math or statistics.
- Students not having completed a BS in a science-based discipline may be considered for admission provided they have completed the following science and math prerequisite course work: 16 credits of Biological Sciences including one semester of Microbiology; 12 credits of chemistry including one semester of organic chemistry; 3 credits of immunology required including a laboratory component; and 3 credits of college level math or statistics.
- Application is competitive and a minimum cumulative GPA of 3.0 is recommended.
- The GRE is not required.
- Completion of the TOEFL requirements are described in detail below for international applicants
- Written statement of goals and objectives (the personal statement) that clearly identifies the applicant's research and curriculum interests and explains how admission to the program will facilitate their professional objectives.
- Current résumé and two academic or professional letters of recommendation.

All students will be expected to be sufficiently conversant in English and knowledgeable in the written word to convey clear, logical and complex written expressions.

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Admission Procedures

Applicants must submit all of the following items directly to the University Graduate College using the online admission process before admission can be considered. Admission applications are available at: <https://www.udel.edu/academics/colleges/grad/prospective-students/grad-admissions>

1. A nonrefundable application fee must be submitted with the application. Credit card payment is accepted with the online application. Applications received without the application fee will not be processed.
2. Applicants must submit responses to specific questions asked on the application, a resume, and a statement of professional goals and objectives.
3. Applicants must submit at least two letters of recommendation. All letters of recommendation should be submitted directly to the Graduate College.
4. One official transcript of all US colleges and universities attended must be sent directly from the institution to the Graduate College or be provided in a sealed envelope with the application packet. Students who have attended the University of Delaware need not supply a transcript from Delaware. Applicants may use an unofficial transcript for their applications; upon accepting a conditional offer of admission the official transcripts must be provided.
5. One official transcript of all non-US based college and university records is required. The transcript must list all classes taken and grades earned. If the transcript does not state that the degree has been awarded, send a degree certificate that states that the degree has been awarded. If the degree has not been awarded or the degree certificate has not been issued, evidence of the awarded degree must be provided prior to the first day of classes in the term of admission.
 - For institutions that issue documents only in English, send the English original.
 - For institutions that issue documents both in English and a foreign language, send both the English language original and the foreign language original.
 - For institutions that issue documents only in a foreign language, send the foreign language original and a certified translation in English. The translation must be certified by an official of the issuing institution, a state- or court-appointed translator, or the Embassy of the issuing country in the United States.

If it is necessary to send non-original documents: a. The documents must be original “attested copies”, officially attested to by the issuing institution or the Embassy of the using country in the United States, and b. Certified translations must be originals, no copies will be accepted.

6. International student applicants must demonstrate a satisfactory level of proficiency in the English language if English is not the first language. The Test of English as a Foreign Language (TOEFL) is offered by the ETS in test centers throughout the world. The University requires an official paper-based TOEFL score of at least 550 or at least 79 on the Internet-based TOEFL for an applicant to be considered for admission.

TOEFL scores more than two years old cannot be validated or considered official.

7. International students must be offered admission to the University and provide evidence of adequate financial resources before a student visa will be issued. The University has been authorized under federal law to enroll non-immigrant alien students. International students are required to purchase the University-sponsored insurance plan or its equivalent.
8. All first-time international students are required to attend the Orientation Day for new international students, which takes place before classes begin.
9. It is a Delaware State Board of Health regulation and a University of Delaware mandate that all graduate students with a birth date after January 1, 1957, be immunized for measles, mumps and rubella (MMR). Also, students may be required to provide evidence of PPD (Mantoux) Tuberculosis Screening Test within 6 months prior to beginning classes. Students who are admitted beginning January 2002 are required to show proof of vaccination against meningococcal disease unless granted a waiver. Students should refer to and complete the Student Health Service Immunization Documentation form upon admission.

Admission Application Processing

Applications will be processed as they are submitted. The admission process is completed as follows: First, completed applications consisting of the application form, academic transcripts, letters of recommendations, résumé, and written statement of goals and objectives are reviewed by the Medical and Molecular Sciences' Graduate Program Committee.

The Program Committee arrives at an admission decision after reviewing the completed application. Students are notified in writing of the admissions decision within two weeks of the decision. It should be noted, admission to the MS in Medical Laboratory Science does not confer admission to the Ph.D. in Molecular Biosciences, which is a distinct graduate program offered through the College of Health Sciences.

Application Deadlines

Applications should be submitted by August 1 but will be taken on a rolling basis to allow for admittance in the Fall semester (only). International applicants are highly encouraged to apply early to allow sufficient time for obtaining an appropriate student visa.

Special Entry Level Competencies Needed: Essential Functions

To ensure that your decision to pursue a career in a laboratory is the correct one, students should review the Essential Functions by which they will be assessed as an MS in Medical Laboratory Science student. The Essential Functions are the non-academic requirements of the program, and they comprise physical, emotional, and professional/intellectual demands required of a medical laboratory scientist.

The physical demands required of students include the ability to:

1. Perform manual laboratory procedures safely and with dexterity.

2. Operate state-of-the-art instruments and laboratory information systems, including proper use of computers and keyboards.
3. Read and employ information displayed on a computer monitor or in print, e.g., text, numbers, graphs, etc.
4. Use a binocular microscope and differentiate microscopic components for structural and color (shading/intensity) differences.
5. Describe the visual characteristics of bodily specimens and chemical and immunologic reactions, e.g., color, clarity, viscosity, agglutination, etc.
6. Perform delicate manipulations which require good eye-hand coordination, e.g., pipetting, use of inoculating loops, etc.
7. Utilize equipment for the safe collection of blood specimens from patients.
8. Participate in safe laboratory practices through one's ability to move effectively in the work place, to access laboratory work areas, and to reach hospitalized patients and out-patients for the purpose of blood collection.

The emotional demands required of students include the ability to:

1. Perform laboratory procedures accurately and quickly even under stressful conditions.
2. Maintain composure and provide appropriate laboratory services under stressful situations, such as time constraints, emergencies, rudeness, etc.
3. Utilize independent judgment and act logically in the performance of one's duties.
4. Organize and accept responsibility for one's work, including acknowledgement of errors or uncertainty and acceptance of constructive criticism.

The professional/intellectual demands required of students include the ability to:

1. Communicate in a professional, positive, tactful manner with patients, physicians, nurses, other health care and non-health care employees, and fellow laboratory personnel.
2. Communicate, comprehend, and follow directions understandably in English as evidenced by verbal, written, and reading skills.
3. Communicate, through the use of assistive devices (e.g., hearing aids, phone receivers, etc.) if needed, so as to converse understandably in English.
4. Maintain patient confidentiality and exercise ethical judgment, integrity, honesty, dependability, and accountability in the performance of one's laboratory responsibilities.
5. Perform laboratory tests carefully while maintaining efficiency and organization.
6. Demonstrate the intellectual skills required to comprehend scientific and medical information, to perform mathematical calculations, to analyze information, to evaluate

information, and to use critical thinking skills to solve problems.

7. Maintain a well-groomed, neat, professional appearance.

After reviewing the Essential Functions, students acknowledge that they have a clearer understanding of the program's professional expectations and of the competency that will be required of them. Throughout their professional studies, their ability to meet these standards will be evaluated and assessed.

Admission Categories

Students will be admitted as full-time students. Requests for part-time status will be evaluated on a case-by-case basis in consultation with the Graduate College.

Other Documents Required

The MS in MLS is a clinically-oriented program that includes clinical practicum courses at various hospital and healthcare facilities. This requires students to submit documentation of immunizations (including but not limited to hepatitis B virus, measles, mumps, rubella, and Sars-CoV-2 viruses, a current influenza vaccine, as well as immunization or history of disease for varicella). Additionally, these institutions require proof of immunity to hepatitis B, measles, mumps, rubella and varicella, and a current negative tuberculin skin test or quantiferon gold test for tuberculosis. Other documentation including HIPAA training, bloodborne pathogen training, online training specific to the organization may be required. In addition, all students will have to submit a urine drug screen test and criminal background check. NOTE: items listed in II. E will be addressed later in the curriculum prior to scheduling clinical practicums. For admission, students need to meet the University of Delaware Student Health Services requirements only, and provide proof of hepatitis B virus immunization or a signed waiver to participate in student laboratory exercises, as well as required safety training once admitted.

III. Academics

Degree Requirements

Table 1 - Degree Requirements	
Category	Semester Credit
Core MLS Curriculum	42
Core MS Courses	9
Other (Specify, clinical practica)	12
TOTAL	63

Medical Laboratory Science Core

Table 1 presents an overview of the sectors which make up the MS in MLS curriculum.

42 credits of subjects specific to clinical laboratory science will be completed by students. This is necessary both for the student to be sufficiently knowledgeable about the profession to practice in a clinical laboratory setting, be eligible to sit for the ASCP Board of Certification Exam and to select a Capstone Project.

These courses are predominantly laboratory courses. Competency in the various laboratory techniques is necessary to function within the clinical science laboratory. This requires that the student be able to attend courses at the UD campus.

Any grades below C- will not count toward the degree, and will have to be repeated. NOTE: These courses are typically only taught in the semester outlined in the chart below. A need to repeat a course will likely result in a delay in program completion. See also the section below regarding grade requirements for satisfactory progress.

Additional Required Courses

Students are required to complete 9 credits of graduate level coursework which includes courses in research design, regulatory and fiscal issues in laboratory management and completion of a capstone project.

The student will complete a rigorous capstone project that 1) constructs a focused investigation of a clinical laboratory science problem in real-world setting, 2) applies problem solving methodologies for development and execution of solutions, 3) investigates and applies theory through practical implementation of a project, and 4) evaluates and reports this research project in a clear, professional manner using the guidelines set forth in the course syllabus.

Clinical Practica

Supervised clinical practice will include clinical chemistry, hematology, microbiology, immunohematology as well as immunology and body fluid analysis.

Supervised clinical practice (preceptorship) will involve 40 hours/week for 3 weeks per specialty area specified above for a total of 480 hours.

**Table 2 – Curriculum Sequence
(MLS Core, Masters Core Courses & Clinical Practica)**

Prefix and Number	Required Courses	SCH
Fall - Semester 1		
MMSC 603	Research Design and Statistics (hybrid)	3
MMSC 691	Human Molecular Genetics	3
MMSC 602	Body Fluid Analysis	2
MMSC 612	Body Fluid Analysis Laboratory	1
	Total Credits	9
Spring - Semester 2		
MMSC 607/617	Clinical Physiological Chem I with lab	4
MMSC 623/624	Hematology I with lab	3
MMSC 628/629	Medical Microbiology with lab	5
MMSC 609/619	Immunohematology I with lab	3
	Total Credits	15
Fall - Semester 3		
MMSC 636	Clinical Physiological Chem II	3
MMSC 637	Clinical Instrumentation Lab	2
MMSC 633/634	Hematology II with lab	4
MMSC 620/621	Immunohematology II with lab	3
MMSC 638/639	Diagnostic Bacteriology & Medical Mycology with lab	5
	Total Credits	17
Spring – Semester 4		
MMSC 605	Regulatory and Fiscal Issues in Laboratory Management	3
MMSC 627	Flow Cytometry	2
MMSC 815	Contemporary Topics Research I	3
MMSC 693	Cellular & Molecular Diagnostic Techniques	2
	Total Credits	10
Summer – Semester 5		
MMSC 673	Advanced Clin. Chem/Body Fluid Analysis Practicum	3

MMSC 675	Advanced Clinical Hematology Practicum	3
MMSC 677	Advanced Clinical Microbiology and Immunology Practicum	3
MMSC 679	Advanced Immunohematology Practicum	3
Total Credits		12
Credits For Degree		63

Residency Requirement: At least 5 semesters of graduate work are required for the MS degree. This residency requirement, by design for the MS degree will be fulfilled using a fall, spring, fall, spring, summer semester combination.

Course Substitutions: Courses in the core curriculum may not be substituted. Transfer graduate coursework cannot count towards the degree.

Required Background Check: Clinical practical rotation/fieldwork sites that require a criminal background check, child abuse clearance, adult abuse clearance and/or fingerprinting may deny a student's participation in the clinical experience or rotation because of a felony or misdemeanor conviction or a record of child abuse. Clinical sites may also deny participation in clinical experiences for other reasons, including but not limited to failure of a required drug test, or inability to produce an appropriate health clearance. As participation in clinical experiences is a required part of the curriculum and a requirement for graduation, denial of participation by a clinical site may result in delay of graduation or the inability to graduate from the program. Regardless of whether or not a student graduates from the University of Delaware, individuals who have been convicted of a felony or misdemeanor may be denied employment, certification or licensure as a health professional. Information regarding individual eligibility may be obtained from the appropriate credentialing bodies or health care facility.

Grade Minimums: No grades below a C- will be accepted in the MS in MLS program.

Expectations of Facility in English: As noted in the Essential Functions above, students are expected to be able to communicate, comprehend, and follow directions understandably in English as evidenced by verbal, written, and reading skills.

Time Limit for Completing the Degree & Definition of Satisfactory Academic Progress

Timetable: The time limit for completion of degree requirements begins with the date of matriculation and is specifically detailed in the student's letter of admission. Students entering the program are given 5 consecutive semesters, in the specific sequence outlined in the curriculum sequence (Table 2), to complete the program requirements. An extension of time limit may be granted for circumstances beyond the student's control. Requests for time extensions must be made in writing and approved by the MS in Medical Laboratory Science Program Director. The director will forward the request to the Graduate College.

Submission of Required University Forms: To initiate the process for degree conferral, candidates must submit an "Application for Advanced Degree" to the Graduate College. The application deadline is in early March for Summer candidates. Please see the university's

academic calendar for submission deadlines. The application must be signed by the program director and department chair. There is an application fee for master's degree candidates that is published by the university. Payment is required when the application is submitted. Upon completion of the audit, the Graduate College notifies students in writing when they have met all degree requirements.

Grade Requirements for Satisfactory Progress: Failure to satisfactorily progress in the program will be based on the University Graduate Policy as noted below: The Graduate College monitors the academic progress of all graduate students and notifies students in writing of all academic deficiencies. The cumulative GPA after each term determines academic standing. The University's Academic Probation Policy is expressed in the following chart.

If a student is on	Earns a GPA of	The status becomes
Any status	3.0 or above	Clear
Clear	2.99-2.5	Warning
Clear	2.49-2.0	Probation
Probation	Below 3.0	Dismissal
Warning	Below 3.0	Probation
Any status	Below 2.0	Dismissal

Reasons for Dismissal/Termination from the Program: The Graduate College notifies students when they are dismissed from graduate programs without completing a degree. Dismissals usually take place at the end of a term. Students may be dismissed for the following reasons:

- Upon the expiration of the 24 month time limit required for students to complete their degree
- Upon the failure to meet the grade point average requirements as stated in the policy on Academic Deficiency and Probation
- University of Delaware policies for appeal of dismissal can be found at <https://grad.udel.edu/policies/graduate-academic-policies/>

IV. Learning Outcomes and Educational Goals

Four Learning Outcomes have been identified for the program. Upon completion of the program, all students will:

1. Employ research methods to assess a problem in the field of medical science in an ethical manner. Course Assessed: MMSC 603 *Research Design and Statistics*
2. Communicate research findings in an effective manner. Course Assessed: MMSC815 *Contemporary Topics Research*
3. Demonstrate the ability to quantitatively analyze data using several different statistical procedures. Courses Assessed: MMSC 603 *Research Design and Statistics* and MMSC 815 *Contemporary Topics Research*
4. Evaluate and assess regulatory and fiscal situations encountered in laboratory settings and make best-practice, evidence-based recommendations. Course Assessed: MMSC 605 *Regulatory and Fiscal Issues in Laboratory Practice*

Outcomes for the MS in MLS include the expectation that students will be able to:

5. Apply the advanced knowledge and technical skills needed to serve as active contributors and/or leaders in the laboratory science profession;
6. Critically review, appraise and synthesize the biomedical sciences literature;
7. Identify and systematically investigate research questions pertinent to laboratory practice;
8. Synthesize new concepts, models and theories through the appropriate application of empirical knowledge and the scientific method to help resolve clinical laboratory and health sciences issues or problems;
9. Apply current knowledge to evaluate or design more effective ways to deliver clinical laboratory and health-related services;
10. Use a variety of information technologies to address both theoretical and practical problems, enhance communication, and disseminate knowledge to applicable audiences and interest groups;
11. Demonstrate proficiency in both oral and written communication, using both scholarly and technical formats; Work collaboratively with others to advance the scientific bases of knowledge in laboratory science via ongoing scholarship;
12. Integrate basic principles of ethics and cultural sensitivity within all interpersonal and professional activities.

V. Financial Aid

Tuition remission and/or stipends are not offered. Graduate students in this program would be eligible to apply for financial aid as applicable.

VI. Current Faculty Affiliated with the Program

Name	Degree	Rank	Specialty
Charles 'Buz' Swanik	Ph.D.	Professor & Deputy Dean	Administration
Esther Biswas-Fiss	Ph.D.	Professor & Chair	Molecular Diagnostics, Biotechnology
Mona Batish	Ph.D.	Associate Professor	Applied Molecular Biology
Subhasis Biswas	Ph.D.	Professor	Applied Molecular Biology, Clinical Chemistry
Endale Gebregzabher	Ph.D.	Assistant Professor	Molecular Diagnostics, Clinical Chemistry
Andrew Hollinger	M.S.	Instructor	Molecular Diagnostics, Medical Microbiology, Regulatory Affairs
Michael Lacy	Ph.D.	Assistant Professor	Immunology, Flow Cytometry, Hematology
Huey-Jen Lin	Ph.D.	Associate Professor	Molecular Diagnostics
Vijay Parashar	Ph.D.	Associate Professor	Applied Molecular Biology
Nicole Pekarek	Ph.D.	Assistant Professor	Immunohematology
Heather Walters	M.Ed.	Instructor	Medical Microbiology
Wendy White	M.S.	Instructor	Hematology, Body Fluid Analysis, Regulatory Affairs

VII. MS in MLS Students

General Student Responsibilities

Graduate students are expected to maintain up-to-date addresses in UDSIS and within the Departmental records as requested. On an annual basis, students will be required to complete specific safety training through the EHS SciShield system on a timely basis. Students are granted use of certain facilities to include the copier and related office supplies for the purpose of teaching assistantship responsibilities.

Student Government and Organization

Students in the program will be encouraged to periodically meet as a group so that the student representative can pass on any pertinent information from program meetings and so the group can discuss any issues or concerns they might have. Concerns can be brought to the attention of the program faculty by the elected student representative.

Laboratory Safety and Research Regulations and Standards of Student Conduct

Graduate students performing laboratory diagnostic testing and/or research are subject to all University regulations regarding safety, human subjects, animal use, and hazardous and radioactive material use and disposal. These guidelines may be found in the University of Delaware Policies and Procedures Manual. Additional information can be obtained from the UD Research and Graduate Studies website: <http://www.udel.edu/research/>

Travel for Professional Meetings or Presentations

Students will be encouraged to attend regional scientific meetings and symposia. Funding will be sought from available University/College/departamental funds should a student attend a conference for the purpose of presenting a peer-reviewed poster or to play a leadership role in the conference.