DEPARTMENT *of* MEDICAL AND MOLECULAR SCIENCES

MASTER OF SCIENCE IN MEDICAL AND MOLECULAR SCIENCES
Program Policies

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I. Program History and Description

In today's competitive employment market, individuals seeking management and leadership positions in the laboratory-based health professions require a graduate level degree. The Master of Science in Medical and Molecular Sciences (MMS) is designed for practicing professionals who want to advance their knowledge and skills in the clinical laboratory sciences and develop new proficiencies needed to meet the challenges of a changing profession and fast-paced development in technology.

The MMS allows students to tailor their program of study to meet their specific career goals whether it be laboratory administration, research, or laboratory science education. In addition, the curricular flexibility of this program allows laboratory professionals to gain knowledge and technical competency in emerging areas of practice in the laboratory such as molecular diagnostics. The program is useful for those wishing to pursue a clinical focused MS to enhance educational and career trajectories in other health professions.

Individuals seeking leadership positions in laboratory management, education and research can earn an MS in Medical and Molecular Sciences through either full- or part-time study.

The MMS is designed for individuals holding a baccalaureate degree in a laboratory field with an interest in advancing theoretical and clinical learning, practice, and research.

The program prepares the student for advanced practice opportunities with academic, industrial, and clinical professional growth through:

- Advanced expert-knowledge and skills
- Critical thinking proficiency
- Interdisciplinary collaboration through a focused advanced practica
- Increased skills in evidence-based practice, and research methodologies
- Conduct of translational research in laboratory science

Students must have a BS or a post-baccalaureate certificate in a laboratory field such as medical laboratory sciences, biotechnology, cytogenetic technology or cytotechnology. (Other laboratory professionals may be eligible, based on training and experience.) The program is customized to each student's unique interests and professional goals.

An overarching goal of this program is to provide a cadre of leaders in the laboratory-based health professions. The new program aligns with the vision of the University of Delaware as a center for graduate level professional education and training.

Outcomes for the MMS include the expectation that students will be able to:

- Critically review, appraise, and synthesize the health sciences literature
- Identify and systematically investigate research questions pertinent to clinical laboratory practice

- 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
- Apply the advanced knowledge and technical skills needed to serve as active contributors and/or leaders in the laboratory science professions
- Apply current knowledge to evaluate or design more effective ways to deliver clinical laboratory and health-related services
- Use a variety of information technologies to address both theoretical and practical problems, enhance communication, and disseminate knowledge to applicable audiences and interest groups
- 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 clinical laboratory science via ongoing scholarship
- Integrate basic principles of ethics and cultural sensitivity within all interpersonal and professional activities

II. Admission to the MS in Medical and Molecular Sciences Program

University Policy on 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.

Admissions Requirements

Admissions decisions are made by the Medical and Molecular Sciences Program Committee. Students will be admitted to the program based on enrollment availability and their ability to meet the following minimum recommended entrance requirements:

- BS, equivalent degree, or post-baccalaureate certificate in a laboratory profession (such as medical laboratory sciences, biotechnology, cytogenetic technology or cytotechnology; other laboratory professionals may be eligible, based on training and experience) from an accredited college or university.
- The GRE is not required, TOEFL requirements are described in detail below for international applicants
- An undergraduate GPA of 3.0 or higher.
- 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 his/her professional objectives.
- Current résumé and two 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.

University Admission Procedures

Applicants must submit all of the following items directly to the Graduate College using the online admission process before admission can be considered:

1. A completed application should be submitted no later than February 1 for the fall semester, and October 1 for the spring semester to ensure consideration.
2. A nonrefundable application fee must be submitted with the application. Credit card payment is accepted with the online application. Checks must be payable to the University of Delaware. Applications received without the application fee will not be processed. International students paying by check must use a check drawn on a US bank or an International Postal Money Order.
3. Applicants must submit responses to specific questions asked on the application, a résumé, and a statement of professional goals and objectives.
4. Applicants must submit at least two letters of recommendation. All letters of recommendation should be mailed directly to the Graduate College.
5. 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.
6. 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.
7. International student applicants must demonstrate a satisfactory level of proficiency in the English language if English is not the first language. The University requires an official paper-based TOEFL score of at least 550, at least 213 on the computer-based TOEFL, or at least 79 on the Internet-based TOEFL for an applicant to be considered for admission. For the IELTS examination, the minimum score required is 6.5. TOEFL scores and IELTS scores more than two years old cannot be validated or

considered official. A waiver of the TOEFL exam is only granted when a degree has been earned in a country where English is the primary language.

8. 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 nonimmigrant alien students. International students are required to purchase the University-sponsored insurance plan or its equivalent.
9. All first-time international students are required to attend the Orientation Day for new international students, which takes place before classes begin.
10. 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, undergraduate/graduate transcripts, letters of recommendations, résumé, statement of purpose, and written statement of goals and objectives are reviewed by the Program Committee of the Medical and Molecular Sciences Program.

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. There is only one category of admission – there is no provisional admission to the MMS.

Academic Requirements

Degree Requirements

The MS in Medical and Molecular Sciences (MMS) is built on 32–33 graduate credits that include core courses, fieldwork experiences, and individualized concentration electives. The curriculum can be completed in as little as three semesters (accelerated format), in a traditional four semester format, or in an extended part-time format over the course of six semesters.

Core Courses

Students must earn 12 credits in the core courses of Research Design, Methods in Bioscience Education, Regulatory and Fiscal Issues in Lab Management, and Research or Capstone Project.

Fieldwork

Students must earn 8 credits in the fieldwork experiences category through an individualized combination of the following courses: Advanced Practica, Laboratory Education and

Administration, Laboratory Administration and Management.

Electives

Select 6-8 credits of concentration electives from graduate level courses offered throughout the University. These courses should focus on and reflect contemporary areas of clinical or research laboratory management, administration, and advanced practice. Concentration Areas include but are not limited to:

- Management and supervision
- Financial management
- Regulatory and quality management
- Advanced research skills
- Population health

III. Curriculum

CORE COURSES (12 credits)	**COURSE CREDITS**
MMSC 603 Research Design	3
MMSC 604 Methods in Bioscience Education	3
MMSC 605 Regulatory and Fiscal Issues in Laboratory Management	3
MMSC 803 Seminar (3 total, 1 per semester – 1.0 credit each)	3
FIELDWORK EXPERIENCES (8 credits)	
MMSC 610 Advanced Practicum I	2
MMSC 611 Advanced Practicum II	2
or MMSC 631 Laboratory Education Administration and Instruction	2
MMSC 613 Advanced Practicum III	2
MMSC 614 Advanced Practicum IV	2
or MMSC 632 Laboratory Administration and Management	2
SCHOLARLY PRODUCT & CONCENTRATION ELECTIVES (12-14)[1,2]	
MMSC 815 Contemporary Topics Research (2 total, 3 credits each)	6
Concentration Elective(s)[2]	6-8
Total Credits for the Master of Science in Medical and Molecular Sciences	**minimum 32**

[1]To meet the scholarly product requirement, students may take a literature review/health services/outcomes-based research project course (MMSC 800) or engage in a wet-bench research project with a selected PI (MMSC 868). Students must meet with the MMS program director to determine which course best meets their educational needs.

[2]The degree requires six credits of any 600-800 level course from a relevant biomedical or basic science department, such as, but not limited to, ANFS, BINF, BISC, BMEG, CHEM, CISC, EDUC, ELEG, HBNS, HDFS, KAAP, MEEG, MMSC, NURS, PSYC.

Residency Requirements

At least three academic year semesters of graduate work are required for the MS degree. This residency requirement may be fulfilled using fall and spring semester combinations, summer and winter sessions do not meet the qualifications.

Course Substitutions

Courses in the core curriculum may not be substituted. Concentration electives will be chosen in consultation with the program director in accordance with the student's career goals. Transfer graduate coursework cannot count towards the degree.

Time Limit for Completing the Degree

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 6 consecutive semesters to complete the program requirements. An extension of the 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 student's dissertation committee and the director of the Medical and Molecular Sciences Program. 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 deadlines are February 15 for Spring candidates, March 15 for Summer candidates, September 15 for Fall candidates, and December 15 for Winter candidates. 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.

Definition of Satisfactory Academic 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 9-hour increment determines academic standing. The University's Academic Probation Policy is expressed in the following chart.

If a student who 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
Warning	Below 3.0	Probation
Probation	Below 3.0	Dismissal
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 three-year 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.

IV. Financial Aid

There are no additional costs for the students in this program other than traditional graduate student tuition and fee expenses. Tuition remission and/or stipends are not offered. Graduate students in this program are eligible to apply for financial aid as applicable.

V. Departmental Operations

Current Faculty Affiliated with the Program

Name and Degree	Rank	Specialty
Esther Biswas-Fiss, MS, Ph.D.	Professor and Dept Chair	Translational Genetics
Mona Batish, Ph.D.	Associate Professor	RNA Biology
Endale Gebregzabher, Ph.D.	Assistant Professor	Molecular Epidemiology of Breast Cancer
Andrew Hollinger, M.S.	Instructor	Molecular Diagnostics & Medical Microbiology
Virginia Hughes, Ph.D.	Professor	Hematology
Vijay Parashar, Ph.D.	Associate Professor	Protein Structure and Microbiology
Kimberly Walker, Ph.D.	Assistant Professor	Clinical Chemistry

Graduate Coordinator

The MMSC department chair will appoint a graduate coordinator for the Medical and Molecular Sciences Master's Program from among the department faculty. The term of service for the graduate coordinator is three years, with no limit on the number of consecutive terms that may be served. The graduate coordinator serves as the program representative and point person and is responsible for the following:

- Corresponding with prospective students
- Maintaining program records
- Holding elections for members of the Program Committee
- Chairing Program Committee meetings
- Admitting students to the program following approval of the Program Committee

- Chairing meetings of the Medical and Molecular Sciences faculty as necessary for review/revision of program policies and curriculum
- Final approval of degree granting

Program Committee

The Medical and Molecular Sciences Graduate Program Committee will consist of an affiliated faculty member from the department, serving in staggered, three- year terms. The graduate program coordinator will serve as chair of the Program Committee. Responsibilities of the Program Committee shall include:

- Admission of students into the program
- Approval of changes to the graduate curriculum
- Oversight of student progress in the program, including dismissal of students who fail to make satisfactory progress

Medical and Molecular Sciences Students

Student 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 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/ All training and regulatory authorizations must be updated at the time of proposal submission.

Travel

Students will be encouraged to attend regional scientific meetings and symposia. Funding will be sought from available University/College/departmental 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.

VI. Appendix

Sample Schedule of Course Completion Four Semester Option

Fall 1 (7 credit hours)		**SEMESTER CREDITS**
MMSC 603	Research Design	3
MMSC 604	Methods in Bioscience Education	3
MMSC 803	Seminar (3 total, 1 per semester – 1.0 credit each)	1
Spring 1 (9 credit hours)		
MMSC 605	Reg & Fiscal Issues in Lab Management	3
MMSC 803	Seminar	1
MMSC 631	Lab Education & Admin	2
Concentration Elective		3
Fall 2 (9 credit hours)		
MMSC 815	Contemporary Topics Research	3
MMSC 803	Seminar	1
MMSC 610	Advanced Practica I	2
Concentration Elective		3
Spring 2 (7 credit hours)		
MMSC 632	Lab Admin & Management	2
MMSC 611	Advanced Practica II	2
MMSC 815	Contemporary Topics Research	3
		32 credits

Sequences can vary; for example, the program can be completed in an extended part-time option over the course of 5-6 semesters, where students complete an average of 4-6 credits per semester. An accelerated 3 semester option is also possible.