

Program Change Request

Date Submitted: 10/24/18 12:25 pm

Viewing: **SC-BS-MLAB : Medical Laboratory Science, BS**

Last approved: 03/06/18 1:56 pm

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Changes proposed by: jbazaz

Catalog Pages [Medical Laboratory Science, BS](#)
Using this Program

In Workflow

1. **BIOL Program Chair**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. SC CAT Editor
5. Assoc Provost- Undergraduate
6. Registrar-Programs

Approval Path

1. 10/24/18 2:05 pm
Larry Rockwood (Irockwoo):
Approved for BIOL Program Chair

History

1. Oct 23, 2017 by cImig-jwehrheim
2. Feb 14, 2018 by Rebekah Zacharias (rzachari)
3. Feb 26, 2018 by Rebekah Zacharias (rzachari)
4. Mar 6, 2018 by Rebekah Zacharias (rzachari)

Are you completing this form on someone else's behalf?

Yes

Requestor:

| Name | Extension | Email |
|----------------|-----------|----------|
| Anne Verhoeven | 1572 | averhoev |

Effective Catalog: 2019-2020

Program Level: Undergraduate

Program Type: Bachelor's

Degree Type: Bachelor of Science

Title: Medical Laboratory Science, BS

Banner Title:

Registrar/OAPI Use Only – SCHEV Status: Approved

Registrar's Office Use Only – Program Start Term: Fall 2018

Registrar/OAPI Use Only – SCHEV Letter:

Concentration(s):

| | Associated Concentrations | Registrar's Office Use Only: Concentration Code |
|---|---------------------------|---|
| 1 | Molecular Biology | MOB |
| 2 | Microbiology | MIB |
| 3 | Histotechnology | HSTT |
| 4 | Histology | HISO |

Registrar/IRR Use Only – Concentration CIP Code:

College/School: College of Science

Department / Academic Unit: Biology

Jointly Owned Program? No

Justification: Listing Quest Diagnostics.

Total Credits Required: Total credits: minimum 120

Registrar's Office Use Only - Program Code: SC-BS-MLAB

Registrar/IRR Use Only – Program CIP Code:

Admission Requirements:

Admissions

University-wide admissions policies can be found in the [Undergraduate Admissions Policies](#) section of this catalog.

To apply for this program, please complete the [George Mason University Admissions Application](#).

Program-Specific Policies:

Policies

Students must fulfill all [Requirements for Bachelor's Degrees](#) including the [Mason Core](#)¹.

[MLAB 300](#) Science Writing fulfills this major's writing intensive requirement.

Important information and departmental policies are available with the [Department of Biology](#).

This program requires the equivalent of three years of full-time pre-professional study at the college level preceding a senior year of professional education in an affiliated **program school** of medical laboratory science. **Affiliated All-affiliated** schools (see below) are accredited by the [National Accrediting Agency for Clinical Laboratory Sciences \(NAACLS\)](#). **Quest Diagnostics in Chantilly, Virginia also provides professional education for this program.** »

¹Note: Because of the extensive pre-professional education requirements stipulated by NAACLS, students majoring in medical laboratory science are exempt from the Mason Core 'Arts' requirement.

Important Program Requirements

- Students must complete [MLAB 200](#) Introduction to Medical Laboratory Science and present their biology coursework and supporting requirements with a minimum GPA of 2.00.
- A grade of 'C' or better must be earned in [BIOL 213](#) Cell Structure and Function ([Mason Core](#)) in order to advance to other major requirements. Students may repeat [BIOL 213](#) Cell Structure and Function ([Mason Core](#)) once and a second time only with permission of the Department of Biology.
- Medical laboratory science majors must earn a minimum of 'C' in all biology core courses.

Major in Medical Laboratory Science as a Second Bachelor's Degree

While the standard program for medical laboratory sciences is three years on campus followed by a fourth year at a clinical affiliate (3+1), many students elect to complete a bachelor's degree before entering the clinical program (4+1). Students who have completed the [Biology, BS](#) or [Chemistry, BS](#) at Mason and then undertake a fifth year at a clinical affiliate may be eligible for a second bachelor's degree with a major in medical laboratory science. Students wishing to receive the second degree must apply before entering their fifth year. For further information, contact a laboratory sciences advisor.

Applying to Medical Laboratory Sciences Schools

Responsibility for applying to schools of medical laboratory sciences and gaining admission rests with the student; however, guidance is provided by the medical laboratory sciences program director. Admission to medical laboratory sciences schools is selective, so candidates should strive for strong academic standing (2.5 science GPA or higher). Students who fail to gain admission to a NAACLS-approved school are unable to complete this degree program. Such students may transfer to [Biology, BA](#) or the [Biology, BS](#) without loss of credits.

Application to medical laboratory sciences schools should be initiated about a year before the desired entrance date. This fact, coupled with the large number of required courses in the pre-professional curriculum, makes it imperative that students in the program consult regularly with their faculty advisor. All medical laboratory sciences majors and prospective majors are urged to enroll in [MLAB 200](#) Introduction to Medical Laboratory Science as early as possible. This course provides information on the profession, as well as the educational demands placed on candidates.

Senior Year

Students should be aware that the senior year spent off campus requires the following special interpretation of university policies. Transfer students must present at least 16 credits of 300 to 400-level biology or chemistry coursework taken at Mason. Students may present no more than 6 credits of 'D' grades in biology and chemistry courses required in three years of pre-professional study. No unsatisfactory grades may be presented for courses in the senior year of professional study. Transfer students entering with more than 45 transfer credits are often unable to complete the pre-professional phase of their program in the usual three years of full-time study.

Senior students are registered at the university through special procedures. For details, consult the program director.

Affiliated NAACLS-Approved Schools

This program requires the equivalent of three years of full time professional study at the college level preceding a senior year of professional education in an affiliated school of medical laboratory sciences. All affiliated schools are accredited by the NAACLS:

- [Augusta Health- School of Clinical Laboratory Science](#)
- [George Washington University- School of Medicine and Health Sciences: The Medical Laboratory Sciences Program](#)
- [INOVA Fairfax Hospital- Medical Laboratory Science Program](#)
- [Sentara Rockingham Memorial Hospital- School of Medical Laboratory Science](#)

Degree Requirements:

Students should refer to the [Admissions & Policies](#) tab for specific policies related to this program.

Students must complete the requirements outlined below, choosing one Professional Study/Concentration option:

- Not choosing a concentration ("Professional Study: Generalist Option") will provide students generalist training. Upon graduation, the board certification test may be taken and would allow graduates to practice in any area of a hospital or laboratory.
- Choosing a concentration will allow students to complete their clinical rotations in that specific area. Upon graduation, the Molecular Biology or Microbiology (depending upon the concentration chosen) board certification test may be taken.

Biology Core

| Code | Course List Title | Credits |
|--------------------------|--|---------|
| BIOL 213 | Cell Structure and Function (Mason Core) | 4 |
| BIOL 214 | Biostatistics for Biology Majors | 4 |
| BIOL 311 | General Genetics | 4 |
| Total Credits | | 12 |

MLAB and BIOL Additional Courses

| Code | Course List Title | Credits |
|--------------------------|--|---------|
| MLAB 200 | Introduction to Medical Laboratory Science | 1 |
| MLAB 300 | Science Writing 1 | 2 |
| BIOL 305 | Biology of Microorganisms | 3 |
| BIOL 306 | Biology of Microorganisms Laboratory | 1 |
| BIOL 430 | Advanced Human Anatomy and Physiology I | 4 |
| BIOL 431 | Advanced Human Anatomy and Physiology II | 4 |
| BIOL 452 | Immunology | 3 |
| BIOL 453 | Immunology Laboratory | 1 |
| Total Credits | | 19 |

1 Fulfills writing intensive requirement.

Chemistry

| Code | Course List Title | Credits |
|--|---|---------|
| CHEM 211 & CHEM 213 | General Chemistry I (Mason Core) and General Chemistry Laboratory I (Mason Core) | 4 |
| CHEM 212 & CHEM 214 | General Chemistry II (Mason Core) and General Chemistry Laboratory II (Mason Core) | 4 |
| CHEM 313 | Organic Chemistry I | 3 |
| CHEM 315 | Organic Chemistry Lab I | 2 |
| Select one from the following: | | 4-5 |
| BIOL 483 | General Biochemistry | |
| CHEM 314 & CHEM 318 | Organic Chemistry II and Organic Chemistry Lab II | |
| Total Credits | | 17-18 |

Mathematics

| Code | Course List Title | Credits |
|--|---|---------|
| Select one from the following: | | 3-6 |
| MATH 111 | Linear Mathematical Modeling (Mason Core) | |
| or MATH 113 | Analytic Geometry and Calculus I (Mason Core) | |
| MATH 123 & MATH 124 | Calculus with Algebra/Trigonometry, Part A and Calculus with Algebra/Trigonometry, Part B (Mason Core) | |
| Total Credits | | 3-6 |

Information Technology

| Code | Course List Title | Credits |
|---|--|---------|
| Select one from the following: | | 3 |
| CDS 130 | Computing for Scientists (Mason Core) ¹ | |
| Any course(s) which fulfills the Mason Core: Information Technology requirement | | |
| Total Credits | | 3 |
| 1 Recommended course for this major | | |

Professional Study: Generalist Option

Senior students are registered at the university through special procedures. For details, consult the medical laboratory science program director.

The senior year spent off campus requires the following special interpretation of university policies: transfer students must present at least 16 credits of 300 to 400-level biology or chemistry coursework taken at Mason; no unsatisfactory grades (less than 'C') may be presented for courses in the senior year of professional study. Transfer students entering with more than 45 transfer credits are often unable to complete the pre-professional phase of their program in the usual three years of full-time study. Students may have up to 30 credits of professional study during the senior year awarded for clinical education at an affiliated school of medical technology. No more than 30 professional credits may be applied toward the degree.

| Code | Course List Title | Credits |
|---|--|---------|
| The distribution of credits in these courses varies with the school of medical technology. In consultation with the advisor, select from the following: | | |
| MLAB 401 | Orientation to the Problems and Practices of the Clinical Laboratory | 30 |
| MLAB 402 | Clinical Hematology and Coagulation | |
| MLAB 403 | Clinical Microscopy | |
| MLAB 404 | Serology and Immunohematology | |
| MLAB 405 | Clinical Microbiology | |
| MLAB 406 | Clinical Chemistry | |
| MLAB 407 | Clinical Molecular Biology | |
| Total Credits | | 30 |

Notes:

Students are encouraged to elect additional basic science courses during their pre-professional years. Recommended courses are:

| Code | Course List Title | Credits |
|--------------------------|--|---------|
| BIOL 465 | Histology | 4 |
| BIOL 483 | General Biochemistry | 4 |
| BIOL 484 | Eukaryotic Cell Biology | 3 |
| BIOL 485 | Eukaryotic Cell Biology Laboratory | 2-3 |
| CHEM 321 | Quantitative Chemical Analysis | 4 |
| PHYS 243 | College Physics I (Mason Core) | 3 |
| PHYS 244 | College Physics Lab (Mason Core) | 1 |
| PHYS 245 | College Physics II (Mason Core) | 3 |
| PHYS 246 | College Physics Lab (Mason Core) | 1 |

Professional Study: Molecular Biology Concentration (MOB)

Senior students are registered at the university through special procedures. For details, consult the medical laboratory science program director.

The senior year spent off campus requires the following special interpretation of university policies: transfer students must present at least 16 credits of 300 to 400-level biology or chemistry coursework taken at Mason; no unsatisfactory grades (less than 'C') may be presented for courses in the senior year of professional study. Transfer students entering with more than 45 transfer credits are often unable to complete the pre-professional phase of their program in the usual three years of full-time study. Students may have up to 30 credits of professional study during the senior year awarded for clinical education at an affiliated school of medical technology. No more than 30 professional credits may be applied toward the degree.

This concentration is a pathway leading to eligibility for categorical certification as a Certified Technologist by the [American Society for Clinical Pathology \(ASCP\) Board of Certification \(BOC\)](#). The concentration is one year long, consisting of about 20% classroom and 80% hands-on laboratory experience. Instructors include the expert clinical scientists and technologists of [Quest Diagnostics](#), Chantilly, Virginia.

| Code | Course List Title | Credits |
|---|--|---------|
| In addition to the courses required for all Medical Laboratory Science students, the following is required: | | |
| MLAB 401 | Orientation to the Problems and Practices of the Clinical Laboratory | 30 |
| MLAB 407 | Clinical Molecular Biology | |
| Total Credits | | 30 |

Notes:

Students are encouraged to elect additional basic science courses during their pre-professional years. Recommended courses are:

| Code | Course List Title | Credits |
|--------------------------|--|---------|
| BIOL 465 | Histology | 4 |
| BIOL 483 | General Biochemistry | 4 |
| BIOL 484 | Eukaryotic Cell Biology | 3 |
| BIOL 485 | Eukaryotic Cell Biology Laboratory | 2-3 |
| CHEM 321 | Quantitative Chemical Analysis | 4 |
| PHYS 243 | College Physics I (Mason Core) | 3 |
| PHYS 244 | College Physics Lab (Mason Core) | 1 |
| PHYS 245 | College Physics II (Mason Core) | 3 |
| PHYS 246 | College Physics Lab (Mason Core) | 1 |

Professional Study: Microbiology Concentration (MIB)

Senior students are registered at the university through special procedures. For details, consult the medical laboratory science program director.

The senior year spent off campus requires the following special interpretation of university policies: transfer students must present at least 16 credits of 300 to 400-level biology or chemistry coursework taken at Mason; no unsatisfactory grades (less than 'C') may be presented for courses in the senior year of professional study. Transfer students entering with more than 45 transfer credits are often unable to complete the pre-professional phase of their program in the usual three years of full-time study. Students may have up to 30 credits of professional study during the senior year awarded for clinical education at an affiliated school of medical technology. No more than 30 professional credits may be applied toward the degree.

This concentration is a pathway leading to eligibility for categorical certification as a Certified Technologist by the [American Society for Clinical Pathology \(ASCP\) Board of Certification \(BOC\)](#). The concentration is one year long, consisting of about 20% classroom and 80% hands-on laboratory experience. Instructors include the expert clinical scientists and technologists of [Quest Diagnostics](#), Chantilly, Virginia.

| Code | Title | Credits |
|---|--|---------|
| Course List | | |
| In addition to the courses required for all Medical Laboratory Science students, the following is required: | | |
| MLAB 401 | Orientation to the Problems and Practices of the Clinical Laboratory | 30 |
| MLAB 405 | Clinical Microbiology | |
| Total Credits | | 30 |

Notes:

Students are encouraged to elect additional basic science courses during their pre-professional years. Recommended courses are:

| Code | Title | Credits |
|--------------------------|--|---------|
| Course List | | |
| BIOL 465 | Histology | 4 |
| BIOL 483 | General Biochemistry | 4 |
| BIOL 484 | Eukaryotic Cell Biology | 3 |
| BIOL 485 | Eukaryotic Cell Biology Laboratory | 2-3 |
| CHEM 321 | Quantitative Chemical Analysis | 4 |
| PHYS 243 | College Physics I (Mason Core) | 3 |
| PHYS 244 | College Physics Lab (Mason Core) | 1 |
| PHYS 245 | College Physics II (Mason Core) | 3 |
| PHYS 246 | College Physics Lab (Mason Core) | 1 |

Professional Study: Histotechnology Concentration (HISO)

| Code | Title | Credits |
|---|--|---------|
| Course List | | |
| In addition to the courses required for all Medical Laboratory Science students, the following is required: | | |
| MLAB 401 | Orientation to the Problems and Practices of the Clinical Laboratory | 30 |
| MLAB 408 | Clinical Histology | |
| MLAB 409 | Clinical Histology Practicum | |
| Total Credits | | 30 |

MLAB 401 Topics

The following topics will be covered under [MLAB 401](#) Orientation to the Problems and Practices of the Clinical Laboratory:

1. Introduction to CLS and Laboratory Operations

This course is a brief introduction to the Clinical Laboratory Science professions and Laboratory Operations. Topics include: Introduction to Laboratory Operations, Pre-analytcs and Specimen Types, Quality Management Concepts, Quality Control, Laboratory Professions, Professional Ethics, Laboratory Mathematics, Proper use of Laboratory Equipment, Introduction to Laboratory Instrumentation.

2. Board Exam Preparation

This course is a structured review and practice in preparation for the [American Society for Clinical Pathology](#) Technologist in Molecular Biology Board of Certification Exam. Practice tests and questions from a variety of published and authoritative sources are used to reinforce the content of the Technologist in Molecular Biology program.

MLAB 405 Topics

The following topics are covered under [MLAB 405](#) Clinical Microbiology:

1. Introduction to Clinical Microbiology

This course is a brief introduction to the discipline of Clinical Microbiology, and laboratory diagnostic techniques. Topics include: Overview of Microbiology Theory, Methods and Applications, Instrumentation, Staining, and Media, Immunology, Serology, and Molecular Diagnostics.

2. Medical Virology

This course is a survey of the characteristics, pathogenicity, and laboratory diagnosis of important human viruses. Topics include viral taxonomy and classical virology. Special emphasis is placed on the epidemiology and the laboratory's role in influenza pandemics.

3. Medical Mycology

This course is a comprehensive presentation of medically important fungi. Emphasis is placed on clinical presentation and laboratory identification of pathogenic species and opportunistic pathogens. Topics include general mycology methods, yeasts, susceptibility testing, molds (Hyaline, Mucor, Dematiaceous), Dermatophytes, Systemic infections, and Pneumocystis.

4. Medical Parasitology

This course is a comprehensive presentation of human parasites. Emphasis is placed on clinical presentation and laboratory identification. Topics include Flagellates, Ciliates, Coccidians, Malaria and Babesia, Other Blood Borne and Tissue Borne parasites, Nematodes, Cestodes, Trematodes, and Arthropods.

5. Molecular Detection of Infectious Disease

This course examines the advances in using molecular methods to detect human infectious disease. Careful attention is given to the comparison of molecular technologies with traditional microbiology methods. Topics include molecular methods and applications, including PCR, sequencing, TMA, and PEGE, specimens of choice, sample preparation, Quality Control, primer selection, Molecular methods in selecting antimicrobial agents, molecular epidemiology, and target organisms: fungi, bacteria, parasites, and viruses.

6. Medical Bacteriology

This course is a comprehensive presentation of bacteria isolated in the clinical laboratory. Emphasis is placed on the laboratory identification of isolates from a variety of specimen sources, and pathogenic species. Topics include Instrumentation and MALDI, Gram Positive Cocci, Gram Positive Bacilli, Enterics, non-fermenters, *Moraxella*, *Neisseria*, *Pasteurella*, *Haemophilus* and *HACEK*, *Camphylobacter*, *Helicobacter*, *Legionella*, CDC Select Agents, *Chlamydia*, *Mycoplasma*, *Ureaplasma*, Spirochetes, Anaerobes, Antibiotics and Susceptibility testing, and Acid Fast Bacilli.

7. Microbiology Clinical Correlations

Designed as the capstone for the Technologist in Microbiology program, this course takes a body system view of the pathogenicity of infectious disease. Attention is given to integrating clinical presentation and case history to laboratory investigation and diagnosis. Topics include UTI/Genital, Food Borne/GI, Cystic Fibrosis, Blood, CSF, Body Fluids, and Wounds.

MLAB 407 Topics

The following topics will be covered under [MLAB 407](#) Clinical Molecular Biology:

1. Introduction to Clinical Molecular Biology

This course presents the fundamentals of nucleic acid testing in the clinical laboratory and the underlying human genetics. Topics include: Fundamentals of Nucleic Acid Biochemistry, Common Techniques in Molecular Biology (Extraction, Resolution and Detection of Nucleic Acids, Analysis and Characterization, Amplification, Chromosomal Structure and Mutations, Gene Mutations, and DNA Sequencing).

2. Advanced Methods in Clinical Molecular Biology

This course applies the fundamentals of nucleic acid testing to advanced methods commonly used in the contemporary clinical and research laboratory. Topics include: PCR, Transcription-Based Amplification, Probe Amplification, Branched DNA, Hybrid Capture, Amplification: Signal, Cleavage-Based, Cycling Probe, Sequencing: Direct, Next Gen, Pyrosequencing, Bisulfite, RNA Sequencing, Bioinformatics, Human Genome Project.

3. Molecular Detection of Infectious Disease

This course examines the advances in using molecular methods to detect human infectious disease. Careful attention is given to the comparison of molecular technologies with traditional microbiology methods. Topics include: Molecular methods and applications, including PCR, sequencing, TMA, and PEGE, specimens of choice, sample preparation, Quality Control, primer selection, Molecular methods in selecting antimicrobial agents, molecular epidemiology, and target organisms: fungi, bacteria, parasites, and viruses.

4. Human Molecular and Chromosomal Applications and Pathology

This course presents advanced methods in nucleic acid testing to human medico-legal, forensic, and pathology applications. Topics include: Polymorphisms, RFLP, Paternity Testing, Linkage, Single Nucleotide Polymorphisms, Bone Marrow Engraftment, Mitochondrial DNA Polymorphisms and Disorders, Chromosomal Abnormalities, Patterns of Inheritance, Single Gene Disorders, Lysosomal Storage Disorders, Cystic Fibrosis, Trinucleotide Repeats, Genomic Imprinting, Array CGH, Molecular Oncology, HLA and Transplantation.

**Retroactive
Requirements
Updates:**

Plan of Study:

**Honors
Information:**

Additional Program Information

This information is required by the Office of Accreditation and Program Integrity.

**Courses offered via
distance (if
applicable):**

| | |
|---|-------------------|
| What is the primary delivery format for the program? | Face-to-Face Only |
| Does any portion of this program occur off-campus? | Yes |

Off-campus details: Senior year spent off campus training.

Are you working with a vendor / other collaborators to offer your program?

Yes

Please explain: Students spend their senior year in a laboratory (Augusta Health, GWU, INOVA, **Sentara, Quest Diagnostics**). ~~Sentara). I believe now Quest Diagnostics, too.~~

**Related
Departments**

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?

Yes

Please explain: Medical laboratory scientists.

Are you adding or removing a licensure component?

No

Additional SCHEV & SACSCOC Information

Are you changing the total number of credits required for this program?

Are you changing the delivery format in any way (e.g adding an online option)?

Are you adding/removing a licensure option which was approved by SCHEV?

Will any portion of this program be offered at an off-campus location?

Are you adding significant new content areas to the program?

Will this program change affect any specialized accreditation?

Green Leaf Program Designation

Is this a Green Leaf program? No

Does this program cover material which crosses into another department?

No

Additional Attachments [UGC-COS-Program Mod MLAB concentration.pdf](#)

SCHEV Proposal

Executive Summary

Reviewer Comments

Additional Comments

Is this course required of all students in this degree program?

%wi_required.eshtml%

Key: 34