

Medical Laboratory Science

DEGREE OFFERED

- Bachelor of Science in Medical Laboratory Science

The Degree Program

The B.S. in medical laboratory science has two tracks: Clinical laboratory science (<http://medicine.hsc.wvu.edu/medical-laboratory-science>) and Histotechnology (<http://medicine.hsc.wvu.edu/Histotech>). Clinical laboratory scientists are healthcare professionals educated in all aspects of clinical laboratory analysis, including test development, performance, and evaluation. Clinical laboratory scientists may work in many areas, including clinical chemistry, hematology, immunohematology, immunology, clinical microbiology, and molecular diagnostics.

Histotechnologists are healthcare professionals who are qualified through academic and applied science education and training to provide service, research, and management in histotechnology and areas related to anatomic pathology. Histotechnologists are integral to the success of the anatomic pathology department by performing routine and complex procedures to preserve and process tissue specimens for examination and diagnosis by a pathologist.

Practice settings for both clinical laboratory scientists and histotechnologists include hospital, clinic, public health, or private clinical laboratories; research, cytogenetic, pharmaceutical, or in-vitro fertilization laboratories; technical or sales representatives for medical manufacturers and suppliers; biotechnology, food, and cosmetic industries; and state or federal forensics laboratories.

Nature of Program

Students are admitted into either the clinical laboratory science or the histotechnology track within the medical laboratory science major after completing the pre-requisite courses at an accredited college or university. As students complete the pre-requisite courses, they may apply to the medical laboratory science major, typically during the sophomore year.

Within both tracks, the junior year (the first year of the professional curriculum) includes core and area-specific courses to introduce the student to the medical sciences and to prepare for the senior year curriculum. During the senior year (the second year of the professional curriculum), the student receives both didactic instruction and practical experience. Students receive practical experience at one or more of the affiliated hospital laboratories including:

- Ruby Memorial Hospital, Morgantown, WV
- Monongalia County General Hospital, Morgantown, WV
- West Penn Allegheny Health System, Pittsburgh, PA
- WVU Eastern Division which includes City Hospital, Martinsburg, WV and Jefferson Memorial Hospital, Ranson, WV
- Veterans Affairs Medical Center, Martinsburg, WV
- Excela Health which includes Westmoreland Hospital in Greensburg, PA and Latrobe Hospital in Latrobe, PA
- Charleston Area Medical Center, Charleston, WV
- United Hospital Center, Clarksburg, WV
- St. Clair Hospital, Pittsburgh, PA

Students must provide their own transportation and housing during the clinical rotations. Students assigned to the Eastern Division will participate in the rural rotation activities at this site.

The WVU medical laboratory science tracks in clinical laboratory science and histotechnology are accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), 5600 N. River Road, Suite 720, Rosemont, IL 60018, and (773) 714-8880. Graduates of the clinical laboratory science program and the histotechnology program are eligible for certification by the Board of Certification of the American Society for Clinical Pathology (ASCP).

FACULTY

DIRECTOR OF MEDICAL LABORATORY SCIENCE AND CLINICAL LABORATORY SCIENCE PROGRAM DIRECTOR

- Michelle Butina - PhD

HISTOTECHNOLOGY PROGRAM DIRECTOR

- Kimberly Feaster - B.S. (University of Findlay)

ASSOCIATE PROFESSOR AND CLS MEDICAL DIRECTOR

- Peter L. Perrotta - M.D. (Pennsylvania State University)

CLINICAL ASSISTANT PROFESSOR AND HTL MEDICAL DIRECTOR

- Olukemi Esan - M.D. (West Virginia University)

ASSOCIATE PROFESSOR

- Kerry Harbert - M.A. (West Virginia University)

INSTRUCTOR

- Jane Wade - B.A. (West Virginia University)

ASSISTANT PROFESSOR

- Marianne T. Downes - PhD (The Catholic University of America)
- Abra L. Elkins - M.A. (West Virginia University)
- Jason V. Evans - PhD (West Virginia University)

ASSOCIATE PROFESSOR EMERITUS

- Barbara J. Gutman
- Mary Ellen Koenn
- Karen S. Long

ADJUNCT INSTRUCTOR

- Sharon Hall

Admission to the Medical Laboratory Science Tracks

Students in the pre-medical laboratory science major and direct admit students must meet the admission criteria of WVU. Pre-medical laboratory science students are advised by the Center for Learning, Advising, and Student Success (CLASS). Medical laboratory science faculty advise direct admit students. Prospective students are advised to take mathematics, chemistry, and biology in high school.

Qualified applicants may enter the pre-medical laboratory science major at the beginning of any semester, however the professional curriculum begins the fall semester after the student is admitted to either the clinical laboratory science or histotechnology track. Admission to the pre-medical laboratory science major does not ensure admission to the medical laboratory science tracks in clinical laboratory science or histotechnology.

Pre-medical laboratory science students apply for admission into the junior year (first year in the medical laboratory science professional curriculum) before the second semester of the sophomore year in college. Fulfillment of the pre-requisites does not ensure admittance into either the clinical laboratory science or the histotechnology track.

DIRECT ADMIT

Entering freshman may be admitted directly into the Medical Laboratory Science Division with a high school GPA of 3.75 or above, and a minimum math component ACT score of 26 or a minimum math component SAT score of 620. Direct admit students must maintain an overall and science GPA #3.0 and receive no final course grade lower than a C in any semester. Any student who fails to meet the direct admit criteria will be permitted to apply through regular admission.

PRE-REQUISITES**English**

3-6

ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing
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Biology

8

BIOL 101 & BIOL 103 or BIOL 115	General Biology and General Biology Laboratory Principles of Biology
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BIOL 102 & BIOL 104 or BIOL 117	General Biology and General Biology Laboratory Introductory Physiology
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4

Chemistry

CHEM 115	Fundamentals of Chemistry	4
CHEM 116	Fundamentals of Chemistry	4
CHEM 233 & CHEM 235 or CHEM 231	Organic Chemistry and Organic Chemistry Laboratory Organic Chemistry: Brief Course	4
CHEM 234 & CHEM 236 or CHEM 231	Organic Chemistry and Organic Chemistry Laboratory Organic Chemistry: Brief Course	4
Mathematics (One of the following):		3
MATH 126	College Algebra	
MATH 129	Pre-Calculus Mathematics	
MATH 155	Calculus 1	
Statistics		3
STAT 211 or ECON 225	Elementary Statistical Inference Elementary Business and Economics Statistics	3
GEF		12
Credits to satisfy foundations 4-7.		
Total Hours		56-59

* CHEM 231 Organic Chemistry: Brief Course may be substituted for CHEM 233/235 and CHEM 234/236, however two semesters of organic chemistry are strongly recommended to better prepare for the professional curriculum.

Although not required for admission to the medical laboratory science tracks in clinical laboratory science and histotechnology, eight credits of organic chemistry, eight credits of physics, cell biology, and six credits of social sciences are suggested electives for those students interested in applying to medical, dental, or other graduate programs. In addition, a foreign language is recommended for students who plan to do graduate work.

Admission decisions are based upon the applicant's grade point average, recommendations, interview, and documented ability to successfully complete full-time academic work. Applicants should have a minimum overall and science GPA of 2.5. Applicants may be admitted on probation if their overall or science GPA is less than 2.5. Applicants with less than a 2.0 overall or science GPA will not be admitted. A GPA of 2.5 or above does not ensure admission. Two letters of recommendation are required; at least one must be from a college science professor. A personal interview with the Medical Laboratory Science Admissions Committee is required. Admission of international students is in compliance with WVU regulations.

APPLICATION PROCEDURE

Each year the medical laboratory science division selects a limited number of applicants from the applications received for admission into the clinical laboratory science and histotechnology track. The application is available online after December 1.

There is an application fee for residents and non-residents. The application deadline is March 15 if the applicant expects to enter the program the following fall semester. If the class is not filled by those applications, the deadline may be extended.

Click the link below to view the corresponding track requirements and Suggested Plans of Study.

- Clinical Laboratory Science (p. 6)
- Histotechnology (p. 5)

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. (<http://registrar.wvu.edu/gef>)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

General Education Foundations

F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Skills		3-4
F4 - Society & Connections		3

F5 - Human Inquiry & the Past	3
F6 - The Arts & Creativity	3
F7 - Global Studies & Diversity	3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)	9
Total Hours	31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

Medical Laboratory Science Pre-Requisites

ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing	6
BIOL 101 & BIOL 103 or BIOL 115	General Biology and General Biology Laboratory Principles of Biology	4
BIOL 102 & BIOL 104 or BIOL 117	General Biology and General Biology Laboratory Introductory Physiology	4
CHEM 115	Fundamentals of Chemistry	4
CHEM 116	Fundamentals of Chemistry	4
CHEM 233 & CHEM 235 or CHEM 231	Organic Chemistry and Organic Chemistry Laboratory * Organic Chemistry: Brief Course	4
CHEM 234 & CHEM 236 or CHEM 231	Organic Chemistry and Organic Chemistry Laboratory * Organic Chemistry: Brief Course	4
Select 1 of the following:		3
MATH 124	Algebra with Applications	
MATH 129	Pre-Calculus Mathematics	
MATH 155	Calculus 1	
STAT 211 or ECON 225	Elementary Statistical Inference Elementary Business and Economics Statistics	3
GEF Requirements 4, 5, 6, & 7		12

First Year Studies Requirement

PATH 191	First-Year Seminar	1
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Medical Laboratory Science Core Curriculum

MICB 323 or MICB 200 & PATH 323	Medical Microbiology/Lab Medical Microbiology and Medical Microbiology Lab	5
PATH 300	Introduction to Pathology	3
PATH 303	Clinical Lab Applications	2
PATH 320	Basic Clinical Biochemistry	3
PATH 380	Introduction to Immunology	1
PATH 381	Research and Educational Methodology	2
PATH 403	Community Service Practicum	1
PATH 465	Medical Laboratory Management	2
PATH 475	Medical Relevance (fulfills the Capstone requirement)	3
PSIO 441	Mechanisms of Body Function	4

There are two Tracks: Histotechnology or Clinical Laboratory Science 38

Histotechnology (43 credits)

NBAN 205	Introduction to Human Anatomy	
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PATH 200	Medical Terminology	
PATH 304	Histotechnology Microanatomy	
PATH 305	Staining Techniques 1	
PATH 306	Histotechnique 1	
PATH 405	Staining Techniques 2	
PATH 406	Histotechnique 2	
PATH 407	Histology Laboratory	
PATH 408	Histotechnologist Practicum	
PATH 409	Molecular Pathology for Laboratory Professionals	
Clinical Laboratory Science (38 credits)		
IMMB 327	Parasitology	
PATH 310	Clinical Laboratory Mycology	
PATH 329	Clinical Chemistry 1	
PATH 340	Introduction to Hematology	
PATH 401	Phlebotomy	
PATH 420	Immunology and Blood Banking	
PATH 421	Immunoematology and Blood Banking Laboratory	
PATH 430	Clinical Chemistry 2	
PATH 431	Clinical Chemistry Laboratory	
PATH 440	Clinical Hematology	
PATH 441	Clinical Hematology Laboratory	
PATH 450	Clinical Microbiology	
PATH 451	Clinical Microbiology Laboratory	
PATH 470	Clinical Microscopy	
PATH 472	Urinalysis and Body Fluids Laboratory	
PATH 480	Clinical Immunology	
PATH 481	Clinical Immunology Laboratory	
Electives **		7
Total Hours		120

* CHEM 231 may be substituted for CHEM 233/235 and CHEM 234/236, however two semesters of organic chemistry are strongly recommended to prepare for the professional curriculum.

** PATH 100, PATH 101, PATH 200, and PATH 201 are required for Direct Admit students and highly recommended for Pre-Medical Laboratory Science students.

A minimum of 120 hours are required for graduation. However, students may have to take additional hours.

SUGGESTED PLAN OF STUDY FOR HISTOTECHNOLOGY

First Year

Fall	Hours Spring	Hours
CHEM 115 (GEF 8)	4 CHEM 116	4
Select one of the following (GEF 3):	3 ENGL 101 (GEF 1)	3
MATH 126	Select one of the following (GEF 8):	4
MATH 129	BIOL 102 & BIOL 104	
MATH 155	BIOL 117	
Select one of the following (GEF 2):	4 GEF 4, 5, 6, or 7	3
BIOL 101 & BIOL 103		
BIOL 115		
GEF 4, 5, 6, or 7	3	

PATH 191	1		
	15		14
Second Year			
Fall	Hours Spring		Hours
ENGL 102 (GEF 1)	3 CHEM 234 & CHEM 236		4
STAT 211 or ECON 225 (GEF 8)	3 GEF 4, 5, 6, or 7		3
CHEM 233 & CHEM 235	4 Elective		2
GEF 4, 5, 6, or 7	3		
	13		9
Third Year			
Fall	Hours Spring	Hours Summer	Hours
PATH 300	3 MICB 323	5 PATH 305	4
PATH 320	3 NBAN 205	3 PATH 406	3
PSIO 441	4 PATH 381	2	
PATH 380	1 PATH 304	3	
PATH 303	2 PATH 306	3	
PATH 200	3		
	16	16	7
Fourth Year			
Fall	Hours Spring		Hours
PATH 465	2 PATH 403		1
PATH 405	4 PATH 475		3
PATH 407	8 PATH 408		10
PATH 409	2		
	16		14

Total credit hours: 120

SUGGESTED PLAN OF STUDY FOR CLINICAL LABORATORY SCIENCE

First Year

Fall	Hours Spring		Hours
CHEM 115 (GEF 8)	4 CHEM 116		4
Select one of the following (GEF 3):	3 ENGL 101 (GEF 1)		3
MATH 126	Select one of the following (GEF 8):		4
MATH 129	BIOL 102 & BIOL 104		
MATH 155	BIOL 117		
Select one of the following (GEF 2):	4 GEF 4, 5, 6, or 7		3
BIOL 101 & BIOL 103			
BIOL 115			
GEF 4, 5, 6, or 7	3		
PATH 191	1		
	15		14

Second Year

Fall	Hours Spring	Hours
ENGL 102 (GEF 1)	3 CHEM 234 & CHEM 236	4

STAT 211 or ECON 225 (GEF 8)	3 GEF 4, 5, 6, or 7	3	
CHEM 233 & CHEM 235	4 Electives	6	
GEF 4, 5, 6, or 7	3		
Elective	1		
	14	13	
Third Year			
Fall	Hours Spring	Hours Summer	Hours
PATH 300	3 PATH 340	3 PATH 440	3
PATH 320	3 IMMB 327	2	
PSIO 441	4 MICB 323	5	
PATH 380	1 PATH 310	1	
PATH 303	2 PATH 329	2	
	PATH 381	2	
	PATH 472	1	
	PATH 470	1	
	13	17	3
Fourth Year			
Fall	Hours Spring	Hours	
PATH 450	3 PATH 403	1	
PATH 420	3 PATH 475	3	
PATH 430	3 PATH 421	3	
PATH 480	2 PATH 451	3	
PATH 465	2 PATH 431	3	
	PATH 441	3	
	PATH 401	1	
	PATH 481	1	
	13	18	

Total credit hours: 120

Major Learning Outcomes

MEDICAL LABORATORY SCIENCE

The mission of the medical laboratory science major at West Virginia University is to provide a high-quality education culminating in a Bachelor of Science degree that prepares laboratory professionals for their roles as members of the healthcare team in an environment of rapidly changing technology.

The goals of the program are to provide:

- a program in medical laboratory science which meets the academic standards of the University;
- Clinical Laboratory Scientists and Histotechnologists for medical (both urban and rural) laboratories, public health laboratories, research laboratories, and industry;
- an educational background which enables graduates to assume teaching and supervisory positions;
- an education background acceptable for graduate work in the sciences.

Progression Requirements

JUNIOR YEAR

Students must maintain a minimum grade point average of 2.5 throughout the program. Failure to maintain at least a 2.5 GPA (cumulative and science) may result in disciplinary sanctions. The Academic and Professional Standards Committee must recommend any student for advancement to the senior year. A satisfactory GPA does not ensure advancement.

SENIOR YEAR

Students receive didactic and clinical instruction during the senior year which includes summer, fall, and spring semesters. Students must maintain a minimum grade point average of 2.5 (cumulative and science) for each semester of the senior year.

Graduation requires satisfactory completion of all academic work and the recommendation of the faculty of the School of Medicine. All first degree students are required to complete a total of 120 semester hours for the BS in Medical Laboratory Science degree. Any competencies not completed must be made up by the end of the school year (mid-May) or graduation may be delayed. Graduation is not dependent upon passing a national certification examination.