

Immunology & Medical Microbiology, B.S.

Degree Offered

- Bachelor of Science

Introduction

Every day of our lives, we are exposed to microbes such as bacteria, viruses, and parasites. For the most part we suffer no disease or symptoms from these organisms, and they often go unnoticed. The single system in the body that allows life to continue in the face of these assaults is the immune system. The immune system is the network of cells and their biological processes that enable the body to recognize diseased cells or the invasion by microorganisms (bacteria, viruses, parasites, and prions) and eliminate them. The scientific discipline called immunology is the study of this system, and medical microbiology is the study of the disease states induced by the invasion of microorganisms. Collectively, these two disciplines address how humans and other mammals respond to infectious disease. These scientific disciplines have become the cornerstone for many industries - including the biotechnology, pharmaceutical, and medical and public health industries. These are all areas of particular emphasis and are being targeted for further development in West Virginia.

Educational Objectives

The Bachelor of Science (BS) degree in Immunology and Medical Microbiology will prepare students from diverse backgrounds to serve as professionals that are knowledgeable about the immune system of humans and other mammals, how the immune system functions, and the consequences of its malfunction on the health of the host. Knowledge of the immune system will be fully integrated with an excellent understanding of the diversity of microorganisms that cause disease in humans and other mammals and mechanisms of disease pathogenesis. Graduates will possess the laboratory skills and knowledge needed to assess the functional status of the immune system and to safely cultivate and identify microorganisms that cause disease in mammals. Graduates will be qualified to pursue several professional career paths in private industry, state and federal government, and academic institutions. The degree can also provide a strong foundation to progress to advanced studies including medical school, dental school, and graduate school.

Relationship of the Objectives to the Mission of WVU

The Bachelor of Science (BS) degree in Immunology and Medical Microbiology directly fulfills many of the stated objectives in the Strategic Plan for WVU, the WVU Health Sciences Center, and the WVU School of Medicine. It will be a financially viable, innovative, and dynamic educational program that provides a unique opportunity to earn a degree in Immunology and Medical Microbiology for both in-state and out-of-state undergraduate students. Its learner-centered curriculum will integrate both classroom and hands-on laboratory experiences. Graduates of the program will provide the state of West Virginia with a well-trained healthcare and research workforce who have the education and experience to work in a variety of occupations that require knowledge in immunology, medical microbiology and related disciplines.

ADMINISTRATION

VICE CHAIR OF UNDERGRADUATE EDUCATION

- Kelly Collins - PhD (University of Cincinnati)
Teaching Associate Professor

DIRECTORS

- Kathy Brundage - PhD (University of Pennsylvania)
Research Assistant Professor and Director, WVU Flow Cytometry and Single Cell Core Facility
- F. Heath Damron - PhD (Marshall University)
Associate Professor and Director, Vaccine Development Center

FACULTY

PROFESSOR

- Slawomir Lukomski - PhD (University of Lodz, Poland)

SERVICE PROFESSOR

- Karen Martin - PhD (Duke University Medical Center)

ASSOCIATE PROFESSORS

- Mariette Barbier - PhD (Universitat de les Illes Balears)
IMP Graduate Program Director
- F. Heath Damron - PhD (Marshall University)
Director, Vaccine Development Center
- Tim Eubank - PhD (The Ohio State University)
- Ivan Martinez - PhD (University of Pittsburgh)
- Cory Robinson - PhD (Miami University of Ohio)

TEACHING ASSOCIATE PROFESSOR

- Kelly Collins - PhD (University of Cincinnati)
Vice Chair of Undergraduate Education, Microbiology, Immunology, and Cell Biology
- Meenal Elliott - PhD (University of Alabama)

ASSISTANT PROFESSORS

- Candice Brown - PhD (Duke University)
- Jonathan Busada - PhD (East Carolina University)
- Michael Hu - PhD (Peking University)
- Salik Hussain - DVM, PhD (Université Paris Diderot)
- Tracy Liu - PhD (University of Toronto)
- Edwin Wan - PhD (City University of Hong Kong)

RESEARCH ASSISTANT PROFESSORS

- Kathy Brundage - PhD (University of Pennsylvania)
Director, WVU Flow Cytometry and Single Cell Core Facility

TEACHING ASSISTANT PROFESSORS

- Chad Sethman - PhD (Miami University)
- Valerie Watson - MS (West Virginia University)

TEACHING INSTRUCTOR

- Michelle Witt - MS (Virginia Tech)

ADJUNCT PROFESSORS

- Stacey Anderson - PhD (West Virginia University)
- Donald Beezhold - PhD (University of Illinois Medical Center)
- Lisa Holland - PhD (University of North Carolina at Chapel Hill)
- John Noti - PhD (Purdue University)
- Robert Taylor - PhD (Mississippi State University)
- David Weissman - MD (Northwestern University)

ADJUNCT ASSOCIATE PROFESSOR

- David Klinke - PhD (Northwestern University)

ADJUNCT ASSISTANT PROFESSORS

- Margaret Bennewitz - PhD (Yale University)
- Alexandra Elliott - PhD (University of Tennessee, Knoxville)
- Ida Holaskova - PhD (West Virginia University)
- Sreekumar Othumpangat - PhD (University of Mysore)
- Yong Qian - PhD (West Virginia University)
- Jenny Roberts - PhD (West Virginia University)

ADJUNCT TEACHING ASSISTANT PROFESSOR

- Jennifer Franko - PhD (Case Western Reserve University)

ADJUNCT ASSOCIATE SERVICE FELLOW

- Tara Croston - PhD (West Virginia University)

PROFESSORS EMERITI

- Nyles Charon - PhD (University of Minnesota)
- Christopher Cuff - PhD (Temple University)

ASSOCIATE PROFESSORS EMERITI

- Rosana Schafer - PhD (Temple University)

Admission Requirements

Due to Covid-19 – Admission requirements may differ from what is listed on this page. Please review the most up-to-date program admission requirements for the Bachelor of Science in Immunology and Medical Microbiology (<https://admissions.wvu.edu/academics/majors/immunology-and-medical-microbiology/>) major.

In order to be admitted to the BS program in Immunology and Medical Microbiology, you must fulfill the general admission requirements for WVU and the following program-specific requirements.

Applicants will be automatically admitted with:

- A high school GPA of 3.70 or better, and
- Placement into CHEM 115 (ACT Math score of 26, SAT Math score of 610, or ALEKs placement score of 65)

Applications will be reviewed on a case-by-case basis if:

- The applicant does not submit test scores, and/or
- The applicant's GPA and/or test scores are below the published requirements for automatic admission.

2024-2025 Admission Requirements

The Admission Requirements above will be the same for the 2024-2025 Academic Year.

Major Code: 8352

[Click here to view the Suggested Plan of Study \(p. 6\)](#)

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.

Code	Title	Hours
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 Reasoning		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.

Curriculum Requirements

Code	Title	Hours
A minimum GPA of 2.75 is required in all coursework.		
University Requirements		19
Immunology and Medical Microbiology Program Requirements		46
Immunology and Medical Microbiology Major Requirements		56
Total Hours		121

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 4, 5, 6, and 7		18
IMMB 191	First-Year Seminar	1
Total Hours		19

Immunology and Medical Microbiology Program Requirements

Code	Title	Hours
A minimum grade of C- is required in Immunology and Medical Microbiology Program Requirements.		
BIOC 339	Introduction to Human Biochemistry	4
BIOL 115 & 115L	Principles of Biology and Principles of Biology Laboratory	4
BIOL 117 & 117L	Introductory Physiology and Introductory Physiology Laboratory	4
BIOL 219 & 219L	The Living Cell and The Living Cell Laboratory	4
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory	4
CHEM 116 & 116L	Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory	4
CHEM 233 & 233L	Organic Chemistry 1 and Organic Chemistry 1 Laboratory	4
CHEM 234 & 234L	Organic Chemistry 2 and Organic Chemistry 2 Laboratory	4
Select one of the following:		3
MATH 150	Applied Calculus	
MATH 153	Calculus 1a with Precalculus	
MATH 154	Calculus 1b with Precalculus	
MATH 155	Calculus 1	
Select one of the following sequences:		8
PHYS 101 & 101L & PHYS 102 & PHYS 102L	Introductory Physics 1 and Introductory Physics 1 Laboratory and Introductory Physics 2 and Introductory Physics 2 Laboratory	
PHYS 111 & 111L & PHYS 112 & PHYS 112L	General Physics 1 and General Physics 1 Laboratory and General Physics 2 and General Physics 2 Laboratory	
STAT 211 or STAT 215 or ECON 225	Elementary Statistical Inference Introduction to Probability and Statistics Elementary Business and Economics Statistics	3
Total Hours		46

Immunology and Medical Microbiology Major Requirements

Code	Title	Hours
A minimum grade of C- is required in Immunology and Medical Microbiology Major Requirements.		
IMMB 150	Microbiology Colloquium 1	2
IMMB 175	Immunology and Medical Microbiology Colloquium	2
IMMB 201 & 201L	Basic Medical Microbiology and Basic Medical Microbiology Laboratory	4
IMMB 275	Immunology Colloquium 1	2
IMMB 276	Principles of Immunobiology	3
IMMB 305	Microbial Genetics	3
IMMB 310 & 310L	Bacterial Pathogenesis and Bacterial Pathogenesis Laboratory	4
IMMB 320	Cellular Immunobiology	3
IMMB 350	Micro/Immuno Junior Journal Club	1
IMMB 375	Immunology Colloquium 2	2
IMMB 405	Scientific Integrity	2
IMMB 420 & 420L	Molecular Immunobiology and Molecular Immunobiology Laboratory	5
IMMB 450	Immunology/Microbiology Journal Club 2	1
IMMB 460	Contemporary Issues for Majors	3
IMMB 470	Medical Virology	3
IMMB 484	Senior Thesis (Capstone)	3
IMMB 494	Seminar	1
IMMB Electives		12
IMMB 327	Parasitology	
IMMB 480	Vaccinology	
IMMB 490	Teaching Practicum *	
IMMB 491	Professional Field Experience **	
IMMB 497	Research ***	
AEM 401 & 401L	Environmental Microbiology and Environmental Microbiology Laboratory	
AEM 445 & AEM 449	Food Microbiology and Food Microbiology Lab	
AEM 545	Food Microbiology	
ANPH 424	Physiology of Reproduction	
BIOL 221	Ecology and Evolution	
BIOL 302	Biometry	
BIOL 310 & 310L	Advanced Cellular/Molecular Biology and Advanced Cellular/Molecular Biology Laboratory	
BIOL 313	Molecular Basis of Cellular Growth	
BIOL 315	Communicating Natural Science	
BIOL 316 & 316L	Developmental Biology and Developmental Biology Laboratory	
BIOL 324 & 324L	Molecular Genetics and Molecular Genetics Laboratory	
BIOL 335	Cell Physiology	
BIOL 348	Neuroscience 1	
BIOL 349	Neuroscience 2	
BIOL 409	Biochemical Basis of Therapeutics	
BIOL 410	Cell and Molecular Biology Methods	
BIOL 413	Molecular Endocrinology	
BIOL 415	Epigenetics	
BIOL 420	Genomics	

BIOL 422	Current Topics in Genome Biology	
BIOL 423	Biochemistry of Nucleic Acids and Proteins	
BIOL 424	Protein Structure and Function	
BIOL 426	Molecular Biology of Cancer	
BIOL 430	Bioinformatics	
BIOL 453	Molecular Basis of Disease	
BIOL 455	Evolution of Infectious Diseases	
BIOL 457	Ecology of Parasites	
BIOL 461	Principles of Evolution	
BIOL 474	Neurogenetics and Behavior	
BIOL 475	Neurobiological Diseases	
BIOL 476 & 476L	Computational Neuroscience and Computational Neuroscience Laboratory	
BIOL 478	Sensory Neural Systems and Behavior	
BIOL 490	Teaching Practicum	
BIOL 493	Special Topics	
FDST 445	Food Microbiology	
FDST 445L	Food Microbiology Laboratory	
HIST 393	Special Topics	
HN&F 348L	Science of Food Preparation Laboratory	
PALM 205	Introduction to Human Anatomy	
PALM 206	Human Anatomy Laboratory	
PCOL 449	Drugs and Medicine	
PHIL 331	Health Care Ethics	
PSIO 241	Elementary Physiology	
PUBH 201	Global Perspectives of Public Health	
PUBH 222	Epidemiology for Public Health	
SOC 393	Special Topics	
VETS 401	Veterinary Anatomy	
Total Hours		56

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A total of 2-credits of IMMB 490 can be applied to the IMMB Approved Electives group.

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A total of 3-credits of IMMB 491 can be applied to the IMMB Approved Electives Group

A total of 3-credits of IMMB 497 can be applied to the IMMB Approved Electives group.

SUGGESTED PLAN OF STUDY

First Year

Fall	Hours	Spring	Hours
IMMB 191		1 IMMB 175	2
IMMB 150		2 ENGL 101 (GEF 1)	3
MATH 150, 153, or 155 (GEF 3)		3 GEF 4, 5, 6, or 7	3
CHEM 115 (GEF 8)		3 BIOL 117	3
CHEM 115L		1 BIOL 117L	1
BIOL 115 (GEF 8)		3 CHEM 116 (GEF 2)	3
BIOL 115L		1 CHEM 116L	1
	14		16

Second Year

Fall	Hours	Spring	Hours
IMMB 201		3 IMMB 275	2
IMMB 201L		1 IMMB 276	3

BIOL 219	3 CHEM 234	3
BIOL 219L	1 CHEM 234L	1
CHEM 233	3 PHYS 101	4
CHEM 233L	1 PHYS 101L	0
ENGL 102 (GEF 1)	3 GEF 4, 5, 6, or 7	3
	15	16

Third Year

Fall	Hours	Spring	Hours
IMMB 320		3 IMMB 375	2
IMMB 305		3 IMMB 310	3
BIOC 339		4 IMMB 310L	1
IMMB Elective		3 IMMB 350	1
GEF 4, 5, 6 or 7		3 PHYS 102	4
		PHYS 102L	0
		IMMB Elective	3
	16		14

Fourth Year

Fall	Hours	Spring	Hours
IMMB 420		3 IMMB 484	3
IMMB 420L		2 IMMB 470	3
IMMB 450		1 IMMB 460	3
IMMB 405		2 IMMB 494	1
STAT 211 or 215		3 IMMB Elective	3
IMMB Elective		3 GEF 4, 5, 6 or 7	3
	14		16

Total credit hours: 121

Major Learning Outcomes

IMMUNOLOGY & MEDICAL MICROBIOLOGY

The Bachelor of Science degree in Immunology and Medical Microbiology will prepare students from diverse backgrounds to serve as professionals that are knowledgeable about the immune system of humans and other mammals, how the immune system functions, and the consequences of its malfunction on the health of the host. Knowledge of the immune system will be fully integrated with an excellent understanding of the diversity of microorganisms that cause disease in humans and other mammals and mechanisms of disease pathogenesis. Graduates will possess the laboratory skills and knowledge needed to assess the functional status of the immune system and to safely cultivate and identify microorganisms that cause disease in mammals. Graduates will be qualified to pursue several professional career paths in private industry, state and federal government, and academic institutions. The degree can also provide a strong foundation to progress to advanced studies including medical school, dental school, and graduate school.

Students will:

- Summarize and apply the basic concepts of microbiology and microbial pathogenesis.
- Summarize and apply the basic concepts of immunology and immunological disorders.
- Demonstrate expertise in the laboratory skills and knowledge needed to assess the functional status of the immune system.
- Demonstrate expertise in the laboratory skills and knowledge needed to safely cultivate and identify microorganisms that cause disease in mammals.
- Critically interpret microbiological and immunological assay data.
- Discuss, critique, and interpret primary literature in microbiology, microbial pathogenesis, and immunology.
- Demonstrate oral, written, and visual communication skills that result in clear and organized dissemination of material at a level appropriate for the audience.

Policies

REQUIREMENTS TO REMAIN IN THE IMMB PROGRAM

Students will be reviewed at the completion of each semester and summer term by the Microbiology, Immunology, and Cell Biology Academic and Professional Standards Committee. Students must be in good academic standing as determined by the following:

- Maintain a cumulative GPA of # 2.75 in all coursework attempted
 - Students who do not maintain a minimum cumulative GPA of # 2.75 will be placed on probation for one semester and be required to meet with their academic advisor on a monthly basis. Students on probation, who do not raise their cumulative GPA to 2.75 or better after one semester, will be dismissed from the program. Exceptions to this requirement must be approved by the IMMB Scholarship Committee and the Chair of the MICB Department.
- Pass all required courses for the IMMB major with a grade of C or better
 - A student who receives a grade of D, F, U, or W in a required Immunology and Medical Microbiology program course may repeat that course **once** and must earn a grade of C or better. A student may repeat **only one** IMMB core course (i.e., a course with an IMMB prefix). Students who earn a grade of D, F, U, or W in a repeated required Immunology and Medical Microbiology program course will be dismissed from the program. Exceptions to this requirement must be approved by the IMMB Scholarship Committee and the Chair of the MICB Department.
- Dismissal from the program under the circumstances described above is not dismissal from WVU and the student may be eligible to enroll in another degree program.
- Pre- or corequisite courses in which students earn a grade of D, F, U, or W must be repeated prior to the student's progression to the next course(s) in the sequence.
- Any general education course that is not a pre- or corequisite of the Immunology and Medical Microbiology program and in which a grade of D has been earned, must be repeated prior to graduation if it is to be counted toward graduation requirements (WVU requirement).