

BS in Microbiology
Department of Veterinary
Pathobiology
University of Missouri

Advising Handbook

2021-2022

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Degree Requirements

Students will be required to complete 120 hours of credit with an overall GPA of 2.0 in order to graduate. The distribution of these hours is as follows: 39 credit hours of general education requirements, 60-61 credit hours of major requirements, and 19-20 credit hours of free electives.

Students must complete all general education requirements; the following courses require a grade of C- or better: Math and Quantitative Reasoning course, English 1000, and Writing Intensive course 1000+. Students must receive a grade of C- or higher in all microbiology and related science courses (biology, chemistry, physics, mathematics) that are used to fulfill the requirements for a bachelor of science in microbiology (BSM) degree, with the exception of V_PBIO 2950 Undergraduate Research, which is taken S/U. Students must also maintain a GPA of 2.0 or higher in all microbiology and related science courses taken at the University of Missouri in fulfillment of the BSM degree requirements. Lastly, students must maintain a GPA of 2.0 for their final 60 hours and final 30 hours. Note that a grade of C- equates to a GPA of 1.7 on a 4.0 scale.

Residency Requirements

Thirty (30) of the final 36 credit hours must be taken at the University of Missouri. Twelve hours of microbiology at the 3000 level or above must be completed at MU.

Admission

Students who wish to be admitted to the BS in Microbiology degree program must meet the general admission requirements for all students applying to the University of Missouri. Please refer to <https://admissions.missouri.edu/requirements/> for the most current information on the admission process. For students newly admitted to the University of Missouri, admission to the BSM program is open with no additional requirements. Students currently enrolled at the University of Missouri must have an overall GPA of 2.7 to transfer into the microbiology undergraduate program. Although not required, prospective students are strongly encouraged to build a solid foundation in math and science prior to admission to the BSM program.

General Education Requirements

<https://generaleducation.missouri.edu/requirements/>

Refer to the website above for current requirements. Courses taken to fulfill the general education requirements cannot be taken using the Satisfactory/Unsatisfactory grading system.

- English Exposition and Argumentation (3 credits)
English 1000 or 1000H or transferable equivalent
- Math and Quantitative Reasoning (3 credits)
Math 1050, 1100, 1160, STAT 1200, or transferable equivalent
The requirement can also be satisfied by completing a calculus course (Math 1320, 1400, 1500/1500H, 1700/1700H, or 2300/2300H) that provides back-credit for Math 1100 or 1160 or by passing the proctored Math Placement Exam
<http://mathplacement.missouri.edu/> with a sufficient score.

- Writing Intensive Course (3 credits)
Three credits of writing intensive-designated coursework from anywhere in the University curriculum or from an English Composition I transfer course equivalent from a Missouri regionally-accredited institution (ENGLSH 1010W). This course may also be applied toward the Distribution of Content requirement.

- American History or Government (3 credits)
The following courses will satisfy this Missouri requirement:

History courses

1100/1100H: Survey of American History to 1865
 1200/1200H: Survey of American History since 1865
 1400: American History (no longer offered but still accepted for AP credit)
 2210: Twentieth Century America
 2440: History of Missouri
 4000: Age of Jefferson
 4220: U.S. Society Between the Wars 1918-1945
 4230: Our Times: United States since 1945

Political Science courses

1100/1100H: American Government
 2100/2100H: State Government

Designated courses may also be used toward the distribution of content requirement.

- Distribution of Content (27 credits)

The distribution of content requirement of 27 credits is designed to provide a breadth and depth of knowledge in three broad areas of study. There are three different areas of distribution; 9 credit hours are required in each area. At least one course numbered 2000 or above is required in two of the three areas of distribution.

The distribution of content must include:

- Nine credits of Biological Science, Physical Science, and/or Mathematical Science.
Please note that:
 - At least one biological or physical science and its related laboratory component must be taken.
 - Two different areas of science must be represented.
- Nine credits of Behavioral and/or Social Science including courses from at least two different departments in these areas.
Note that designated courses for the American History or Government requirement **may also** be counted toward the distribution of content requirement.
- Nine credits of Humanities and/or Fine Arts including courses from at least two different departments in these areas.

Requirements for the Microbiology Major

The following courses are required for the microbiology major. All courses must be taken for a letter grade (satisfactory/unsatisfactory grades will not count toward the major). A grade of C- or higher is required for each class and an overall GPA of 2.0 for these courses is also required.

- PHYSCS 1210 College Physics I or PHYSCS 2750 University Physics I
- PHYSCS 1220 College Physics II or PHYSCS 2760 University Physics II
- BIO_SC 1500 Introduction to Biological Systems with Laboratory
- MATH 1100 College Algebra or MATH 1160 Precalculus Mathematics
- MATH 1400 Calculus for Social and Life Sciences I or MATH 1500 Analytical Geometry and Calculus I
- CHEM 1320 College Chemistry I
- CHEM 1330 College Chemistry II
- CHEM 2100 Organic Chemistry I
- CHEM 2110/2130 Organic Chemistry II and Organic Laboratory I
- BIOCHM 3630 General Biochemistry or BIOCHM 4270 Biochemistry I
- V_PBio 2001 Fundamentals of Microbiology with lab or BIO_SC 3750 and BIO_SC 3760
- V_PBio 3551 Introduction to Immunology I
- V_PBio 3554 Introduction to Virology or V_PBio 3345 Fundamentals of Parasitology
- V_PBio 3600 Bacterial Genetics and Genomics
- V_PBio 4970 and 4970H Microbiology Undergraduate Research Capstone or V_PBio 4980 Microbiology Senior Seminar (Capstone)
- MICRO 3200 Medical Microbiology and Immunology
- Microbiology Electives (15 credit hours selected from the following):
 - ANTHRO 3560W Plagues and People
 - BIOCHM 4272 Biochemistry II
 - BIO_SC 2300 Cell Biology
 - BIO_SC 4976 Molecular Biology
 - ENV_SC 4312 Environmental Soil Microbiology
 - F_S 2172 Elements of Food Microbiology
 - F_S 4370 Food Microbiology
 - F_S 4375 Food Microbiology Laboratory
 - P_HLTH 3450 Introduction to Epidemiology **OR** P_HLTH 3760 Infectious Disease and Public Health Approaches (only 1 of these will count as a major elective)
 - PLNT_SC 4500 Biology and Pathogenesis of Plant Microbes
 - V_PBio 2950 and 2950H Undergraduate Research in Microbiology†
 - V_PBio 3345 and V_PBio 3345W Fundamentals of Parasitology*
 - V_PBio 3554 Virology*
 - V_PBio 3557 Microbial Pathogenesis
 - V_PBio 3650 Applied Microbiology and Biotechnology
 - V_PBio 3560 Microbial Physiology
 - V_PBio 3658 Public Health Microbiology
 - V_PBio 3700 Medical and Veterinary Entomology
 - V_PBio 3500W Issues in Vector-borne and Emerging Infectious Diseases
 - V_PBio 3900W Beneficial Microbes
 - V_PBio 4600W Host-Associated Microbiomes and Disease
 - V_PBio 4950 and 4950H Advanced Undergraduate Research**†

*One of these 2 courses **must** be taken as a major requirement; the other can be taken as a major elective.

**Can be repeated for a maximum of 6 credit hours.

†A maximum of 6 credit hours combined total can be applied to fulfill major electives.

If all degree requirements are met, microbiology majors who enroll in the MU College of Veterinary Medicine prior to receiving their baccalaureate degree will be eligible to receive the BSM degree at the end of their second year in the professional curriculum. The following course substitutions for required core courses will be accepted:

- V_PBio 5552 Veterinary Bacteriology and Mycology I and V_PBio 5553 Veterinary Bacteriology and Mycology II for MICRO 3200 Medical Microbiology and Immunology
- V_PBio 5511 Veterinary Immunology 1 and V_PBio 5512 Veterinary Immunology 2 for V_PBio 3551 Introduction to Immunology
- V_PBio 5557 Veterinary Parasitology for V_PBio 3345 Fundamentals of Parasitology

The following courses will be accepted as major electives:

- V_PBio 5554 Veterinary Virology
- V_PBio 5555 Veterinary Epidemiology and Biostatistics
- V_PBio 5558 Veterinary Public Health

Requirements for Graduation

- Satisfactory completion (grade of C- or better) of a 3 credit upper division writing intensive class in the microbiology major. Acceptable classes are:
 - ANTHRO 3560W Plagues and Peoples
 - HLTH_SCI 3900W Introduction to the Research Process and Evidence Base
 - V_PBio 3500W Issues in Vector-borne and Emerging Infectious Diseases
 - V_PBio 3900W Beneficial Microbes
 - V_PBio 3345W Fundamentals of Parasitology
 - V_PBio 4600W Host-Associated Microbiomes and Disease
- Additional electives to meet the 120 credit hour minimum for graduation. These electives can be taken using the satisfactory/unsatisfactory grading system if in compliance with university academic policies.

Common Credit Limitations

The University has established limitations on receiving credit for multiple courses if very similar in content. These limitations are applicable to all undergraduate students, regardless of degree program. Refer to <http://catalog.missouri.edu/academicdegreerequirements/commoncreditlimitations/> for further information.

Graduating with Honors in Microbiology

The Department of Veterinary Pathobiology offers an honors program for qualifying students enrolled in the Bachelor of Science in Microbiology major. The Honors Program in Microbiology is designed to provide exceptional students with opportunities to develop research and analytical skills beyond that obtained in the regular course of study. Students who attain this level of achievement will be acknowledged with the notation of “BS in Microbiology with Honors” on their diplomas and transcripts. Students are not required to be enrolled in the MU Honors College to participate.

Eligibility for Acceptance into the Honors Program

1. Completion of 45 credit hours. Transfer students must have completed at least 15 hours of credit through MU.
2. Cumulative GPA of 3.30 or higher

Students must complete the “Honors Program Application” and submit it to the Undergraduate Microbiology Program Director to be accepted into the Honors program. Upon acceptance, a research mentor/advisor will be selected.

To receive the BS in Microbiology with Honors distinction, students will be required to satisfy all of the following criteria:

1. Satisfy the BS degree requirements
 2. Maintain a cumulative GPA of at least 3.30
 3. Complete six credit hours of research (Undergraduate Research V_PBIO 4950 and V_PBIO 4970)*
 4. Present to the Undergraduate Microbiology Program Director one of the following:
 - a. A poster or an abstract of an oral presentation given by the student at a scientific meeting
 - b. A manuscript describing the student’s research written in a format suitable for publication in a scientific journal
- *Note that steps 3 and 4 combined can also be used to fulfill the capstone requirement for graduation.
5. In the last semester of studies before graduation, inform the Undergraduate Microbiology Program Director that you will satisfy the honors requirement so that the Registrar can be notified and the honors recognition placed on your diploma and transcript.

Dean’s List for Academic Achievement

To be on the Dean's List in the College of Veterinary Medicine, an undergraduate student needs a 3.0 cumulative GPA and a 3.25 GPA in the preceding semester. The student must have completed at least 12 graded hours in the most recent term.

At MU, the grades for credits earned at other institutions do show on the MU transcript but do not average into the official MU cumulative GPA.

Academic Standing and Probation

- If a student who starts out in good standing (2.0 cumulative and most recent term GPA) earns
 - a term GPA of 2.0 or higher, they will remain in good standing.
 - a term GPA less than 2.0 but higher than 1.0, they will be placed on probation (PR).
 - a term GPA of 1.0 or less, they will be dismissed.
- If a student who is on probation (PR) earns
 - a term GPA of 2.0 or higher AND the cumulative GPA is at least 2.0, they will be in good academic standing (remove probation, or RP).
 - a term GPA less than 2.0 but greater than 1.0, they will be placed on final probation (FP).
 - a term GPA of 1.0 or less, they will be dismissed.
- If a student on final probation (FP) earns
 - a term GPA of 2.0 or higher AND the cumulative GPA is at least 2.0, they will remove probation (RP).
 - a term GPA less than 2.0, they will be dismissed.
 - a term GPA of 2.5 or higher, no in-progress, self-paced courses, and completion of 6 credit hours or more but the cumulative GPA is less than 2.0, the student's FP status *may be* extended.
- Students conditionally admitted on probation (CAOP)
 - a term GPA of 2.0 or higher will remove students from CAOP probation
 - a term GPA less than 2.0 but greater than 1.0, they will be placed on final probation (FP).
 - a term GPA of 1.0 or less, they will be dismissed.

Readmission

- A student who has been dismissed from the program and ineligible to enroll for a period of one year may be readmitted only on the approval of the departmental Undergraduate Curriculum Committee (UCC).
- As a condition of readmission, the UCC may set forth stipulations with regard to minimum standards of academic work that must be maintained by the student.
- After readmission, if the student again becomes ineligible to enroll by falling out of good standing in any subsequent semester, his or her ineligibility is considered permanent. (registrar.missouri.edu/policies/academic-standing.php)

MINOR IN MICROBIOLOGY

Requirements:

15 credit hours as outlined below. At least 9 (nine) of these credit hours must be taken at the University of Missouri.

A minimum GPA of 2.0 for all minor coursework is required and all coursework applied to the minor must be completed with a grade of C- or higher.

To declare a minor in Microbiology, go to: https://musis2.missouri.edu/Minor_Declare/main.cfm

Required Courses (8 credit hours)

V_PBIO 2001 *Fundamentals of Microbiology* **or**
BIO_SC 3750 and 3760 *General Microbiology with lab*

V_PBIO 3551 *Introduction to Immunology I*

Elective Courses (Choose a sufficient number of the following courses to complete the 15 credit hour minimum for the minor):

MICRO 3200 or MICRO 2800	<i>Medical Microbiology and Immunology</i> or <i>Microbiology for Nursing & Health Professions</i>
V_PBIO 3600	<i>Bacterial Genetics and Genomics</i>
V_PBIO 3557	<i>Microbial Pathogenesis</i>
V_PBIO 3700	<i>Medical and Veterinary Entomology</i>
V_PBIO 3560	<i>Microbial Physiology</i>
V_PBIO 3658	<i>Public Health Microbiology</i>
V_PBIO 3345	<i>Fundamentals of Parasitology</i>
V_PBIO 3554	<i>Introduction to Virology</i>
V_PBIO 3650	<i>Applied Microbiology and Biotechnology</i>
ENV_SC 4312	<i>Environmental Soil Microbiology</i>
F_S 4370	<i>Food Microbiology</i>
F_S 4375	<i>Food Microbiology Laboratory</i>
PLNT_SCI 4500	<i>Biology and Pathogenesis of Plant-Associated Microbes</i>
P_HLTH 3450 or P_HLTH 3760	<i>Introduction to Epidemiology</i> or <i>Infectious Disease and Public Health Approaches</i>

SAMPLE COURSE OF STUDY

Year 1 Fall	Credits	Year 1 Spring	Credits
ENGLSH 1000 Exposition and Argumentation	3	V_PBio 2001 Fundamentals of Microbiology with lab	5
CHEM 1320 College Chemistry I	4	CHEM 1330 College Chemistry II	4
MATH 1100 or 1120 College Algebra	3	MATH 1400 or 1500 MATH 1400 Calculus for Social and Life Sciences I	3/5
BIO_SC 1500 Introduction to Biological Systems and Laboratory	5	Gen Ed Requirements	3
	15		15/17

Year 2 Fall	Credits	Year 2 Spring	Credits
CHEM 2100 Organic Chemistry I	3	CHEM 2110/2130 Organic Chemistry II and Organic Laboratory I	5
MICRO 3200 Medical Microbiology and Immunology	4	Free Elective	1- 3
Gen Ed Requirement	6	Gen Ed Requirement	6
Free Electives	3	Major Elective	3
	16		15-17

Year 3 Fall	Credits	Year 3 Spring	Credits
PHYSICS 1210 College Physics I	4	PHYSICS 1220 College Physics II	4
V_PBio 3551 Intro to Immunology I	3	Major Elective	3
Major Elective	3	Free Electives	3
Free Elective	3	Gen Ed Requirement	3
		BIOCHM 3630 General Biochemistry	3
	13		16

Year 4 Fall	Credits	Year 4 Spring	Credits
V_PBio 4950 Microbiology Undergraduate Research OR V_PBio 4980 Microbiology Seminar Capstone	3	V_PBio 3600 Bacterial Genetics and Genomics	3
Major Electives	3	Major Elective or V_PBio 4970 Microbiology Undergraduate Research Capstone	3
V_PBio 3345 Fundamentals of Parasitology	3	Gen Ed Requirement	3
Gen Ed Requirement	3	Free Elective	6

Free Elective	3		
	15		15

SAMPLE COURSE OF STUDY: Early Admit to MU CVM

Year 1 Fall	Credits	Year 1 Spring	Credits
ENGLSH 1000 Exposition and Argumentation	3	V_PBIO 2001 Fundamentals of Microbiology with lab	5
CHEM 1320 College Chemistry I	4	CHEM 1330 College Chemistry II	4
MATH 1100 College Algebra	3	WI 1000+	3
BIO_SC 1500 Introduction to Biological Systems and Laboratory	5	Social or Behavioral Science Gen Ed	3
	15		15

Year 2 Fall	Credits	Year 2 Spring	Credits
CHEM 2100 Organic Chemistry I	3	CHEM 2110/2130 Organic Chemistry II and Organic Laboratory I	5
MATH 1400 or 1500	3/5	V_PBIO 3700	3
Gen Ed: Humanities and History/Gov	6	WI 3000+	3
V_PBIO 3551	3	Social/Behavioral Science Gen Ed	3
	15/17		14

Year 3 Fall	Credits	Year 3 Spring	Credits
PHYSICS 1210 College Physics I	4	PHYSICS 1220 College Physics II	4
V_PBIO 3557 or V_PBIO 3560	3	V_PBIO 4980 Capstone	3
BIOCHM 4270	3	V_PBIO 3600 Bacterial Genetics/Genomics	3
Humanities Gen Ed	3	Humanities	3
Free Elective	3	Free Elective	3
	16		16

Year 1 Veterinary School	Credits	Year 2 Veterinary School	Credits
Accept any courses as free electives to reach 120 credit hours	14+	V_PBIO 5552 and V_PBIO 5553	5.5
		V_PBIO 5557	3
		V_PBIO 5555	2
		V_PBIO 5558	2
		V_PBIO 5554	2.5
	14+		15