BS in Microbiology

Degree Program Description

From the Greek words mikros (small), bios (life), and logos (science), microbiology is the branch of science that studies microscopic forms of life, including bacteria, viruses, algae, fungi, protozoa, and parasites. Although most commonly thought of as causing infection and disease, microorganisms are often beneficial, with many uses in the pharmaceutical, biotech, food, and agricultural industries. A bachelor of science (BS) in microbiology provides direct entry into a number of employment opportunities in the private sector with medical, animal health, pharmaceutical, and biotechnology-based companies and with government laboratories such as the Center for Disease Control and Prevention (CDC), the National Institutes of Health, and the United States Department of Agriculture. A degree in microbiology provides a strong science background which can be beneficial for specialization in such diverse careers as journalism (science and public health reporting) and law (biotech, environmental, medical, and patent law). This degree also provides excellent preparation for professional schools (medical, veterinary, dental, and nursing) and for admission to masters and PhD degree programs in numerous areas of study.

The faculty in the Department of Veterinary Pathobiology has designed a comprehensive and challenging curriculum for this degree program. Subject matter to be covered includes microbial structure and physiology, genetics and genomics, pathogenic mechanisms, beneficial microbes, and the immune response. Supporting courses from other departments include mathematics, physics, chemistry, biology, and biochemistry. Numerous opportunities for undergraduate research are available. The microbiology courses are taught by faculty whose areas of expertise include bacteriology, immunology, parasitology, and virology.

Major Program Requirements

To earn a bachelor's degree in microbiology, all undergraduate students must complete the university's general education requirements, degree specific requirements set by the Department of Veterinary Pathobiology, and university total credit hour and writing intensive class requirements.

The following courses are required for the microbiology major. All courses other than free electives must be taken for a letter grade except MICRO 2950, which is graded Satisfactory/Unsatisfactory. MICRO 2950H is letter grade only. All courses in the major must be completed with a grade of C- or higher with a cumulative GPA of 2.0 or higher.

REQUIRED COURSES		
PHYSCS 1210	College Physics I	4-5
or PHYSCS 2750	University Physics I	
PHYSCS 1220	College Physics II	4
or PHYSCS 2760	University Physics II	
BIO_SC 1500	Introduction to Biological Systems with Laboratory	5
MATH 1400	Calculus for Social and Life Sciences I	3
or MATH 1500	Analytic Geometry and Calculus I	
CHEM 1400 & CHEM 1401	College Chemistry I and College Chemistry I Laboratory	4
CHEM 1410 & CHEM 1411	College Chemistry II and College Chemistry II Laboratory	4
CHEM 2100	Organic Chemistry I	3
CHEM 2110 & CHEM 2130	Organic Chemistry II and Organic Laboratory I	5
BIOCHM 3630	General Biochemistry	3
or BIOCHM 4270	Biochemistry	
MICRO 2010	Fundamentals of Microbiology	3
or BIO_SC 3750	General Microbiology	
MICRO 2011	Fundamentals of Microbiology Laboratory	2
or BIO_SC 3760	Microbiology Laboratory	
MICROB 3200	Medical Microbiology and Immunology	4
MICRO 3345	Fundamentals of Parasitology	3
or MICRO 3554	Introduction to Virology	
MICRO 3551	Introduction to Immunology I	3
MICRO 3600	Bacterial Genetics and Genomics	3
MICRO 4970	Capstone Undergraduate Research in Microbiology	3
or MICRO 4980	Capstone Senior Seminar	
MICROBIOLOGY ELECTIVES (15 credit hours selected from the following MICRO and non-MICRO courses):		
MICRO 3554	Introduction to Virology *	3
or MICRO 3345	Fundamentals of Parasitology	
*Either Parasitology or Virology must be taken as a major requirement; the other can be taken as a major elective.		
MICRO 3557	Microbial Pathogenesis I	3
MICRO 3560	Microbial Physiology	3
MICRO 3650	Applied Microbiology and Biotechnology	3
MICRO 3658	Public Health Microbiology	3
MICRO 3700	Medical and Veterinary Entomology	3
MICRO 3500W	Issues in Vector-borne and Emerging Infectious Diseases - Writing Intensive	3
MICRO 3900W	Beneficial Microbes - Writing Intensive	3
MICRO 4600W	Host-Associated Microbiomes in Health and Disease - Writing Intensive	3
MICRO 2950	Undergraduate Research in Microbiology **	1-3
or MICRO 2950H	Honors Undergraduate Research in Microbiology	
MICRO 4950	Advanced Undergraduate Research in Microbiology **	1-3
or MICRO 4950H	Honors Advanced Undergraduate Research in Microbiology	
**A maximum of 6 credits of research may count toward microbiology electives.		
No more than 8 credit hours of Microbiology Electives can be from the following:		**0-8**
ANTHRO 3560W	Plagues and Peoples - Writing Intensive	3
BIOCHM 4272	Biochemistry	3
BIO_SC 2300	Introduction to Cell Biology	4
BIO_SC 4976	Molecular Biology	3
ENV_SC 4312	Environmental Soil Microbiology	3
F_S 2172	Elements of Food Microbiology	3
F_S 4370	Food Microbiology	3
F_S 4375	Food Microbiology Laboratory	2
P_HLTH 3450	Introduction to Epidemiology	3
or P_HLTH 3760	Infectious Disease and Public Health Approaches	
PLNT_SCI 4500	Biology and Pathogenesis of Plant-Associated Microbes	4

University 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 - Writing Intensive
  HLTH_SCI 4200W Introduction to The Research Process and Evidence Base - Writing Intensive
  MICRO 3500W Issues in Vector-borne and Emerging Infectious Diseases - Writing Intensive
  MICRO 3900W Beneficial Microbes - Writing Intensive
  MICRO 4600W Host-Associated Microbiomes in Health and Disease - Writing Intensive

- 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.

Accelerated BS to DVM in Veterinary Medicine

Students who complete prescribed undergraduate courses in the MU College of Veterinary Medicine, Department of Veterinary Pathobiology, and are then successful in being selected to a class in the MU College of Veterinary Medicine, will receive elective credits concurrently for up to 32 hours of professional degree courses. This enables qualifying students to receive a BS degree with three or four years of undergraduate work and two years of professional studies. Thus, 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 BS in Microbiology degree at the end of their second year in the professional curriculum.

Semester Plan

First Year			
Fall	**CR**	**Spring**	**CR**
ENGLSH 1000	3	MATH 1400 or 1500	3
MATH 1100	3	MICRO 2010	3
BIO_SC 1500	5	MICRO 2011	2
CHEM 1400	3	CHEM 1410	3
CHEM 1401	1	CHEM 1411	1
		Gen Ed Requirements	3
	15		**15**
Second Year			
Fall	**CR**	**Spring**	**CR**
CHEM 2100	3	CHEM 2110	3
MICROB 3200	4	CHEM 2130	2
Major Electives	3	Major Electives	3
Gen Ed Requirements	6	Gen Ed Requirements	6
	16		**14**
Third Year			
Fall	**CR**	**Spring**	**CR**
MICRO 3551	3	MICRO 3600	3
MICRO 3345	3	MICRO 3554	3
Gen Ed Requirements	6	BIOCHM 3630	3
Electives	3	Electives	6
	15		**15**
Fourth Year			
Fall	**CR**	**Spring**	**CR**
PHYSCS 1210	4	PHYSCS 1220	4
MICRO 4980	3	MICRO 4970	3
Major Electives	3	Electives	7
Electives	6		
	16		**14**

Total Credits: 120