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 V_PBIO 2950, which is graded Satisfactory/Unsatisfactory. V_PBIO 2950H is letter grade only.

Required Courses

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>PHYSCS 1210</td>
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<td>or PHYSCS 2750</td>
<td>University Physics I</td>
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<td>PHYSCS 1220</td>
<td>College Physics II</td>
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<td>or PHYSCS 2760</td>
<td>University Physics II</td>
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<tr>
<td>BIO_SC 1500</td>
<td>Introduction to Biological Systems with Laboratory</td>
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<td>MATH 1400</td>
<td>Calculus for Social and Life Sciences I</td>
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<td>Organic Chemistry I</td>
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<td>CHEM 2110</td>
<td>Organic Chemistry II</td>
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<tr>
<td>&amp; CHEM 2130</td>
<td>and Organic Laboratory I</td>
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<td>BIOCHM 3630</td>
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<tr>
<td>or BIOCHM 4270</td>
<td>Biochemistry</td>
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**V_PBIO 2001**  
Fundamentals of Microbiology  

**or BIO_SC 3750 & BIO_SC 3760**  
General Microbiology  
and Microbiology Laboratory  

**MICROB 3200**  
Medical Microbiology and Immunology  

**V_PBIO 3345**  
Fundamentals of Parasitology  

**or V_PBIO 3554**  
Introduction to Virology  

**V_PBIO 3551**  
Introduction to Immunology I  

**V_PBIO 3600**  
Bacterial Genetics and Genomics  

**V_PBIO 4970**  
Capstone Undergraduate Research in Microbiology  

**or V_PBIO 4980**  
Capstone Senior Seminar  

**V_PBIO 4970H**  
Honors Capstone Undergraduate Research in Microbiology  

Microbiology Electives (15 credit hours selected from the following):  

**ANTHRO 3560W**  
Plagues and Peoples - Writing Intensive  

**BIOCHM 4272**  
Biochemistry  

**BIO_SC 2300**  
Introduction to 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  

**PLNT_SC 4500**  
Biology and Pathogenesis of Plant-Associated Microbes  

**V_PBIO 2950**  
Undergraduate Research in Microbiology  

**V_PBIO 2950H**  
Honors Undergraduate Research in Microbiology  

**V_PBIO 3345**  
Fundamentals of Parasitology  

**or V_PBIO 3554**  
Introduction to Virology  

**V_PBIO 3500**  
Issues in Vector-borne and Emerging Infectious Diseases  

**V_PBIO 3557**  
Microbial Pathogenesis I  

**V_PBIO 3560**  
Microbial Physiology  

**V_PBIO 3650**  
Applied Microbiology and Biotechnology  

**V_PBIO 3658**  
Public Health Microbiology  

**V_PBIO 3700**  
Medical and Veterinary Entomology  

**V_PBIO 3900W**  
Beneficial Microbes - Writing Intensive  

**V_PBIO 4600W**  
Host-Associated Microbiomes in Health and Disease - Writing Intensive  

**V_PBIO 4950**  
Advanced Undergraduate Research in Microbiology  

**V_PBIO 4950H**  
Honors Advanced Undergraduate Research in Microbiology  

*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.**

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  
- **V_PBIO 5553** Veterinary Bacteriology and Mycology II  
- **MICROB 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

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
  - HLTH_SCI 3900W Introduction to the Research Process and Evidence Base
  - V_PBIO 3500 Issues in Vector-borne and Emerging Infectious Diseases - Writing Intensive
  - 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.

Semester Plan

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Total Credits: 122