

MICROBIOLOGY, B.S.

Seven Penn State campuses are scheduled for closure after Spring 2027: DuBois, Fayette, New Kensington, Mont Alto, Shenango, Wilkes-Barre, and York. New students are not being admitted at these campuses.

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Learning Objectives

Students will:

- synthesize information from a variety of sources in order to create a comprehensive presentation regarding a microbiology topic
 - access, analyze, and evaluate the primary and secondary literature
 - effectively extract central points and summarize research literature in the field of microbiology
- formulate and support one's own scholarly opinion based on reading, interpreting, and synthesizing scientific literature
- effectively communicate ideas both orally and in written form to a variety of audiences, both lay and professional
- present, analyze and interpret quantitative data using statistics, graphs, and data tables

Students will:

- acquire and recognize why a background in the biological, chemical, and physical sciences is necessary for advanced study in specialty microbiology courses
- be able to demonstrate knowledge of the core principles of microbiology by:
 - explaining the fundamental processes required for cellular life (metabolism, cell structure/function, genetics)
 - describing how forces of evolution (e.g., competition, genetic exchange) affect microorganisms.
 - comparing and contrasting results of evolution in terms of diversity and relatedness
 - explaining interactions among microbes and between microbes and multicellular organisms
 - describing how microorganisms and their environment interact with and modify each other
- apply and integrate knowledge of microbiology principles to real-life scenarios
- identify skills necessary for a professional career in microbiology and other fields related to the life sciences

Students will be able to:

- recognize and discuss ethical issues that relate to scientific research and scientific practices
- discuss the impact of microbiology in a global, economic, environmental, and societal context
- explore careers related to the field of microbiology
- work collaboratively with a diverse set of individuals

Students will be able to:

- formulate a hypothesis, design experiments, acquire and analyze data, and use the results to test a stated hypothesis
- demonstrate proficiency in techniques used in microbiology and an ability to select appropriate techniques that will allow an individual to address a scientific question related to the field of microbiology
- compare and contrast conclusions from a set of data with models developed to represent a process related to the experimental scenario
- work safely in a lab
- use quantitative and statistical reasoning

Students will be able to:

- use reflection to evaluate one's own progress in accomplishing a defined goal
- identify situations in which more information is needed to develop a comprehensive understanding
- identify and use strategies that allow the individual to gain the information needed to answer problems for which the solution is not initially evident