



Southmoreland School District

Microbiology Curriculum Overview

Microbiology Overview:

Microbiology is designed to explore the many aspects of bacteriology (bacteria), virology (viruses), and mycology (fungi). Core concepts will include structure, function, and classification of microbial organisms along with the proper aseptic techniques, isolation, serial dilution, plating, and culturing. Food microbiology and clinical aspects such as infectious diseases and treatments will be presented, where students will learn about the modes of action of common antibiotics against different types of bacteria will be covered in this course. Lab activities play an important part of the microbiology experience.

Module Titles:

Module 1: Introduction to Microbiology

Module 2: Bacteriology

Module 3: Virology

Module 4: Microbes and Infectious Disease

Module 5: The Human Microbiome

Module 6: Beneficial and Food Microbiology

Module 7: Microbial Ecology

Module Overviews:

Module 1: Introduction to Microbiology

During this module, Students will engage major historical figures in microbiology and understand their contributions to the discipline. They will conduct research and present the contributions of a select historical figure in the field. They will also identify and properly use basic equipment and lab ware for microbial lab techniques. Finally, they will be able to differentiate between kingdoms of microbial life - viruses, bacteria, archea, protists, and fungi

Module 2: Bacteriology

This module engages students to understand the concept of aseptic technique and be able to implement it in the lab setting. They will correctly produce nutrient agar streak plates and conduct bacterial and fungal specimen collection from local environments, and Isolate bacterial species from multi-species plate using streak plating technique. They will be able to classify the basic bacterial types and shapes, and illustrate prokaryotic cell structures and their functions.



Southmoreland School District

Microbiology Curriculum Overview

Module 3: Virology

The module presents material that will enable students to explain basic virus classification, classify virus families based on morphological structures, and contrast contemporary methods used to visualize virus particles (microscopy). Students will explain methods used to culture viruses while comparing and contrasting virus and bacterial methods of culturing.

Module 4: Microbes and Infectious Disease

In this module students will identify the mechanisms that virulent microorganisms employ to cause disease. They will compare and contrast different types of infectious agents and their etiology. They will select, research, and present an emerging infectious disease to the class. Students investigate global emerging infectious diseases and their sociological impacts (epidemiology). They will breakdown the COVID-19 outbreak and pandemic as a relevant real-world example (2019-2022). Students will evaluate the US Ebola event (1989) and Anthrax scare (2001) and their impacts on the population. Finally students will investigate the array of treatments and cures used to combat infectious diseases, and evaluate the effectiveness of antibiotics on select species of bacteria

Module 5: The Human Microbiome

In this module students will investigate the human Microbiome and its relationship to human health. They will associate the functions of bacterial flora and health indications. They will associate the locations of bacterial flora in the body and their impact on organ function, as well as evaluate pre and probiotic foods and their effectiveness on the Microbiome

Module 6: Microbes in Food and Industry

Students will investigate the use of microbial life in multiple industries to improve society (biotechnology). They will evaluate the fermentation processes used by eukaryotic and prokaryotic microbes, and select and produce fermented foods using food microbiology procedures and protocols.

Module 7: Microbial Ecology

During this module students will investigate the fundamental overarching effects of microorganisms on the environment. They create a soil bacteria microcosm using a Winogradsky column, and evaluate the ecology of collected soil microbes and their interactions using the Winogradsky column.