



uBEATS Teacher's Guide:

Mycology-The study of fungi (Grades 11-12)

This teacher guide is a supplementary text to support the use of the uBEATS "Mycology-The study of fungi" module for grades 11-12.

To help students develop the knowledge necessary for an incredible future in health care, we created UNMC Building Excellence in Academics Through STEM (uBEATS), an online health science resource for Nebraska students.

UNMC uBEATS modules are short (15 minutes or less), interactive online health science modules to supplement curriculum taught in grades 6 – 12. These do not replace curriculum, but are a supplement for teachers and students incorporating evidence based information and UNMC expert guided material. Each module is chunked into sections with formative and summative assessments with immediate feedback provided.

Tips on how to utilize uBEATS modules:

- Internet access is required to view uBEATS modules.
- For those who have access to one-to-one technology, modules can be used in or outside of the classroom as a topic introduction, extension, or review.
- For classrooms without individual student devices modules can be used in whole group instruction. Formative assessment questions can use the teacher's preferred call and response method and summative assessment questions can be displayed on the board and answered individually by students or printed and distributed to students after viewing the module.

Objectives

- Define mycology.
 - Describe the role of fungi in the process of decomposition.
 - List human diseases caused by fungi.
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Introduction

Fungi are around us all of the time and include many diverse species. For example, some species of mold (a type of fungus) enjoy the moisture and nutrients found in our own favorite foods. In this module you will learn about the study of fungi, the important roles of fungi in nature, and some of the ways that fungi affect humans.

Prior Knowledge

Before beginning this module, the student should understand the Next Generation Science Standards (NGSS) featuring [Three-Dimensional Learning](#).

Core Idea LS1: Structure and Function [A Framework for K-12 Education](#)

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Either way, they are “consumers.” Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil for plants to use. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.

Science and Engineering Practices [NGSS](#)

- Constructing explanations and designing solutions

Crosscutting Concepts [NGSS](#)

- Patterns
- Structure and function

Key Terms/Vocabulary

Mycology, fungus, fungi, mold, toxin, metabolic pathway, pathogenic disease, nutrient cycle, ecosystem, pollutants, antibiotics, antibodies, antigens, mushrooms, yeast, algae, eukaryotic, hyphae, filament, *Penicillium*, penicillin, microsporidia, aspergillosis, decomposer, heterotroph, photosynthesis, light energy, chemical energy, ingestion, digestive enzymes, *Agaricus bisporus*, *Amanita phalloides*, dandruff, athlete's foot, ringworm, *Tinea corporis*, onychomycosis.



Science Standards

This module is related to the content of **UNMC High School Alliance: Introduction to Pathology and Microbiology**

Pathology is the study of disease processes. The field lays the foundation for all of clinical medicine and medical research. All diseases begin at the cellular level and changes in the structure and function of tissues ultimately lead to symptoms that health care providers see on a daily basis. This course will introduce students to medical terminology, normal histology and gross/microscopic pathology, allowing students to correlate the findings they see into basic clinical concepts.

Nebraska's College and Career Ready Standards for Science 2024 [Nebraska Science Standards](#)

Engineering in Health Sciences: SC.HSP.17.1.C

- Evaluate a solution to a complex real-world human health problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. Solutions could include the effects on the human body or solutions for environmental public health issues.

Next Generation Science Standards (NGSS) featuring [Three-Dimensional Learning](#)

- LS2: Ecosystems: Interactions, Energy, and Dynamics

Nebraska Health Science Standards

- HS.HS.8.1.b Describe common diseases and disorders related to body systems.
- HS.HS.11.4.c Describe common diseases and disorders of each body system.

National Health Science Standards (NCHSE)

- 7.1.1 Explain principles of infection transmission.
 - a. Identify classifications of pathogens



Extensions of the lesson

- To help students become more familiar with the Key Terms of this module, the teacher can use the vocabulary list for a classroom Word Wall, or integrate the vocabulary into classroom word games during review sessions.
- To help the students see personal relevance, suggest that they have a **private** conversation at home about family attitudes regarding mushrooms.
- As student misconceptions become apparent, the teacher may need to reinforce these important concepts:
 - The difference between “fungus” and “fungi” is simply a matter of singular (fungus) and plural (fungi).
 - Mold is one type of fungus. Human consumption of moldy food can cause problems. The mold itself can lead to an allergic reaction or respiratory problems, but the toxins produced by mold can be poisonous and trigger different symptoms.
 - The role of fungi as decomposers is essential to a healthy ecosystem. Decomposers dismantle the bodies of dead plants and animals in order to recycle the elements back into the environment so that other living organisms can use those elements for their own growth.
 - Humans need to be careful when consuming mushrooms—some species are edible and delicious, but some species are toxic.
 - There are millions of species of fungi, but only a few hundred fungal species make people sick.

Enrichment

- For information about career opportunities, see UNMC’s [Careers in Healthcare Handbook](#).
- Students should be watchful in current events for recent stories about mold in the home, especially after floods or water leaks.
- An example of a classroom activity could be [Breaking the Mold](#).
- The Centers for Disease Control website provides information about [Types of Fungal Diseases](#).
- The U.S. Department of Agriculture discusses food safety [Molds on Food: Are They Dangerous?](#)
- To make connections in your community, contact local hospitals, healthcare clinics, nurses, doctors, veterinarians, food service organizations, grocery stores.