uBEATS Teacher's Guide:

Careers in Pathology/Microbiology

(Grades 11-12)

This teacher guide is a supplementary text to support the use of the uBEATS Careers in Pathology/Microbiology 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

- List health science careers that involve the use of pathology and microbiology.
- Determine courses that can prepare a person for a career in health sciences.
- Explain how pathologists and microbiologists are involved in solving real world problems.

Introduction

Laboratory professionals are critical and often unknown members of the health care team. Not only are there excellent careers for every educational level, but the work that they do is incredibly important. For example, no cancer therapy can start until the laboratory team is involved in giving a diagnosis or providing crucial data. It is estimated that 90% of the concrete data in a patient's medical record comes from the laboratory and at least 70% of medical decisions are driven by the information that we generate. To be involved in the team that does this work is immensely rewarding.

There are many options for pursuing a career in pathology or microbiology. This module explores three of those careers: phlebotomist, medical laboratory scientist, and pathologist.

Prior Knowledge

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

Core Idea ETS2.B Influence of Engineering, Technology, and Science on Society and the Natural World A Framework for K-12 Education

- ***By the end of grade 12***. Modern civilization depends on major technological systems, including those related to agriculture, health, water, energy, transportation, manufacturing, construction, and communications. Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. Widespread adoption of technological innovations often depends on market forces or other societal demands, but it may also be subject to evaluation by scientists and engineers and to eventual government regulation. New technologies can have deep impacts on society and the environment, including some that were not anticipated or that may build up over time to a level that requires attention or mitigation. Analysis of costs, environmental impacts, and risks, as well as of expected benefits, is a critical aspect of decisions about technology use.

Science and Engineering Practices NGSS

- Asking questions and defining problems

Crosscutting Concepts NGSS

- Influence of Science, Engineering, and Technology on Society and the Natural World

Key Terms/Vocabulary

Pathology, microbiology, phlebotomist, medical assistant, veterinary assistant, dental assistant, medical laboratory scientist, technologist in chemistry, technologist in immunology, technologist in microbiology, pathologist, forensic pathology, hematology, pediatric pathology, infectious disease physician, oncologist, medical microbiologist, virologist.

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 2017 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 constrains, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

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 privately ponder people they know (particularly relatives, friends, neighbors) who work in any of the careers mentioned in this module.
- As student misconceptions become apparent, the teacher may need to reinforce these important concepts:
    - Pathology is the study of diseases, from cause to effects. Much of the work done in this field involves laboratory examination of samples of body tissue. Pathology, therefore, includes many types of jobs, from the people who take the samples, to the laboratory specialists who work with the samples, to the doctors who make decisions based on the analysis.

Various jobs related to pathology require differing levels of education

Enrichment

- For information about career opportunities, see UNMC's Careers in Healthcare.
- The Coordinating Council on the Clinical Laboratory Workforce offers a dynamic website that shares multiple links to information about Laboratory Science Careers.
- Students should be watchful in current events for recent news about diseases, microorganisms, and the people who study them.
- For an example of a laboratory activity, search the Internet for classroom microbiology activities.
- To make connections in your community, contact local hospitals, healthcare clinics, nurses, doctors, medical laboratories.