BIOL 2205

Division: Natural Science and Mathematics
Department: Biology
Course: BIOL 2205
Title: General Microbiology Laboratory
Catalog Description:

The laboratory component will involve hands-on experience in microscopy, staining methods, aseptic technique, media preparation, sterilization, maintenance of cultures, microbial identification, molecular biology and enumeration methods. The lab must be taken concurrently with BIO 2200.

General Education Requirements: Life Science
Semesters Offered: Spring
Credit/Time Requirement: Credit: 2; Lecture: 0; Lab: 5
Clock/Hour Requirements: 0
Offered for Non-Credit: No
Prerequisites: CHEM 1210 or CHEM 1110 and BIOL 1610 (formerly BIOL 1310) or BIOL 2420 (formerly BIOL 2610), or instructor's permission. Students need to be able to use a microscope.

Corequisites: The lecture BIOL 2200 must be taken concurrently with the lab BIOL 2205.

Justification:

The course will advance the students understanding of the biology of microorganisms, and microbial and molecular genetics. The course follows the recommendations for a laboratory course of the American Society for Microbiology and will serve as a core course for microbiology majors. In addition, it will serve as a support course for other Biology and Pre-professional majors. Many pharmacy schools and Veterinary Medicine schools now require a general microbiology with a lab before students can be accepted. Clinical Laboratory Science majors also need a science major's microbiology lab course. Similar courses are taught at Utah State University and Weber State University.

Student Learning Outcomes:

Students will know the essential and key processes commonly found in microorganisms
Students will know how to apply systematic methods to distinguish different species of microorganisms

Students will have begun to recognize the diversity of microorganisms and interrelationships in the microbiological world

Students can use microscopes, computers, and other commonly available lab equipment and techniques

Students can read the literature of life sciences flexibly, analytically and imaginatively

Students will appreciate that they have been exposed to a small number of the numerous beauties and marvels of the living world

Students will have an understanding of how microorganisms impact our daily lives

Content:

- Laboratory safety
- microbiological procedures for safety
- protective procedures
- emergency procedures
- Bright field light microscopy
    - microscopic measurements
- Diversity of microorganisms
    - Protists, algae, invertebrates, fungi, and bacteria
- Staining techniques
    - smear prep, simple staining, Gram staining, spore staining, acid-fast staining and motility
- Pure culture techniques and media preparation
    - streak plate, pour plate, and sub-culturing
- Bacterial enumeration
    - standard plate count and turbidity
- Microbial growth
    - autotroph culture, temperature effects, osmotic pressure and pH effects,
- Microbial control
    - antiseptics, antimicrobial sensitivity testing, and UV radiation
- Prep and care of stock cultures
- Identification of unknown
    - cultural characteristics
    - physiological characteristics
    - Enterobacteriaceae test
- Bacteriological examination of water
- Food microbiology
    - yogurt production
    - alcohol fermentation
    - bacterial counts in food
- Molecular biology
    - transformation and PCR
- Computer database and Bergey's manual for ID of unknown

General Education Outcomes:

4) Retrieve, evaluate, interpret, and deliver information through a variety of traditional and electronic media.
Students will need to retrieve information from a number of computer databases, reference books, and bacterial identification software. Most of the databases will be national research databases that can be accessed online or through the library. Others may be in the form of compact disks. Reference texts will be available in the lab and in the library. The bacterial identification software will be available in the lab and the library. Students will need to access this media to complete various assignments such as, identification of virtual unknown bacteria (bacterial identification software), identification of lab unknown, and research methods and experiments in the lab. Students will be required to write a report justifying their identification of the their unknown bacterium.

7) Apply scientific reasoning to a variety of contexts.
Many methodologies will be taught that will assist them in testing hypotheses, developing experiments, and looking critically at data. Scientific reasoning will be applied as students complete each laboratory exercise, quiz, and unknown bacterium report.

Key Performance Indicators:
Outcomes will be assessed by lab reports (50-60%), quizzes (20-30%), identification of unknown with a written report (5-15%), and comprehensive final exam (10-20%).

Representative Text and/or Supplies:

Microbiological Applications: Laboratory Manual in General Microbiology. Benson. WCB/McGraw-Hill Publishers (current edition)
or

Self-published laboratory manual

Optimum Class Size: 12
Maximum Class Size: 24

Signatures:

I hereby submit this course syllabus:

Allan Stevens, , Professor

I hereby find this course consistent with the goals and resources of the Biology Department:

Allan Stevens, , Professor, Chair

I hereby find this course consistent with the goals and resources of the Natural Science and Mathematics Division:

Dan Black, EdD, Associate Professor, Dean

I have discussed the need for library resources related to this class with the person submitting the syllabus:

Lynn Anderson, MLIS, Technical Services Librarian (Main Campus)

Michelle Olsen, MLS, Campus Librarian (Richfield Campus)