COURSE OUTLINE OF RECORD

Number: BIOL G210  TITLE: General Microbiology

ORIGINATOR: Michael Valinluck  EFF TERM: Fall 2015
FORMERLY KNOWN AS:

CROSS LISTED COURSE:

SEMESTER UNITS: 5.0
HRS LEC: 54.0  HRS LAB: 108.0  HRS OTHER: 0.0
CONTACT HRS TOTAL: 162.0
STUDY NON-CONTACT HRS RECOMMENDED: 108.0

CATALOG DESCRIPTION:
Major concepts of general microbiology are discussed, including 1) procaryotic and eucaryotic cell types, 2) structural organization of cells, 3) cellular metabolism, regulation of metabolism, and genetics, 4) host-parasite relationships, 5) microorganisms in human health and disease, 6) immunology and serology, 7) recombinant DNA technology, 8) growth of microbial cells, 9) controlling growth by chemical and physical means. Bacteria, fungi, algae, protozoa, and viruses are studied. Laboratory skills include: microscopy, staining techniques cultivation techniques, and aseptic techniques.

JUSTIFICATION FOR COURSE:

PREREQUISITES:
• BIOL G100: Introduction To Biology with a minimum grade of C or better
or
• BIOL G220: Human Anatomy with a minimum grade of C or better
or
• BIOL G225: Human Physiology with a minimum grade of C or better
or
• BIOL G180: Cell and Molecular Biology with a minimum grade of C or better
and
• ENGL G090: Accelerated Preparation for College Writing and Reading with a minimum grade of C or better
or
• ENGL G099: Preparation for College Writing and Reading with a minimum grade of C or better or Placement Test
and
• MATH G030: Intermediate Algebra with a minimum grade of C or better or Mathematics Placement Assessment
or
• MATH G040: Accelerated Elementary and Intermediate Algebra with a minimum grade of C or better

COREQUISITES:

ADVISORIES:

ASSIGNED DISCIPLINES:
Biological sciences

MATERIAL FEE: Yes [X] No [ ] Amount: $12.50
CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]
GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]
BIOL G210-General Microbiology

OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]

TRANSFER STATUS: CSU Transferable[ ] UC/CSU Transferable[X] Not Transferable[ ]

BASIC SKILLS STATUS: Yes [ ] No [X] LEVELS BELOW TRANSFER: Not Applicable

CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable

NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course

OCCUPATIONAL (SAM) CODE: E

REPEATABLE ACCORDING TO STATE GUIDELINES: No [X] Yes [ ] NUMBER REPEATS:

REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]

General Biology(Associate in Arts)
Liberal Arts: Emphasis in Science(Associate in Arts)

GE AND TRANSFER REQUIREMENTS MET:
IGETC Area 5: Physical and Biological Sciences
5B: Biological Science
  x
  x
CSU GE Area B: Scientific Inquiry and Quantitative Reasoning
  B2 - Life Science
  B3 - Laboratory Sciences

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:

1. Use aseptic technique in laboratory manipulations using microorganisms.
2. Separate mixed cultures of bacteria through specific techniques.
3. Identify unknown microorganisms through specific techniques.
4. Describe the role of microorganisms related to:
   a. Their role in disease and parasitism.
   b. Their public health role in food, dairy, water technologies and sewage and waste water treatments.
   c. Their role in defining knowledge about genetics, inheritance, and the DNA molecule itself.

COURSE OBJECTIVES:
1. use proper aseptic technique in laboratory manipulations using live microorganisms.
2. separate mixed cultures of bacteria using specific techniques.
3. identify unknown microorganisms using specific isolation techniques and biochemical tests.
4. describe the role of microbes related to: a. The cycling of carbon, nitrogen and other mineral elements on earth b. Disease and parasitism and the human immune response to microbial pathogens c. Their economic value in food, dairy and water technology d. Their place in public health regarding food, dairy, water technologies, sewage and waste water treatments e. Their defining position in understanding genetics, inheritance, and the DNA molecule itself.

COURSE CONTENT:

LECTURE CONTENT:

1. Microscopy
   a. Structure and function of the parts of a microscope, student-type.
   b. Types of microscopes.
   c. Electromagnetic radiation used with certain microscopes.
d. Metric system.

2. Staining
   a. Anatomical stains to identify specific bacterial cell structures.
   b. Differential stains – Gram’s and acid-fast procedures.
   c. Simple stains, wet-mount and smear preparation techniques.

3. Cell Anatomy of Microorganisms
   a. Eucaryotic cell structure and function.
   b. Procaryotic cell structure and function.
   c. Comparison of eucaryotic and procaryotic cells.

4. Bacterial Cultivation Techniques.
   a. Medium ingredients.
   b. Trophic types of bacteria and relationship to medium used and culture conditions required by various organisms.

5. Population Dynamics
   a. Population growth curve as exemplified by E.Coli.
   b. Continuous culture, synchronous culture techniques with relationship to industry and research.

6. Enzymes and Cell Metabolism
   a. Structure and function of enzymes.
   b. Metabolic pathways discussed: Krebs cycle, Embden-Meyerhof pathway, oxidative phosphorylation.
   c. Photosynthesis.
   d. Industrially important fermentations.

7. Regulation of Metabolism
   a. Structure and function of DNA
   b. Protein synthesis model
   c. One gene-one enzyme theory
   d. Jacob-Monod model of enzyme induction

8. Genetics
   a. Structure and function of DNA
   b. Conjugation
   c. Transduction
   d. Transformation
   e. Recombinant DNA Technology

9. Bacterial Taxonomy

10. Viruses
    a. Isolation and cultivation techniques
    b. Observation, microscopic
    c. Influence on man in health and disease

11. Fungi and Protozoa
    a. Isolation and cultivation techniques
    b. Cell structure and function
    c. Influence on man in health and disease

12. Helminth Parasites
    a. Concept of life cycle of selected helminths
    b. Discussion of parasitic association and its effects on host
    c. Control methods for parasitic diseases are discussed

13. Immunology
    a. Clonal selection theory of immunogloblin synthesis
    b. Antigen-antibody laboratory tests
    c. Immunizations and anamnestic response

14. Antibiotics, Chemotherapy, Chemical and Physical Control Agents
    a. Types of antibiotics, sources, and mode of action
b. Chemotherapeutics and metabolic inhibition

c. Chemical agents and their mode of action on the microorganism affected

d. Physical agents and their mode of action on the microorganism affected

15. Food, Milk, and Water Microbiology

a. Techniques to determine the sanitary quality of food, water, and milk

b. Role of public health agencies

c. Pathogenic organisms transmitted by food, water, or milk

d. Sewage and waste water treatments

e. Drinking water treatments

16. Soil Cycles

a. Microorganisms in soil and water important in the cycling of important minerals and decompose organics

b. Nitrogen cycle

c. Carbon cycle

LABORATORY CONTENT:

1. Microscopy

a. Structure and function of the parts of a microscope, student-type.

b. Types of microscopes.

c. Electromagnetic radiation used with certain microscopes.

d. Metric system.

2. Staining

a. Anatomical stains to identify specific bacterial cell structures.

b. Differential stains – Gram’s and acid-fast procedures.

c. Simple stains, wet-mount and smear preparation techniques.

3. Cell Anatomy of Microorganisms

a. Eucaryotic cell structure and function.

b. Procaryotic cell structure and function.

c. Comparison of eucaryotic and procaryotic cells.

4. Bacterial Cultivation Techniques.

a. Medium ingredients.

b. Trophic types of bacteria and relationship to medium used and culture conditions required by various organisms.

5. Population Dynamics

a. Population growth curve as exemplified by E.Coli.

b. Continuous culture, synchronous culture techniques with relationship to industry and research.

6. Enzymes and Cell Metabolism

a. Structure and function of enzymes.

b. Metabolic pathways discussed: Krebs cycle, Embden-Meyerhof pathway, oxidative phosphorylation.

c. Photosynthesis.

d. Industrially important fermentations.

7. Regulation of Metabolism

a. Structure and function of DNA

b. Protein synthesis model

c. One gene-one enzyme theory

d. Jacob-Monod model of enzyme induction

8. Genetics

a. Structure and function of DNA

b. Conjugation

c. Transduction

d. Transformation

e. Recombinant DNA Technology

9. Bacterial Taxonomy
10. Viruses
   a. Isolation and cultivation techniques
   b. Observation, microscopic
   c. Influence on man in health and disease

11. Fungi and Protozoa
   a. Isolation and cultivation techniques
   b. Cell structure and function
   c. Influence on man in health and disease

12. Helminth Parasites
   a. Concept of life cycle of selected helminths
   b. Discussion of parasitic association and its effects on host
   c. Control methods for parasitic diseases are discussed

13. Immunology
   a. Clonal selection theory of immunoglobulin synthesis
   b. Antigen-antibody laboratory tests
   c. Immunizations and anamnestic response

14. Antibiotics, Chemotherapy, Chemical and Physical Control Agents
   a. Types of antibiotics, sources, and mode of action
   b. Chemotherapeutics and metabolic inhibition
   c. Chemical agents and their mode of action on the microorganism affected
   d. Physical agents and their mode of action on the microorganism affected

15. Food, Milk, and Water Microbiology
   a. Techniques to determine the sanitary quality of food, water, and milk
   b. Role of public health agencies
   c. Pathogenic organisms transmitted by food, water, or milk
   d. Sewage and waste water treatments
   e. Drinking water treatments

16. Soil Cycles
   a. Microorganisms in soil and water important in the cycling of important minerals and decompost organics
   b. Nitrogen cycle
   c. Carbon cycle

METHODS OF INSTRUCTION:

A. Lecture:
B. Lab:
C. Tutoring – noncredit:
D. Dist. Ed – Delayed Interaction:
E. Other simultaneous interactive:
F. Independent Study:

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:

Reading Assignments

A. Required Readings:
   Textbook assignments
   Laboratory manual assignments and reports

Out-of-class Assignments

1. Readings in journal articles and magazines of current publication selected for their up-to-date
information on course topics.

**Writing Assignments**

1. Examinations and quizzes are short answer and essay format.
2. A project is to be completed and then reported in writing, and in an oral presentation to the class.
3. Laboratory work involves the identification of the species name of a bacterium by conducting suitable laboratory tests.
4. Record-keeping of laboratory work in the students lab manual is evaluated for completeness and accuracy.
5. Purify and separate mixed cultures of bacteria.

**METHODS OF STUDENT EVALUATION:**

- Midterm Exam
- Final Exam
- Short Quizzes
- Written Assignments
- Essay Examinations
- Objective Examinations
- Report
- Projects (ind/group)
- Problem Solving Exercises
- Oral Presentations
- Skills Demonstration

**Demonstration of Critical Thinking:**

1. The process of testing, analyzing results, and identifying an unknown bacterial species employs laboratory skills and reasoning skills to identify the bacterium.
2. Correctly using laboratory test procedures and equipment to complete lab assignments utilizes reasoning skills and physical skills.

**Required Writing, Problem Solving, Skills Demonstration:**

1. Examinations and quizzes are short answer and essay format.
2. A project is to be completed and then reported in writing, and in an oral presentation to the class.
3. Laboratory work involves the identification of the species name of a bacterium by conducting suitable laboratory tests.
4. Record-keeping of laboratory work in the students lab manual is evaluated for completeness and accuracy.
5. Purify and separate mixed cultures of bacteria.

**TEXTS, READINGS, AND RESOURCES:**

**TextBooks:**


**Other:**

1. Optional:

    THE GAMES CELLS PLAY, M.D. Lechtman, B. Roohk, R.J. Egan, 2nd edition

**LIBRARY:**

Adequate library resources include:

Comments:
Attachments:

Attached Files