COURSE OUTLINE OF RECORD

Number: BIOL G180  TITLE: Cell and Molecular Biology

ORIGINATOR: Mary Lamantia  EFF TERM: Spring 2019
FORMERLY KNOWN AS: Principles of Biology  DATE OF
OUTLINE/REVIEW: 02-10-2015

CROSS LISTED COURSE:

TOP NO: 0401.00  CID: BIOL 190

SEMESTER UNITS: 5.0
HRS LEC: 72.0  HRS LAB: 54.0  HRS OTHER: 0.0
CONTACT HRS TOTAL: 126.0
STUDY NON-CONTACT HRS RECOMMENDED: 144.0

CATALOG DESCRIPTION:
This course is designed as the first in a three-course sequence for students desiring to major in biology. The topics to be covered in this course are among those which serve to unify the science of biology. Included in these concepts are: prokaryotic and eukaryotic cell structure, function and homeostasis, cell reproduction and metabolism, cell communication, classical and molecular genetics, molecular biology, biotechnology, and evolution.

JUSTIFICATION FOR COURSE:

PREREQUISITES:
  - MATH G030: Intermediate Algebra with a minimum grade of C or better
  - MATH G040: Accelerated Elementary and Intermediate Algebra with a minimum grade of C or better

  or
  - GWC Math Placement Level of 50 or higher.
  - OCC Math Placement Level of 50 or higher.
  - MATH A030: Intermediate Algebra with a minimum grade of C or better
  - CCC Math Placement Level of 60 or higher.

  or
  - MATH C030: Intermediate Algebra with a minimum grade of C or better
  and
  - CHEM G180: General Chemistry A with a minimum grade of C or better
  - CHEM G185: General Chemistry B with a minimum grade of C or better
  - CHEM G220: Organic Chemistry A with a minimum grade of C or better
  - CHEM G225: Organic Chemistry B with a minimum grade of C or better
  - CHEM C180: General Chemistry A with a minimum grade of C or better
  - CHEM C185: General Chemistry B with a minimum grade of C or better
  - CHEM C220: Organic Chemistry A with a minimum grade of C or better
  - CHEM C225: Organic Chemistry B with a minimum grade of C or better
• CHEM C225: Organic Chemistry B with a minimum grade of C or better
  or
• CHEM A180: General Chemistry A with a minimum grade of C or better
  or
• CHEM A185: General Chemistry B with a minimum grade of C or better
  or
• CHEM A220: Organic Chemistry A with a minimum grade of C or better
  or
• CHEM A225: Organic Chemistry B with a minimum grade of C or better

COREQUISITES:

ADVISORIES:
• ENGL G099: Preparation for College Writing and Reading
  or
• ENGL G090: Accelerated Preparation for College Writing and Reading

ASSIGNED DISCIPLINES:
  Biological sciences

MATERIAL FEE: Yes [X] No [ ] Amount: $9.00

CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]

GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]

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
Degree Applicable
  AA Degree Applicable

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

1. List and describe the different steps of eukaryotic cell division.
2. Evaluate enzymatic data and associated graphs in a laboratory setting.
3. Correctly identify various organelles of a eukaryotic cell and list their functions.
4. Prepare a diluted chemical solution by calculating and measuring the required volumes of stock
solution and diluents.

5. Correctly calculate and draw a map of the restriction enzyme sites of a plasmid DNA molecule using RFLP analysis.

6. Assess current biological issues relevant to molecular biology such as stem cell research, cancer, gene therapy, epigenetic processes and genetic engineering.

COURSE OBJECTIVES:
1. Demonstrate, through essay or objective examination, an understanding of those principles which permeate and consequently serve to unify the science of Biology.
2. Demonstrate an understanding of evolutionary processes and discuss these processes as they relate to the origin of prokaryotic and eukaryotic cells.
3. Identify, describe and discuss prokaryotic and eukaryotic cell structures and important biological molecules.
4. List and describe critical prokaryotic and eukaryotic cell processes, including metabolism, cell communication, DNA replication, cell reproduction and gene regulation, and describe the main differences between the two cell types regarding these processes.
5. Discuss, through group debate and objective examination, the technical and ethical issues facing modern biology, biotechnology, and genetic engineering.
6. Use attained knowledge of classical, population and molecular genetics to solve a variety of genetics problems.
7. Demonstrate an understanding of recent advances and future goals in the areas of biotechnology and genetic engineering.
8. Research the biological literature and utilize that literature to write a scientific report.
9. Cite experimental evidence to support or refute a proposed hypothesis.

COURSE CONTENT:

LECTURE CONTENT:
I. Introduction
   A. The Scientific Method of Inquiry
   B. Properties of Life
   C. Origin of Life
   D. Prokaryotic and Eukaryotic Cells
II. Introduction to the Chemistry of Biology
   A. Importance and Properties of Water
   B. Importance and Properties of Carbon
   C. Biological Molecules and Macromolecules
III. Cell Structure and Function
   A. Microscopy and Histology
   B. Prokaryotic Cell Structure and Function
   C. Eukaryotic Cell Structure and Function
   D. The Secretory Pathway
   E. Evolution of Eukaryotic Organelles
IV. Membrane Structure and Function
   A. Membrane Proteins
   B. Transport Across Membranes
   C. Membrane Receptors
V. Cell Communication
   A. Signal Transduction
VI. Metabolism
   A. Energy, Thermodynamics and Enzymes
   B. Cellular Respiration
C. Photosynthesis

VII. Cell Reproduction
A. Mitosis and Cell Cycle Control
B. Meiosis and Genetic Diversity

VIII. Genetics
A. Classical/Mendelian Genetics
B. Chromosomal Basis for Heredity
C. Molecular Genetics
D. Population Genetics

IX. From Gene to Protein
A. DNA Structure and Function
B. Transcription and Control of Gene Expression
C. Translation
D. Epigenetics

X. Biotechnology
A. Genetic Engineering
B. Stem Cell Research and Ethics

XI. Evolution of Genomes

LABORATORY CONTENT:
A. Introduction to laboratory technique and equipment, laboratory safety, tools of measurement, and the Scientific Method.
B. Introduction to the spectrophotometer and graphing.
C. Studies of enzyme reactions and variables that affect enzymes.
D. Introduction to microscopy.
E. Microscopic studies of the organelles of eukaryotic cells and tonicity.
F. Photosynthesis, cellular respiration and fermentation.
G. Determination of the molecular weight of a protein using polyacrylamide gel electrophoresis.
H. Introduction to sterile technique.
I. Preparing dilutions of bacterial cultures and isolation of single colonies.
J. Using Restriction Fragment Length Polymorphisms to generate a restriction map of circular plasmid.
K. Preparation of competent bacterial cells and transformation of cells with a recombinant plasmid.
L. Isolation of recombinant plasmids from transformed bacteria.
M. Amplification of mitochondrial DNA by Polymerase Chain Reaction.
N. Hardy-Weinberg studies and evolution.

METHODS OF INSTRUCTION:
A. Lecture:
B. Lab:
C. Independent Study:

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:
Reading Assignments
A. Textbook chapters (weekly)
B. Scientific Journal articles

Out-of-class Assignments
A. Project report
B. Laboratory reports
C. Problem sets

Writing Assignments
A. Laboratory reports  
B. Written project report

**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:**

During the course, students will be required to analyze laboratory data, evaluate hypotheses, and deduce valid conclusions from experimental evidence. They will also be required to discuss and critique current biological research.

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

Students will practice writing as they complete lab reports, take essay exams, submit a project report, and demonstrate laboratory proficiency with a practical exam.

**TEXTS, READINGS, AND RESOURCES:**

**TextBooks:**

**LIBRARY:**

**Adequate library resources include:** Print Materials  
Non-Print Materials  
Online Materials  
Services

**Comments:**

**Attachments:**

[Attached Files]