RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

BIOL 245 CELLULAR AND MOLECULAR BIOLOGY

I. Basic Course Information
A. Cellular and Molecular Biology, BIOL-245

B. Modified Course

C. Date of Proposal: Semester: Spring Year: 2017

D. Effective Term: Fall 2017

E. Sponsoring Department: Science & Engineering

F. Semester Credit Hours: 4

G. Weekly Contact Hours:
   Lecture: 3
   Laboratory: 3
   Out of class student work per week: 7.5

H. Prerequisites: General Biology I (BIOL-101), General Chemistry I (CHEM-103)

I. Laboratory Fees: Yes

J. Department Chair: Dr. Sarah Imbriglio, sarah.imrbiglio@raritanval.edu

II. Catalog Description

Prerequisites: General Biology I (BIOL-101) and General Chemistry I (CHEM-103)

This lecture and laboratory course provides an overview of the structure and function of prokaryotic and eukaryotic cells. Topics include DNA replication, transcription, translation, mutation, gene regulation, membrane function, cellular communication and secretion. Laboratory stresses molecular and recombinant DNA techniques, protein purification and characterization and cell culture techniques.

III. Statement of Course Need
A. This course serves as a 200 level Biology course as one of the two required for the AS Biology Program.

B. In the laboratory portion of the course, students will utilize molecular techniques and cell culture techniques essential for the analysis of gene expression.
C. This course generally transfers as a program requirement and/or a free elective.

IV. Place of Course in College Curriculum

A. Free elective

B. This course does not satisfy a general education requirement.

C. This course meets a program elective for the AS Biology as a 200 level Biology course.

D. Course transferability; for New Jersey schools go to the NJ Transfer website, www.njtransfer.org. For all other colleges and universities go their individual websites.

V. Outline of Course Content

A. Introduction to Cells

B. Biochemistry
   1. Chemical bonding
   2. Macromolecules
   3. Energy

C. Protein Structure and Function
   1. Protein Structure
   2. Protein folding
   3. Enzymes
   4. Purifying, detecting and characterizing proteins

D. Molecular Genetic mechanisms
   1. Structure of nucleic acids
   2. Transcription, translation and protein synthesis
   3. Control of gene expression
   4. DNA replication
   5. Molecular structure of genes and chromosomes

E. Biomembranes and Cell Architecture
   1. Components and function
   2. Membrane transport
   3. Organelles
   4. The cytoskeleton
   5. Microscopy

F. Molecular Genetic Techniques and Genomics
   1. DNA cloning
   2. Analysis of gene structure and expression
   3. Identifying and locating human disease genes

G. Cell cycle and cell growth control
   1. Cell signaling
   2. Checkpoints
3. Cell cycle control
4. Cancer

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:
   At the completion of this course, students will be able to:
   1. Demonstrate the ability to synthesize and integrate biological information and ideas. (GE-NJ3) (*Embedded Critical Thinking)
   2. Demonstrate the use of quantitative skills to analyze experimental data accurately and reproducibly. (GE-NJ2)
   3. Develop an informed understanding of the role of science and technology in society (GE-NJ3-ER)
   4. Produce accurate lab reports (GE-NJ1) (*Embedded Critical Thinking)

B. Course Learning Outcomes:
   At the completion of this course, students will be able to:
   1. Identify the major structures and organelles of plant and animal cells.
   2. Describe the modes of membrane transport.
   3. Explain the structure of genes and genomes.
   4. Explain the mechanisms of the control of gene expression.
   5. Explain the events and control of the cell cycle.
   6. Discuss how aberrant cell cycle control leads to cancer.

C. Assessment Instruments
   Given the outcomes described above, the following assessment methods may be used:
   1. production of laboratory reports
   2. analysis of data
   3. analysis of primary literature
   4. laboratory quizzes
   5. semester examinations

VII. Grade Determinants
   A. Analysis of current scientific literature
   B. Quizzes
   C. Lecture exams
   D. Laboratory notebooks and reports

Given the goals and outcomes described above, LIST the primary formats, modes, and methods for teaching and learning that may be used in the course:

   A. lecture/discussion
   B. small-group work

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C. computer-assisted instruction
D. laboratory
E. student oral presentations
F. student collaboration
G. independent study

VIII. Texts and Materials
   A. suggested textbook
   B. primary sources
   C. web sources

Sample of specific text that may be featured:

(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

IX. Resources
Students may need to use library databases and other library resources for research assignments and/or computers.

X. Honors Option: Not applicable.