BIO 2.1 Course Outline as of Fall 2018

CATALOG INFORMATION

Dept and Nbr: BIO 2.1
Full Title: FUND BIO: CELL
Catalog Description:
Cell structure and function, origin, evolution and diversity of cells, biochemistry, metabolism, Mendelian genetics, molecular genetics, cell regulation, cell differentiation and evolutionary development. Intended for students majoring in biological sciences, pre-medical or related pre-professional programs. (Formerly BIO 3)

Prerequisites/Corequisites:
Course Completion of CHEM 1A OR CHEM 4A; AND Course Completion of BIO 10 AND ENGL 1A

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Cell structure and function, origin, evolution and diversity of cells, biochemistry, metabolism, Mendelian genetics, molecular genetics, cell regulation, cell differentiation and evolutionary development. Intended for students majoring in biological sciences, pre-medical or related pre-professional programs. (Formerly BIO 1.3, BIO 3) (Grade Only)
Prerequisites: Course Completion of CHEM 1A OR CHEM 4A; AND Course Completion of BIO 10 AND ENGL 1A

Recommended:

Transfer Credit: CSU; UC

Limit on Enrollment:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

Associate Degree: Effective: Fall 1981 Inactive:

Area: C Natural Sciences

CSU GE: Transfer Area Effective: Inactive:

B2 Life Science Fall 1981

B3 Laboratory Activity

IGETC: Transfer Area Effective: Inactive:

5B Biological Sciences Fall 1981

5C Fulfills Lab Requirement

CSU Transfer: Transferable Effective: Fall 1981 Inactive:

UC Transfer: Transferable Effective: Fall 1981 Inactive:

CID:

CID Descriptor: BIOL 190 Cell and Molecular Biology

SRJC Equivalent Course(s): BIO2.1

Certificate/Major Applicable:

Major Applicable Course

Approval and Dates

Version: 010

Version Created: 9/7/2017

Submitter: Anthony Graziani

Version Status: Approved (Changed Course)

Version Status Date: 10/23/2017

Version Term Effective: Fall 2018

COURSE CONTENT

Student Learning Outcomes:

Upon successful completion of this course, students will be able to:

1. Apply the scientific method to develop hypotheses and use lab skills to investigate these hypotheses by measuring biological phenomena and analyzing the resulting data. Generate lab reports in formal scientific paper format.

2. Demonstrate proficiency (without assistance or instruction) in a variety of standard laboratory techniques and equipment, which are used for the study of cells, DNA and proteins.

3. Explain, and provide supporting evidence for the major concepts of cell biology, and be able to integrate these concepts using an evolutionary perspective.
Objectives:
During the course students will:
1. Use the scientific method to develop and test hypotheses.
2. Explain current hypotheses on the diversity, origins and evolution of cellular life.
3. Differentiate the structure and function of prokaryotic and eukaryotic cells.
4. Relate the properties of biochemical macromolecules to the structure and function of cell membranes and organelles.
5. Compare and contrast the mechanisms of cell respiration and photosynthesis.
6. Describe the transmission of genetic information through sexual and asexual reproduction and the inheritance of traits via Mendelian genetics.
7. Explain the molecular flow of information from DNA to RNA to protein.
8. Explain cell regulation based both on control of gene expression and on signal reception and transduction.
9. Explain how cells become differentiated during the processes of embryogenesis and development, and how the mechanisms of cellular differentiation contribute to evolutionary change.
10. Use the microscope proficiently and perform a variety of standard laboratory techniques used for the study of cells, DNA and proteins.
11. Analyze and present student-generated data using formal scientific paper format.

Topics and Scope:
I. Introduction to Biology
   A. Characteristics of life
   B. Biological levels of organization
   C. Disciplines of biology
   D. Scientific method
   E. Evolution and biological thought
   F. Cell theory and origins of cells
II. The Chemistry of Life
   A. Atoms and molecules
   B. Water and carbon
   C. Biochemistry
   D. Chemical reactions
III. Cell Structure and Function
   A. Evolution, classification and diversity of cells
   B. Archaea vs Bacteria vs Eukarya
   C. Cytoskeleton and organelles
   D. Cell membranes and transport
   E. Bioenergetics and enzymes
   F. Signal transduction pathways
IV. Energy Flow in Cells
   A. Cell respiration reactions
   B. Photosynthesis reactions
V. Information Flow in Cells
   A. Cell reproduction: mitosis and meiosis
   B. Inheritance: genes and chromosomes
   C. Mendelian genetics
      1. Monohybrid crosses
      2. Dihybrid crosses
      3. Probability theory
      4. Sex-linkage, epistasis, multi-gene traits and pleiotropy
      5. Chi-squared analysis of genetic data
D. Structure, replication, mutation and repair of DNA
E. Transcription, RNA processing and translation
F. Genetic regulation: epigenetics, transcriptional and post-transcriptional regulation
G. Cell Cycle
VI. Cell Differentiation and Evolutionary Development
A. Embryonic development
B. Stem cells
C. Generation of biological diversity
VII. Laboratory Exercises
A. Molecular model building
B. Microscopy, cell structure, diversity and adaptation
C. Statistical analysis of data: chi square and probability theory
D. Enzyme activity
E. Drosophila monohybrid and dihybrid crosses
F. Chromatography of Drosophila eye color pigments
G. Bacterial transformation
H. Recombinant DNA technology
I. Gel electrophoresis of DNA
J. Polymerase chain reaction
K. Performance of student-designed original experiments

Representative Assignments:

Lecture-Related Assignments:
1. Weekly reading in text, 30-60 pages per week
2. Original group research project, written as a scientific paper and presented. May include calculation, graphing and data analysis as well as explanation of ideas
3. Formal assessment: 3-4 midterm exams, including objective and essay questions, 1 lab practical examination, and 5-15 quizzes

Lab-Related Assignments:
1. Lab reports: may include calculation, graphing, data analysis, and explanation of ideas

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

- Research paper and poster
- Writing
- 15 - 30%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

- Lab reports and problem sets
- Problem solving
- 0 - 20%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.
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<tr>
<th>None</th>
<th>Skill Demonstrations 0 - 0%</th>
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<td><strong>Exams:</strong> All forms of formal testing, other than skill performance exams.</td>
<td>Exams 60 - 70%</td>
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<td>Multiple choice, completion, essay questions, lab exams, quizzes</td>
<td>Other Category 0 - 10%</td>
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<td><strong>Other:</strong> Includes any assessment tools that do not logically fit into the above categories.</td>
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<td>Group presentation and student participation</td>
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**Representative Textbooks:**
Instructor prepared lab manual
OTHER REQUIRED ELEMENTS

STUDENT PREPARATION
- Matric Assessment Required: E
- Requires English Assessment
- Prerequisites-generate description: U
- User Generated Text
- Advisories-generate description: NA
- No Advisory
- Prereq-provisional: N
- NO
- Prereq/coreq-registration check: Y
- Prerequisite Rules Exist
- Requires instructor signature: N
- Instructor's Signature Not Required

BASIC INFORMATION, HOURS/UNITS & REPEATABILITY
- Method of instruction: 02 Lecture
- 04 Laboratory
- Area department: LIFESC Biological Sciences
- Division: 73 Science, Technology, Engineering & Mathematics
- Special topic course: N Not a Special Topic Course
- Program status: 1 Major Applicable Course
- Repeatability: 00 Two Repeats if Grade was D, F, NC, or NP
- Repeat group id: N Not in a repeat group

SCHEDULING
- Audit allowed: N Not Auditable
- Open entry/exit: N Not Open Entry/Open Exit
- Credit by exam: N Credit by examination not allowed
- Budget code: Program: 0000 Unrestricted
- Budget code: Activity: 0401 Life Science

OTHER CODES
- Discipline: BIO Biological Sciences (requires master's)
- Basic skills: N Not a Basic Skills Course
- Level below transfer: Y Not Applicable
- CVU/CVC status: N Not Distance Ed
- Non-credit category: Y Not Applicable, Credit Course
- Classification: Y Liberal Arts and Sciences Courses
- SAM classification: E Non-Occupational
- TOP code: 0401.00 Biology, General
- Work-based learning: N Does Not Include Work-Based Learning
- DSPS course: N Not a DSPS Course
- In-service: N Not an in-Service Course