BIO 2.1 Course Outline as of Fall 2009

CATALOG INFORMATION

Dept and Nbr: BIO 2.1 Title: FUND BIO: CELL
Full Title: Fundamentals of Biology (Cell and Molecular)
Last Reviewed: 10/23/2017

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	5.00	Lab Scheduled	6.00	6	Lab Scheduled	105.00
		Contact DHR	0		Contact DHR	0
		Contact Total	9.00		Contact Total	157.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 262.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	BIO 3

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 1.3, BIO 3)

Prerequisites/Corequisites:
Completion of CHEM 1A or higher (V6) and Course Completion of BIO 10

Recommended Preparation:
Eligibility for ENGL 1A.

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/Corequisites: Completion of CHEM 1A or higher (V6) and Course Completion of

BIO 10
Recommended: Eligibility for ENGL 1A.
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
	C	Natural Sciences	Fall 1981	
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

COURSE CONTENT

Outcomes and Objectives:
Upon completion of the course, students will be able to:
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 in prokaryotes and eukaryotes based both on control of gene expression at the DNA level 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. Write lab reports analyzing and explaining student-generated data and 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. Cell theory
- B. Evolution, classification and diversity of cells
- C. Archaea vs Bacteria vs Eukarya
- D. Cytoskeleton and organelles
- E. Cell membranes and transport
- F. Bioenergetics and enzymes

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, signal transduction pathways and allosteric proteins

VI. Cell differentiation and evolutionary development
- A. Gamete formation and fertilization
- B. Embryonic development and stem cells
- C. Enhancers and specific transcription factors
- D. Homeotic genes and morphogens
- E. Generation of diversity in animals

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. Osmosis

F. Drosophila monohybrid and dihybrid crosses
G. Chromatography of Drosophila eye color pigments
H. Bacterial metabolism and fermentation
I. Bacterial transformation
J. Plasmid DNA extraction and restriction enzyme disgestion
K. Gel electrophoresis of DNA
L. Polymerase chain reaction
M. Performance of student-designed original experiments

Assignment:

1. Weekly reading in text, 30-60 pages per week.
2. Lab reports: may include calculation, graphing, data analysis, and explanation of ideas in writing 3 reports per semester.
3. Original research project, group or individual. Written as a scientific paper and presented in poster format. May include calculation, graphing and data analysis as well as explanation of ideas in writing.
4. Formal assessment: 4 midterm exams, including objective and essay questions, 2 lab practical examinations, and 6-9 quizzes may be required.

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 project, research paper	Writing 20 - 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 10 - 15%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Multiple choice, completion, essay questions, lab exams, quizzes	Exams 60 - 70%

Other: Includes any assessment tools that do not logically fit into the above categories.

None	Other Category 0 - 0%

Representative Textbooks and Materials:
Biology, Campbell and Reece, 8th edition, 2008
World of the Cell (6th Edition) by Wayne M. Becker, Lewis J. Kleinsmith, Jeff Hardin 2005
Asking About Cells, A J Tobin and R E Morel, 1997