

**BIO 2.1 Course Outline as of Fall 2018****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

General/Basic Info

Approval Dates

General/Hours and Units

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	8	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

General/Basic Info

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

General/Repeatability

Also Listed As:

Formerly: BIO 3

General/Basic Info

Description/Catalog

**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:**

Course Completion of CHEM 1A OR CHEM 4A; AND Course Completion of BIO 10 AND ENGL 1A

**Recommended Preparation:**

Student Prep

**Limits on Enrollment:**

Description/Schedule

**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:

Limits on Enrollment:

Transfer Credit: CSU;UC.

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

Student Prep

General/Basic Info

General/Repeatability

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

**Associate Degree:**

Area: C

Effective: Fall 1981

Natural Sciences

Inactive:

**CSU GE:**

**Transfer Area**

B2

B3

Life Science

Laboratory Activity

Effective:

Fall 1981

Inactive:

**IGETC:**

**Transfer Area**

5B

5C

Biological Sciences

Fulfills Lab Requirement

Effective:

Fall 1981

Inactive:

**CSU Transfer:** Transferable

Effective:

Fall 1981

Inactive:

**UC Transfer:** Transferable

Effective:

Fall 1981

Inactive:

Articulation Module

**CID:**

CID Descriptor:BIOL 190

SRJC Equivalent Course(s):

Cell and Molecular Biology

BIO2.1

**Certificate/Major Applicable:**

Major Applicable Course

General/Basic Info

Approval Dates

### **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 Created/Approved: 8/1/1981

Course Last Modified: 4/23/2018

Course last full review: 10/23/2017

Prereq Created/Approved: 10/25/2017

Semester Last Taught:

Term Inactive:

## **COURSE CONTENT**

**Student Learning Outcomes:**

Content/Outcomes and Objectives

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

Content/Topics and Scope



- 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:**

Content/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:**

Content/Methods of Evaluation

**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.

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.

Group presentation and student participation

Other Category  
0 - 10%

**Representative Textbooks:**

Campbell Biology. 10th Ed. Reece, Jane and Urry, Lisa and Cain, Michael. Pearson. 2014  
Essential Cell Biology. 4th Ed. Alberts, Bruce and Bray, Dennis and Hopkin, Karen. Garland Science. 2014  
Instructor prepared lab manual



Content/Textbooks

## OTHER REQUIRED ELEMENTS

Student Prep

### **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**

General/Hours, Units  
and 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**

General/  
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

General/Other Codes