

CATALOG INFORMATION

Dept and Nbr: BIO 3

Title: FUNDAMENTALS OF BIO

Full Title: Fundamentals of Biology (Cell and Molecular)

Last Reviewed: 8/14/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	5.00	Lab Scheduled	3.00	6	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	7.00		Contact Total	122.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00

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 1.3

**Catalog Description:**  
Intended for major in biological sciences, pre-medical or related pre-professional programs. Cell structure and function, biochemistry, metabolism, molecular genetics, cell differentiation and development and their application to the study of selected cell types. (Formerly Biology 1.3)

**Prerequisites/Corequisites:**  
Chem 1A or equivalent with grade of "C" or better.

**Recommended Preparation:**  
Course Eligibility for ENGL 1A

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: Intended for majors in biological sciences, pre-medical or related pre- professional programs. Cell structure & function , biochem, metabolism, molecular genetics, cell differentiation & development & their application to the study of selected cell types. (Grade Only)  
Prerequisites/Corequisites: Chem 1A or equivalent with grade of "C" or better.  
Recommended: Course Eligibility for ENGL 1A

Limits on Enrollment:

Transfer Credit: CSU;UC. (CAN BIOL2)(BIO 2.3+BIO 2.2+BIO 3=BIOL SEQ A)

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

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

<b>AS Degree:</b>	<b>Area</b>		Effective:	Inactive:
	C	Natural Sciences	Fall 1981	
<b>CSU GE:</b>	<b>Transfer Area</b>		Effective:	Inactive:
	B2	Life Science	Fall 1981	
	B3	Laboratory Activity		
<b>IGETC:</b>	<b>Transfer Area</b>		Effective:	Inactive:
	5B	Biological Sciences	Fall 1981	
	5C	Fulfills Lab Requirement		
<b>CSU Transfer:</b>	Transferable	Effective:	Fall 1981	Inactive:
<b>UC Transfer:</b>	Transferable	Effective:	Fall 1981	Inactive:
<b>CID:</b>				
CID Descriptor:	BIOL 190	Cell and Molecular Biology		
SRJC Equivalent Course(s):		BIO2.1		

**Certificate/Major Applicable:**

Not Certificate/Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

The students completing Biology 1.3 will be able to:

1. Describe the bonding, 3-D structure and reactivity of the primordial molecules and build models of these molecules.
2. Explain the role of the primordial molecules in the structure and function of macro-molecules.
3. Describe the relations of structure and function in DNA, RNA, and protein.
4. Describe the role of water and hydrophobic forces in the formation of membranes.
5. Describe the organization of procaryotes and eucaryotes and explain it's evolutionary significance.
6. Isolate and grow cells in pure culture. Construct a growth curve.
7. Explain the historical development of molecular genetics, describe the experiments supporting the identity of DNA as genetic material and those demonstrating it's heterocatalytic and regulating functions.
8. Describe DNA replication and explain it's dependence on 3-D structure.
9. Distinguish mutation from re-combination and describe their role in evolution.
10. Describe procaryotic recombination systems and explain their role in biotechnology.
11. Describe protein synthesis and explain the role of RNA.

12. Explain how changes in DNA, RNA, and Protein sequences are used to measure evolution.
13. Define virus, explain its interactions with the cell and relate to other mobile genetic elements.
14. Isolate, cut, and splice DNA molecules. Transfer DNA and select for re-combinants. Purify DNA using chromatography and electrophoresis.
15. Titrate virus.
16. Explain the specificity of enzyme catalysis and relate to activation energy.
17. Explain cell regulation based on the operon model and allosteric proteins.
18. Differentiate between prokaryotic and eukaryotic regulation.

### **Topics and Scope:**

1. Basic Chemistry of Life.
  - A. origin and definition of life
  - B. atoms and molecules
  - C. water and the carbon atom
  - D. chemical reactions and enzymes
2. Biochemistry of the Cell.
  - A. sugars and polymers of sugars
  - B. lipids
  - C. proteins
  - D. nucleic acids
3. Structural Characteristics of Viruses and Cells.
  - A. cell theory
  - B. cell sizes and shapes
  - C. structure of viruses and prokaryotic cells
  - D. structure of eukaryotic cells
4. The Cell Membrane.
  - A. membrane structure and function
    1. diffusion and osmosis
    2. active transport
    3. the fluid mosaic model
    4. recognition
  - B. the nucleus and cell division
5. Molecular Genetics.
  - A. Mendel review and connect classical to modern genetics
  - B. genes and chromosomes
  - C. DNA: structure, replication, repair and protein coding
  - D. RNA and its specialized roles
    1. post transcriptional modification
  - E. protein synthesis
    1. regulation (regulatory genes - the operon)
  - F. diversity
    1. mutation
    2. recombination
      - a. virus and retrovirus
    3. prokaryotic mechanisms
    4. lymphocyte genetics

- G. biotechnology
    - 1. vectors, enzymes, recombinants
      - a. isolation, purification, and transfer of DNA and selection of recombinants
  - H. molecular evolution
    - 1. random chemistry and biological clocks
    - 2. phenotypic effects
  - I. new ideas in genetecs (split genes, chromosomal protein, junk DNA, catalytic RNA)
6. Proteins.
- A. the folding problem
  - B. structural proteins
  - C. enzymes and catalysis
    - 1. mechanisms
  - D. allosteric regulation
  - E. antibodies
    - 1. domains and modular construction
7. Cell Specialization.
- A. developmental biology
  - B. the immune response

### Assignment:

- 1. Textbook - reading one to two chapters per week.
- 2. Outside reading - ten to twelve pages per week.
- 3. Term paper - approximately ten pages.
- 4. Significant preparation for upcoming lab assignments (ten to twenty pages per week). Completion of two lab reports (five to ten pages and fifteen to twenty pages).

### 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.

Essay exams, Term papers, UP TO 50% ESSAY EXAMS, UP TO 10% TERM PAPER

Writing  
50 - 80%

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

Exams

Problem solving  
5 - 10%

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

Class performances

Skill Demonstrations  
5 - 10%

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

Multiple choice, True/false, Matching items, Completion,  
OBJECTIVE ON FINAL UP TO 50%

Exams  
10 - 40%

**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, Neil A.; 3rd Edition, 1995

MOLECULAR BIOLOGY OF THE CELL by Bruce Alberts; 3rd edition, 1994, et al.