COURSE OUTLINE : BIOL 101
D Credit – Degree Applicable
COURSE ID 005071
Cyclical Review: August 2020

COURSE DISCIPLINE : BIOL

COURSE NUMBER : 101

COURSE TITLE (FULL) : General Biology I

COURSE TITLE (SHORT) : General Biology I

CALIFORNIA STATE UNIVERSITY SYSTEM C-ID : BIOL 190 - Cell and Molecular Biology

CATALOG DESCRIPTION

BIOL 101 is the first half of a one-year course designed for biological science majors. It covers fundamental biological principles and processes including: the scientific method, biochemistry, metabolism, cell respiration, photosynthesis, molecular biology, cell structure and function, mitosis and meiosis, Mendelian genetics, molecular genetics, and gene regulation.

Total Lecture Units:3.00

Total Laboratory Units: 1.00

Total Course Units: 4.00

Total Lecture Hours:54.00

Total Laboratory Hours: 54.00

Total Laboratory Hours To Be Arranged: 0.00

Total Contact Hours: 108.00

Total Out-of-Class Hours: 108.00

Prerequisite: CHEM 101.

ENTRY STANDARDS

	Subject	Number	Title	Description	Include
1				Describe the scientific method and apply it to the development of the science of chemistry;	Yes
2				describe chemical processes in terms of chemical equations and be able to use the equations to answer quantitative questions concerning the process described;	Yes
3				analyze modern theories of atomic motion, especially as they apply to gases;	Yes
4				utilize bonding theories to describe the chemical nature of ions and molecules;	Yes
5				demonstrate an understanding of intermolecular forces and apply those forces to the nature of solids and liquids;	Yes
6				demonstrate the proper use of laboratory equipment and the ability to handle chemicals safely.	Yes

EXIT STANDARDS

1 Identify the properties of lipids, carbohydrates, proteins, and nucleic acids;
2 describe the structure of prokaryotic and eukaryotic cells;
3 explain cell respiration and photosynthesis;
4 describe and identify the different stages in mitosis;
5 describe the relationships between meiosis and Mendelian genetics;
6 solve Mendelian genetics problems, including autosomal, X-linked genes and dihybrid crosses;
7 describe the processes of DNA replication, transcription, and translation;
8 explain the basic mechanisms of gene regulation in prokaryotes and eukaryotes.
9 demonstrate proper use of laboratory equipment including the microscope, spectrophotometer, and micropipettes;
10 demonstrate proficiency with data collection, analysis, and graphical representation.

STUDENT LEARNING OUTCOMES

1 describe and compare the structures of prokaryotic and eukaryotic cells and their biochemical composition;
2 explain the differences between mitosis and meiosis, the relationship between meiosis and Mendelian genetics, and how genes are expressed in prokaryotes and eukaryotes;
3 explain how organisms acquire energy by photosynthesis and cellular respiration;
4 compare the different forms of signal transduction, apply this knowledge to disease processes, and describe modern techniques in biotechnology.

COURSE CONTENT WITH INSTRUCTIONAL HOURS

	Description	Lecture	Lab	Total Hours
1	Introduction • The scientific method and its current application in biology • Unit conversion and significant figures • Characteristics of living systems • Overview of evolutionary theory as the central paradigm of the biological sciences	1.5	6	7.5
2	Chemistry of Biological Systems • Properties of water • Functional groups and carbon based molecules • Biological monomers and polymers • Carbohydrates, lipids, proteins, and nucleic acids	6	6	12
3	Cell Biology • Cell size and surface to volume ratio • Prokaryotic and eukaryotic cell structure and function • Cell membrane structure • Active and passive transport across membranes	6	6	12
4	Cellular Energetics • Laws of thermodynamics • Oxidation-reduction and energy • Phosphorylation • Cellular respiration • Fermentation • Energy, pigments, and light • Light dependent/independent reactions of photosynthesis	12	6	18
5	Cell Division • Chromosomes, genes, and DNA • Mitosis • Meiosis • Meiotic abnormalities	3	6	9

6	Mendelian Genetics • Historical perspective of Mendel's work • Mendelian laws • Autosomal and sex-linked patterns of inheritance • Types of dominance • Solving genetic problems • Genetic abnormalities	12	6	18
7	Molecular Genetics • Early work - the search for DNA structure • Watson and Crick's model of DNA structure • DNA replication and repair • Central dogma of molecular biology • Mutations - origin and types • Biotechnology techniques • Bacterial transformation	7	6	13
8	Gene Regulation • Basic prokaryotic models • Bacterial growth and sterile techniques • Inducible/repressible operons • Basic eukaryotic models • Transposable elements	5	6	11
9	Enzyme kinetics • Micropipetting • Data analysis and graphing • Spectrophotometer use	1.5	6	7.5
				108

OUT OF CLASS ASSIGNMENTS

1 written lab reports (e.g. describe results of an enzyme kinetics experiment);
2 prepare graphs of experimental results.

METHODS OF EVALUATION

1 evaluation of written lab reports;
2 laboratory practical examinations;
3 lecture examinations (including multiple choice and essay questions).

METHODS OF INSTRUCTION

- [x] Lecture
- [x] Laboratory
- [ ] Studio
- [x] Discussion
- [x] Multimedia
- [ ] Tutorial
- [ ] Independent Study
- [x] Collaboratory Learning
- [x] Demonstration
- [ ] Field Activities (Trips)
- [ ] Guest Speakers
- [ ] Presentations

TEXTBOOKS

Title	Type	Publisher	Edition	Medium	Author	IBSN	Date
Life: The Science of Biology	Required	MacMillan	12	Print	Hillis, David M., et al.	9781319307042	2020