

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

BIOLOGY 131 – GENERAL BIOLOGY I LABORATORY

3 hours laboratory, 1 unit

Catalog Description

Laboratory experiments on the basic biological principles with particular emphasis on the molecular and cellular aspects of the organism. Meets transfer requirements for non-majors.

Prerequisite

“C” grade or higher or “Pass” in BIO 130 or equivalent or concurrent enrollment

Entrance Skills

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Understand the methods and activities of scientific inquiry used to solve problems in biology.
- 2) Distinguish between statements that describe a hypothesis and a theory.
- 3) Understand the systems used to classify living organisms.
- 4) Recognize the relationships between cellular structures and functions in prokaryotic and eukaryotic cells.
- 5) Compare and contrast passive and active transport mechanisms
- 6) Understand the differences in chemical composition and structure of carbohydrates, proteins, lipids, nucleic acids
- 7) Explain the differences in the functions and mechanisms of photosynthesis and cellular respiration
- 8) Recognize the differences between mitotic and meiotic cellular divisions
- 9) Understand Mendelian and non-Mendelian genetics laws and terminology and describe the associated patterns of inheritance

Course Content

- 1) Microscopy
- 2) Prokaryotic and eukaryotic cellular structures
- 3) Organic constituents of life including nucleic acids, carbohydrates, proteins and lipids
- 4) Classification, structure and function of living organisms including bacteria, fungi, protists, plants and animals
- 5) Molecular movement, net diffusion and osmosis
- 6) Enzymes
- 7) Photosynthesis
- 8) Respiration and fermentation
- 9) Mitosis and meiosis
- 10) Mendelian and Post-Mendelian genetic and relationship to modern molecular genetics
- 11) Representative mammalian anatomy
- 12) Relationships among organisms and physical environment in ecosystems

Course Objectives

Students will be able to:

- 1) Perform the basic activities of scientific inquiry, including presentation of data in the form of tables, charts and graphs, design of experiments, collection of data, and critical analysis of data.
- 2) Use both compound and stereo microscopes to study cells and organisms.

- 3) Describe the relationship between respiration and photosynthesis, producers and consumers and the role of each of these in ecosystems.
- 4) Relate membrane transport examples to real world situations.
- 5) Test for the presence of carbohydrates, lipids, proteins and nucleic acids, and recognize the relationships between the testing methods and the chemical properties of these compounds and the significance of these molecules in living organisms.
- 6) Measure the rate of enzyme catalyzed reactions under different conditions, and explain the significance to living systems.
- 7) Recognize the roles of light, CO₂ and pigments in photosynthesis and to measure the rate of photosynthesis under different conditions.
- 8) Compare human-controlled oxidation to glucose oxidation in respiration and to measure the rate of respiration under different conditions.
- 9) Compare the role of mitosis to meiosis in cellular division and to recognize the different phases of these processes.
- 10) Solve problems in genetics based on Mendelian and non-Mendelian models of inheritance.
- 11) Describe the relationship between classical genetics and modern molecular genetics, and the significance of molecular genetics in the modern world.
- 12) Understand the structure and functional relationships of plants with other biotic and abiotic factors in ecosystems.
- 13) Study the structure and function of the major organs and organ systems in a representative mammal and compare and contrast to those of humans.
- 14) Understand the basis of the classification of the animal kingdom as well as recognize members of the different animal phyla.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Lab practical exams that demonstrate proficiency in specific laboratory skills and knowledge
- 2) Written and oral lab quizzes
- 3) Formal and informal lab reports that demonstrate the student's ability to recognize and perform the various activities of scientific inquiry
- 4) Group discussions and projects that demonstrate ability to construct experiments and analyze data to answer scientific questions

Special Materials Required of Student

None

Minimum Instructional Facilities

- 1) Smart classroom laboratory facilities with writing board, overhead projection system, utilities including hot/cold/DI water
- 2) Microscopes, both compound and binocular dissecting scopes
- 3) Computers with software for construction of charts and graphs
- 4) Equipment including balances, glassware, measuring devices, computer-based data acquisition system

Method of Instruction

- 1) Integrated laboratory exercises, discussion and demonstration
- 2) Small and large group work and discussion
- 3) In-class activities and independent homework/research projects
- 4) Field trips designed to link course material to real world phenomena
- 5) Instructional slides, video presentations
- 6) Use of study groups, peer tutoring and instructional office hours

Out-of-Class Assignments

Students will be required to pre-read laboratory assignments, study for quizzes and to write laboratory reports or complete laboratory worksheets.

Texts and References

- 1) Required (representative example): Nette, Kathryn M. *BIO 131 Laboratory Manual*. Cuyamaca College, 2020.
- 2) Supplemental: None

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Develop hypotheses design experiments, organize and critically analyze data to show relationships and conclusions. Communicate results of investigations.
- 2) Utilize typical laboratory microscopes to recognize and explain the significance of the differences between prokaryotic and eukaryotic cells
- 3) Describe the relationship between respiration and photosynthesis, producers and consumers and the role of each of these in ecosystems
- 4) Compare and contrast the chemical properties and the functions of biological macromolecules.
- 5) Understand the significance of the plasma membrane in living organisms
- 6) Understand and be able to measure how enzymes relate to the metabolism of molecules in cells.
- 7) Predict the pattern of inheritance based on Mendelian and post-Mendelian principles
- 8) Compare and contrast the chemical nature and structure of nucleic acids as well as their role in gene expression
- 9) Describe the significance of the relationship between structure and function in biological systems.
- 10) Understand the system of classification of living organisms.

Student Learning Outcomes

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

- 1) Collaborate as a member of a team to use the tools and methods of scientific inquiry to solve problems in biology.
- 2) Formulate hypothesis, and accurately collect, organize, and analyze experimental data to draw meaningful conclusion about proposed hypotheses.
- 3) Operate laboratory microscopes to observe and distinguish structures within eukaryotic cells and relate these structures to broader cellular functions and organization.