

BIOLOGY 101
BIOLOGICAL PRINCIPLES I

BULLETIN INFORMATION

BIOL 101: Biological Principles I (3 credit hours)

Co-requisite: BIOL 101L

Prerequisites: BIOL 101L

Course Information:

Introductory survey of macromolecules, cell structure and function, genetics, and molecular biology

SAMPLE COURSE OVERVIEW

This is the first portion of a two-semester sequence in Introductory Biology. The purpose of the course is to provide a basic overview of biological processes at multiple spatial and temporal scales that will generate a basis for understanding modern biological issues, their importance to contemporary societal issues, and for success in advanced course work in the Biological Sciences. The course covers fundamental biological chemistry, cell biology, cellular metabolic biochemistry and metabolism, cell replication and differentiation, the molecular basis of inheritance and development. BIOL 101 is a separate course from the laboratory, BIOL 101L. A separate syllabus will be issued for the laboratory. This syllabus only covers the lecture. The importance of biological scientific literacy to understand and analyze the impact of biological processes on contemporary issues such as genetic engineering and other applications of DNA technology, diagnosis and treatment of genetic and metabolic diseases, and implications of genomics to human health and welfare will be emphasized.

ITEMIZED LEARNING OUTCOMES

Upon successful completion of BIOL 101, students will be able to:

1. Distinguish scientific inquiry from other legitimate methods of inquiry and to recognize the difference between scientifically legitimate inquiry and claims without a sound scientific basis
2. Analyze the properties of water that govern biological processes at multiple levels of subcellular and cellular organization.
3. Describe the structural and functional properties of biological macromolecules and understand their importance in biological function
4. Describe the structure and function of biological membranes.
5. Describe the constituents of eukaryotic and prokaryotic cells and explain their biological functions to understand biological basis of life
6. Describe the biochemical basis and the cellular organization of metabolism and discuss how these processes are integrated for a functional life form

7. Identify basic mechanisms of communication within and among cells and describe how they combine to perform a cellular/organismal function
8. Describe the mechanisms and regulation of the molecular and biochemical workings of cells with emphasis on genetic code, cell proliferation, regulation of gene expression, cell cycle, mitosis, and meiosis, DNA replication, and development.
9. Demonstrate how genetic and cellular processes determine variation among individuals and populations
10. Apply statistical and quantitative approaches to analyze phenotypic ratios from different genetic experiments
11. Discuss how rapid developments in cell biology and genetics have impacted human welfare and society, including, in some cases, generated ethical quandaries (i.e. genetic screening and privacy, genetic engineering, individual-based medical treatment, stem cell research, etc.). These discussions will be integrated throughout the subject matter.
12. Demonstrate understanding of how genetic engineering technology has affected human day-to-day life as well as management and treatment of health related issues
13. Apply knowledge about biological processes to current issues pertaining to biological problems in the immediate and global environment.

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS

1. Textbook: Campbell, N.A. and J.B. Reece. 2008. *Biology*, 8th edition (any previous edition is also suitable)
2. Online Resources, including Power Point presentations, are available through *Blackboard*

SAMPLE ASSIGNMENTS AND/OR EXAMS

1. Three Exams and a Final Exam

- a. The exams will include questions that assess the student's capacity to integrate scientific literacy and utilize the scientific method to derive new conclusions from data and differentiate among alternative hypotheses. Specific topics regarding diagnosis of genetic and metabolic diseases will be discussed in the lectures and these will lead to hypotheses to be tested regarding various treatments that will be addressed in weekly homework. Most of the cellular processes emphasized in this course integrate information across multiple levels of organization and consequently some of the exam questions will specifically test the student's capacity to apply this integrative approach. The exams will specifically test the students' ability to apply their knowledge about biology to current issues regarding human health, welfare, medicine, and environmental ecosystem changes. The format of the exams may vary (multiple choice, short answer, and essay).

SAMPLE COURSE OUTLINE WITH TIMELINE OF TOPICS, READINGS/ASSIGNMENTS, EXAMS/PROJECTS

Week 1:	Introduction-Chapter 1
Week 2:	Chemical context of life-Chapter 2; Water-Chapter 3
Week 3:	Tour of the cell-Chapter 6

- Week 4: Carbon and macromolecules-Chapters 4 and 5
Week 5: Macromolecules cont'd
Week 6: Membrane structure and function-Chapter 7
Week 7: Membranes cont'd; Intro to Metabolism-Chapter 8
EXAM #1 (Chapters 1-6)
Week 8: Respiration-Chapter 9
Week 9: Photosynthesis-Chapter 10
Week 10: The Cell Cycle-Chapter 12
Week 11: EXAM #2 (Chapters 7-10)
Meiosis and sexual life cycles-Chapter 13
Genes and Chromosomes-Chapter 14 and 15
Week 12: Genes and Chromosomes cont'd
Week 13: Molecular Genetics-Chapter 16
Week 14: Gene to Protein-Chapter 17
Week 15: EXAM #3 (Chapters 12-16)
Week 16: Viruses, Cancer Biology and Biotechnology

FINAL EXAM according to University exam schedule: FINAL EXAM COVERS NEW MATERIAL SINCE LAST EXAM AND AS WELL AS THE CUMULATIVE PART FROM ALL PREVIOUS EXAMS