

BIOLOGY 101L
BIOLOGICAL PRINCIPLES I LABORATORY

BULLETIN INFORMATION

BIOL 101L: Biological Principles I Laboratory (1 credit hour)

Course Description:

(Recommended concurrent with BIOL 101) Experimental examination of basic principles of cell biology, genetics and metabolism

Note: Three hours per week.

SAMPLE COURSE OVERVIEW

BIOL 101L is a laboratory course that accompanies BIOL 101 and is meant to be taken concurrently with the lecture course. The purpose of the course is to provide an introduction to the laboratory study of cell and molecular biological processes and for success in advanced course work in the Biological Sciences. The course covers experimental methods and techniques as applied to fundamental biological chemistry, cell biology, cellular metabolic biochemistry and metabolism, cell replication and differentiation, the molecular basis of inheritance and development. The course will also emphasize scientific inquiry and writing as they apply to Biology. The course will also emphasize safe laboratory practices and students will be expected to conform to these standards at all times. The importance of biological scientific literacy to understand and analyze the impact of biological processes on contemporary societal issues and human welfare will be emphasized.

ITEMIZED LEARNING OUTCOMES

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

1. Demonstrate a knowledge of basic laboratory techniques and safe laboratory practices
2. Distinguish scientific inquiry from other legitimate methods of inquiry to recognize the difference between scientifically sound inquiry and claims without a solid scientific basis.
3. Quantitatively analyze data to evaluate the merits of a scientific hypothesis
4. Analyze the properties of water, including pH, hydrogen bonding and molarity.
5. Analyze the properties of enzymes that determine biological rates
6. Identify the properties of biological macromolecules: name, recognize, and determine the functional properties of the four classes of macromolecules.
7. Describe the structures and functions of biological membranes.
8. Describe the structure of the cell and explain the functions of each structure
9. Describe the biochemical basis and cellular organization of photosynthesis.
10. Assess the energetics of assembling high-energy organic molecules via photosynthesis.
11. Demonstrate how genetic processes at the cellular level determine variation among individuals and populations

12. Apply statistical and quantitative approaches to analyze phenotypic ratios from different genetic experiments.

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS

1. Biology 101 Laboratory Manual 2010-2011
2. A Short Guide to Writing About Biology, 7th edition, J.A. Pechenik
3. Online Resources, including Power Point presentations, are available through *Blackboard*

SAMPLE ASSIGNMENTS AND/OR EXAMS

1. **Student Evaluation:** In every lab session data is collected and analyzed to address a question or problem of interest. Some specific examples include analysis of termite behavior, enzyme kinetics, and analysis of genetic inheritance. Understanding of basic experimental design, data collection, proficiency in data analysis, and ability to communicate the results to an audience will be tested. Regular assignments, lab reports, and presentations will measure these abilities. Integrated throughout the course will be discussions on the impact of biological processes and discoveries on societal issues and human welfare, which will be assessed primarily during **oral presentations** and active class participation (see below).
 - a. Paper #1 Termite Behavior/Scientific Method
 - b. Peer Review
 - c. Final and Complete Lab Report
 - d. Paper # 2 Catalase/Enzyme Kinetics
 - e. Peer Review
 - f. ete Lab Report
 - g. Paper # 3 Drosophila/Mendelian Genetics
 - h. Final and Complete Write-up
 - i. Worksheets
 - j. Eight (8) worksheets
 - k. Quizzes
 - l. Twelve (12) quizzes
 - m. Oral Presentation
 - n. Participation

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

- Week 1:** Lab Intro, Scientific Method, Expt Design- sound scientific evidence versus shaky claims
Quiz 1: email reply
WS1: Scientific Paper
WS2: Abstract
- Week 2:** Scientific Literature, Figure/Table Creation
Lab Report Writing

- Quiz 2 Write Termite
Lab Report
- Week 3:** Buffers and pH Lab
Quiz 3
LR1 (Termite) to PR
WS 3: Buffers and pH
Review 3 peer lab reports and review own report
- Week 4:** Diffusion /Osmosis Lab
Quiz 4
WS 4: Diffusion,
Revise Termite Lab Report
- Week 5:** Catalase
Quiz 5
LR1 Final (Termite)
- Week 6:** Catalase Data Analysis
Quiz 6
Write Catalase Lab Report
- Week 7:** Tour of the Cell
Quiz 7
LR2 (Catalase) to PR
WS 5: Tour of the Cell
Review 3 peer lab reports and review own report
- Week 8:** Macromolecules - their relevance to current practice of medicine and human welfare
Quiz 8
WS 6: Macromolecules
Revise Catalase Lab Report
- Week 9:** Photosynthesis
Quiz 9
LR2 Final (Catalase)
WS 7: Photosynthesis
- Week 10:** Drosophila I
Quiz 10
- Week 11:** Corn Genetics
Quiz 11
WS 8: Genetics/Chi-square
- Week 12:** Drosophila II
Quiz 12
Prepare Oral Presentations
- Week 13:** Oral Presentations
LR3 Final (Drosophila)