

BIOLOGY 102L
BIOLOGICAL PRINCIPLES II LABORATORY

BULLETIN INFORMATION

BIOL 102L: Biological Principles II Laboratory (1 credit hour)

Course Description:

Experimental examination of structure and function of plant and animal systems, biodiversity, ecology.

Prerequisites: Grade of C or better in BIOL 101 and BIOL 101L; recommended concurrent with BIOL 102

SAMPLE COURSE OVERVIEW

BIOL 102L is a laboratory course that accompanies BIOL 102 and is meant to be taken concurrently with the lecture course. The course covers experimental methods and techniques as applied to the study of evolution, genetics, biodiversity, ecology, and plant and animal biology. The course will 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. The purpose of BIOL 102L is to provide an introduction to the laboratory study of evolutionary and ecological biology and the structure and function of plants and animals. This course will also lay a foundation for success in advanced course work in the Biological Sciences.

ITEMIZED LEARNING OUTCOMES

Upon successful completion of Biology 102L, students will be able to:

1. Demonstrate a knowledge of basic laboratory techniques, including safe laboratory practices
2. Demonstrate understanding of the relationships between quantitative data analysis and the hypotheses being tested in different experiments
3. Evaluate the critical role of “peer” review in scientific inquiry by both writing and critically evaluated scientific papers
4. Utilize quantitative and statistic approaches to test different genetic hypotheses to explain the segregation of phenotypic values.
5. Demonstrate the effectiveness of different experimental approaches in analyzing genetic information
6. Describe biological diversity and demonstrate an understanding of the underlying evolutionary processes that determine biological relationships
7. Describe the fundamental organ and tissue types in plants and animals and demonstrate how form determines function and vice versa

8. Analyze the impact and role of biological systems and processes on historical aspects such as evolution, biodiversity, as well as contemporary societal issues such as changing environments and habitats
9. Demonstrate understanding of the mechanism of scientific review and critical analysis of biological data and the process of writing and publishing scientific results
10. Demonstrate and apply their understanding of scientific method by analysis of genetics of populations, quantitative analysis of the data, identification and description of fundamental organ and tissue types in vertebrate animals as well as plants
11. Utilize real contemporary and historical examples to illustrate how scientific developments led to the development of applications that benefit society (i.e. underlying basis of disease and subsequent medical practice, maximizing agriculture performance, etc.)

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS

1. *Biology 102 Lab Manual*, c.2009. Hayden McNeil Publisher
2. Pechinek, Jan A. *A Short Guide to Writing about Biology*. 2004.
3. Memory key (aka thumb drive, flash drive; to transport electronic files)
4. Recommended Text: *Photographic Atlas for the Biology Lab*. 2001. VanDeGraaff and Crawley.
5. Online Resources available at:
<http://www.biol.sc.edu/~biol102>
<http://blackboard.sc.edu>

SAMPLE ASSIGNMENTS AND/OR EXAMS

1. The **quizzes, written reports, and presentations** will include emphasis on how scientific review and critical analysis of biological data is linked to the process of writing and publishing scientific results. In addition, we will utilize contemporary and historical examples to illustrate how scientific developments lead to the development of applications that investigate underlying basis of disease and subsequent medical practice, or maximize agriculture performance, etc. Questions pertaining to these principles will be included on quizzes in assessment of student learning. Written reports and presentations will be evaluated to assess how successfully the students can critically evaluate the data to arrive at scientific conclusions that are solidly founded in experimental observations and data.
2. **Peer Review** is an important part of BIOL 102L because it is an important part of science. Peer Review is the only major mechanism that maintains the integrity, progress and quality of science. Whose papers are published, whose ideas receive funding, who becomes well-respected in science and who doesn't are all determined by peer review and here we literally mean "peer" review. The scientists who submit the papers and grant proposals have the same types of training and expertise as the people who review and decide what is worthy and what is not. Thus, it is a perfectly legitimate and indeed authentic process for your peers to provide you with feedback and suggestions on your academic work. The point is to critically assess the value and accuracy of the work, the

ideas and the intellectual contribution. You should take both giving and receiving peer feedback seriously as you are engaging in a very real process in science.

3. Projects:

- a. Group Work
- b. Bibliography & articles
- c. QUIZ 1
- d. Biodiversity Oral Presentation
- e. Various Pigeon or Daphnia Graphs (A & B)
- f. QUIZ 2
- g. Biodiversity Written Report
- h. Graphs (C & D)
- i. Quiz 2.5 (5pts) + research paper upload & review process
- j. QUIZ 3
- k. Plant Research Peer Reviews
- l. QUIZ 4
- m. Final Research Paper
- n. QUIZ 5
- o. QUIZ 6
- p. QUIZ 7
- q. Lab Practical

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

Week 1: Introduction to course, Email Warnings activity, Receive organisms for Biodiversity activity and answer four basic challenges for your organism via Web search (background), review scientific naming and classification; Biodiversity discussion in kingdom groups Email Warnings survey, presentation and Information search for your organism (keep records of sources you find on your memory key- working bibliography)

Week 2: Evolution, Genetics & Hardy-Weinberg Equilibrium; Critique primary articles; Biodiversity discussion in ecosystem groups, search & critique primary articles BRING working bibliography on memory key; Submit organism bibliography and primary & non-primary literature articles at end of lab.

Week 3: Bean Foraging Simulation; Rainfall Data Challenge; Pigeon Data Analysis & Graphing; summarize your primary article and main data
Quiz 1
Replace primary article if not acceptable

Week 4: Biodiversity Organism Presentations in small groups;
Continue data analysis and graphing or start plant project

Give 7 min. oral presentation on Organism research to peers
Graphs

- Week 5:** Daphnia Expt; Plant Project
Turn in Biodiversity Report with two articles;
Quiz 2;
Daphnia data
- Week 6:** Plant Project, Analysis, and Graph-making;
Research Report & uploading
Graphs;
Work on plant research paper to upload in next lab
- Week 7:** Anatomy of Seed Plants: Roots, Stems, Leaves, and Reproductive Parts;
What Makes a Good Peer Review?
Plant research paper draft with graphs must be uploaded to Blackboard by end
of lab;
Peer Review Process – finish by 11PM night before next lab for full points
- Week 8:** Plant Project; Flowering Plant reproduction;
Review plant anatomy;
Possibly start Vertebrate Anatomy
Quiz 3
Revise plant research papers;
Peer reviews available to writers so comments can be included in revision.
- Week 9:** Vertebrate Skeletal Systems;
Histology;
External Anatomy of the Rat; Dissection Protocols;
Rat Dissection - Muscles, Digestive System
Quiz 4
Final Plant Research paper due
- Week 10:** Respiratory, Cardiovascular, Reproductive and Excretory Systems of the Rat
Quiz 5
- Week 11:** Nervous System; Pig Parts Review; Rat Review
Course Evaluations (or instructions & link)
Quiz 6 & Quiz 7
Course Evaluations
- Week 12:** Lab Practical
Practical