

BIOLOGICAL INVESTIGATION - BIOL 270

COURSE LEARNING OUTCOMES

1. Recognize the basics of generating a question that can be answered through scientific investigation, and developing and testing hypotheses.
2. Design and conduct authentic experiments.
3. Analyze quantitative data and apply statistical analyses.
4. Present experimental findings in both written and oral form, including effective graphical presentation of summarized data and statistical tests in graphs, tables, or other data appropriate figures.
5. Present data in scientific format.
6. Organize, record, analyzed, and evaluate lab protocols, and experimental data in a laboratory notebook.
7. Record scientific procedures, investigations, and explanations.
8. Locate, read, critique, summarize, discuss, and properly cite scientific literature related to student's question, hypotheses, and experiment design.
9. Apply research strategies and scientific methods.
10. Introduce the use of laboratory tools and techniques for research, such as for DNA sequence data.
11. Students will develop the skills to think critically about research methodology and scientific investigations.
12. Analyze, discuss, and evaluate original research articles.
13. Review and revise personal knowledge gained from experiment design, protocols performed, data acquired and analyzed, and conclusions drawn from authentic research experience.

COURSE OUTLINE

I. The Process of Science

- A. Introduction to Scientific Method
- B. Observations and Asking Questions
- C. Framing and Testing Hypotheses
- D. Experimental Design
- E. Interpretation, analysis, and presentation of results
- F. Laboratory Notebook

II. Science Literacy

- A. Using science databases
- B. Understanding and evaluating sources
- C. Reading and evaluating research articles

III. Statistics

- A. Statistics software
- B. Probability and distributions
- C. Summary statistics and graphics
- D. One- and two-sample tests
- E. Analyzing tabular data
- F. Linear regression and correlation

IV. Communication

- A. Contemporary modes of science communication
- B. Structure of primary scientific literature
- C. Citing sources
- D. Presentations and posters