

Student Learning Goals and Objectives

The Biology Department has set forth three content goals and four process goals for the Biology major. Content goals are those that are specific to a Biology major, based on biological principles and information. Process goals represent a more generalized suite of skills that are applicable to most, if not all students at the university level. We set our content and process goals as follows:

- 1. Content Goal 1:** *Our students will understand fundamental biological principles from the major areas of biology (cell and molecular biology, genetics, evolution, ecology, organismal, and population biology).*

Students will be able to explain and apply their understanding of:

- a. the basic principles of chemistry and some application to the understanding of living systems
- b. the molecular basis for the form and function of cells
- c. the form and function of multicellular organisms
- d. the organization and transfer of genetic information
- e. the ecological relationships between organisms and their environment.
- f. the principles of evolutionary biology and the phylogenetic relationships of the major groups of organisms
- g. the organizing principle of evolution by natural selection and its role in the explanation of life's diversity on earth

- 2. Content Goal 2:** *Our students will apply and integrate fundamental biological principles from the major areas of biology.*

Students will be able to explain and apply their understanding of:

- a. the relationship between structure and function at all levels: molecular, cellular, organismal and population
- b. the importance of evolutionary theory as a unifying principle of biology.
- a. the cellular basis for physiological processes
- b. cellular basis for developmental processes
- c. interactions between organisms and their abiotic and biotic environment

- 3. Content Goal 3:** *Our students will acquire laboratory and field skills necessary to answer biological questions.* Students will be able to:

- a. perform a variety of lab techniques
- b. perform a variety of field techniques
- c. identify organisms based on common and distinguishing traits
- d. demonstrate the process of scientific inquiry and explain how scientific knowledge is discovered and validated
- e. design a biological study and analyze experimental results

- 4. Process Goal 1:** *Our students will develop enhanced critical thinking skills.*

Students will be able to:

- a. identify questions that can be addressed scientifically
- b. collect and interpret primary data and draw conclusions from experiments
- c. demonstrate the ability to read, understand and critically review scientific papers

5. Process Goal 2: *Our students will develop effective quantitative reasoning skills.*

Students will be able to:

- a. use mathematical equations to represent biological phenomena
- b. use mathematical equations and models to predict biological outcomes
- c. understand and use correct statistical techniques to evaluate results

6. Process Goal 3: *Our students will communicate precisely and analytically in written and oral forms.*

Students will be able to:

- a. discuss biological processes using precise scientific terminology
- b. prepare written and/or oral reports in standard scientific formats

7. Process Goal 4: *Our students will engage independently and collaboratively in the scientific process.*

Students will be able to:

- a. apply the scientific process, including designing and conducting experiments and examining hypotheses
- b. acquire the laboratory and/or field skills necessary to perform laboratory exercises and experiments
- c. place their research in a broader scientific context based on current literature
- d. evaluate the work of their peers