

**University Studies Course Rationale**  
**Course: BIO 102, General Biology II**  
**Cluster Requirement: 2B, Science in the Engaged Community**

Bio 102 is the second introductory biology course in a sequence designed for non-majors. One to two 90-student sections are offered each semester. This course focuses on organismal level biology and covers evolution and diversity, human biology, and ecology. The broad objectives of this course are for students to: identify hypothesis and interpret data that addresses them, to explain major concepts such as natural selection and homeostasis and apply them to solve problems, and to work in a group setting to assess the reporting of scientific information. These objectives overlap considerably with the university studies 2a objectives: to analyze and evaluate the use of scientific information in the context of social, economic, environmental or political issues, to apply scientific theories and knowledge to real-world problems, and to effectively communicate scientific information in writing.

The course material is presented through text reading and lecture, as well as an online component utilizing the university's myCourses learning website. Student comprehension is assessed using three exams, with multiple-choice and at least 1 essay question per exam. Assessment is also conducted through online assignments, and through a group presentation.

# Master Syllabus

## Course: BIO 102, General Biology II

### Cluster Requirement: 2B, Science in the Engaged Community

This University Studies Master Syllabus serves as a guide and standard for all instructors teaching an approved in the University Studies program. Individual instructors have full academic freedom in teaching their courses, but as a condition of course approval, agree to focus on the outcomes listed below, to cover the identified material, to use these or comparable assignments as part of the course work, and to make available the agreed-upon artifacts for assessment of learning outcomes.

#### **Course Overview:**

BIO 102 is designed for non-science majors. Bio 101 is a prerequisite for this course that builds upon and reinforces some concepts covered in bio 101. Bio 102 focuses on organismal level biology (rather than cell and molecular). Material is presented through assigned text reading, lecture, and includes an online component using the university's myCourses system. Student learning is assessed by short in class assignments, online discussion, in class exams using multiple choice and essay questions, and through a group presentation/writing project.

#### **Learning Outcomes:**

##### Course-specific Learning Outcomes:

After completion of the course students will be able to:

1. Identify hypotheses and understand how they are tested
2. Interpret data regarding a specific hypothesis
3. Explain major concepts such as natural selection and homeostasis
4. Apply concepts to guide problem solving activities
5. Work in a group setting outside of class to assess and present information about science reporting in the media

##### University Studies Learning Outcomes: Cluster 2B, Science in the Engaged Community.

After completing the course, students will be able to:

1. Analyze and evaluate the use of scientific information in the context of social, economic, environmental or political issues.
2. Apply scientific theories and knowledge to real-world problems.
3. Effectively communicate scientific information in writing.

#### **Example Text:**

*Biology Concepts and Connections, 7<sup>th</sup> ed.* By Reece, Taylor, Simon, Dickey. Pearson publishing, 2011.

#### **Example Assignments:**

Learning outcomes of the course and from cluster 2B are assessed throughout the semester in the form of online discussion questions and problems, in class participation

via iClicker responses, exam questions, and a group project presentation. Each exam will include at least one essay style question in addition to multiple-choice questions.

Outcome 1: Analyze and evaluate the use of scientific information in the context of social, economic, environmental or political issues.

It has recently been reported that priapulid worms, long thought to be protostomes, actually develop a mouth second (deuterostomes). However, their phylogenetic place in the protostomes has not been changed. What evidence would support maintaining their phylogenetic position in the protostomes and not placing them within the deuterostomes?

- a) If they have bilateral instead of radial symmetry
- b) If they have many other characters in common with other protostomes and none of the derived deuterostome characters**
- c) If their mouths are similar to other protostomes
- d) If they breath oxygen

The finding described in the above question has been used by creationist to argue that evolution isn't real, because scientists are changing their story about what is important in determining the relationships of organisms. What is wrong with that argument regarding the scientific method?

- a) The scientific method allows for revision of hypotheses (such as which characters are evolutionarily conserved) based on new information**
- b) The scientific method tells us how animals are related
- c) The scientific method does not allow us to rule out alternative scenarios about evolutionary relationships
- d) Newly collected data are considered superior (carry more weight) than older data

Outcome 2: Apply scientific theories and knowledge to real-world problems.

In type II diabetes, insulin receptors are decreased in response to excessive glucose. Given what you know about type II diabetes, which of the following would be the most effective treatment for type II diabetes (at least early in the progression of the disease)?

- a) Improved diet and exercise**
- b) Insulin injections
- c) Pancreatic transplant
- d) Liver transplant

Outcome 3: Effectively communicate scientific information in writing.

Answer in essay form. Why is it so problematic to apply the term "species" universally to all forms of life? What are the limitations to the species definitions "a species is a group of organisms that interbreeds", "a species is a group of organisms that look similar", and "a species is a group of organisms that fill the same ecological role"?

Students must evaluate each definition, and recognize situations in which they do not apply. For example, "a species is a group of organisms that interbreeds" applies well to organisms that reproduce sexually such as most animals, but it is problematic to apply this definition to asexually reproducing organisms such as bacteria.

**Sample Course Outline:**

Unit 1: Evolution

Chapters 13, 14, 15

Unit 2: Biodiversity

Chapters 16, 17, 18, 19

Unit 3: Comparative vertebrate anatomy/human biology

Chapters 20, 21, 27, 28, 28, 30

Unit 5: Plant biology

Chapters 31, 32

Unit 6: Ecology

Chapters 34, 36, 37, 38