

BI0 121/122/123/124: General Biology I and II

**BI0 121/122 & 123/124
General Biology I and II
(8 credit sequence)
Class Size: 10-20**

Faculty: Jason R. Wiles, Associate Professor, Syracuse University

Administrative Contact: Eric Young, Senior Associate Director, Project Advance

Course Catalog Description

BI0 121: First course in a survey of biological concepts ranging from the molecular level to global ecology. Units include the nature of science, life chemistry, cell structure and function, photosynthesis and respiration, genetics, and evolution.

BI0 122: Laboratory course associated with BI0 121. Includes inquiry-based exploration and practical application of concepts discussed in BI0 121.

BI0 123: Second course in a survey of major biological concepts ranging from the molecular level to global ecology. Units include biodiversity, plant structure and function, human and comparative animal anatomy and function, ecology, and evolution.

BI0 124: Laboratory course associated with BI0 123. Includes inquiry-based exploration and practical application of concepts discussed in BI0 123.

Course Overview

This is a two-semester, eight-credit college course offered through Syracuse University.

The course teaches modern biological concepts, including classification of organisms, ecology, human influences on natural ecosystems, microscopy, cells, organic and inorganic chemistry, animal development, genetics, energy, and plant structure and function. During a session, the student may be asked to carry out an experiment, view a demonstration, interpret experimental results, make a drawing to document observations, and so on.

Biology 121

The Microscope and Measurement—This unit reviews the use of compound and dissecting microscopes. Students study a variety of specimens, focusing especially on the fly's wing as an example of an intricate structure. The metric system is also discussed in this unit.

A Visit to the Great Barrier Reef—This unit is intended to impress the student with the abundance, diversity, and complexity of life. The Great Barrier Reef offers many examples of this theme. The phylum cnidaria is introduced, and corals and hydra are used as illustrative material. The balance of nature is explained and then demonstrated by considering the possible effects of an increase in the crown-of-thorns starfish population on reefs.

How to Make Sense Out of the Diversity of Life—In this unit, the student learns about attempts to catalog organisms in a meaningful way. The difficulty of arriving at a universally applicable definition of a species is emphasized. The principles of hierarchical classification are introduced and demonstrated.

Evolution and the Past Diversity of Life—Some major aspects of evolution, such as the natural selection and modes of species formation, are highlighted. The past diversity of life is

explored, and the role of fossils as a source of evidence is studied. Some of the major features of vertebrate evolution are examined through the fossil record. Atoms, isotopes, and methods for dating fossils are introduced.

Unity of Life and Adaptation—Unifying features of living organisms are discussed, with emphasis on adaptation and homeostasis. A thermostat is used to illustrate the principle of negative feedback, then the operation of negative feedback in humans is derived. General features of control systems are introduced. The adaptations of organisms to their environments are discussed using exemplary organisms. Basic concepts of ecology are introduced, and human influences on natural ecosystems are considered.

Microscopy and the Electron Microscope—The student is introduced to the principles underlying the electron microscope, techniques used, technical limitations, and potentialities for use.

The Architecture of Cells—Cell structures and functions are revealed using electron micrographs. The student also makes an extensive series of microscopic observations on a variety of cell types.

How Substances Get In and Out of Cells—Topics covered include the physical basis of life, diffusion, permeability of living membranes, and active transport. Observations of the amoeba and the contractile vacuole summarize principles are emphasized in the unit.

Chemicals of Life—Elementary principles of inorganic chemistry and organic chemistry are discussed. Consideration is given to the major organic ingredients of living organisms: carbohydrates, lipids, nucleic acids, and proteins.

Proteins and Enzymes—The structural and functional characteristics of proteins and enzymes are emphasized in this unit.

Origin of Life—In this unit, we trace the historical development of ideas concerning the origin of life. Then current views about the origin of life and experimental evidence supporting these views are described and analyzed.

Cell Reproduction—This unit deals with mitosis and meiosis. Cancer and errors in division leading to chromosomal abnormalities are also discussed.

Animal Development—Animal Development I concerns developmental events in the starfish, the frog, the chick, and the human. Animal Development II examines some experimental approaches to our current concepts of development.

Biology 122

This is the laboratory course associated with BIO 121. It includes inquiry-based exploration and practical application of concepts discussed in BIO 121. There is one laboratory session per week. Dissection is required

Biology 123

Genetics—This unit deals with the basic principles of heredity as they apply to a variety of organisms. In the laboratory, *Drosophila melanogaster* is introduced. Also, heredity in corn and the genetics of blood types are studied. Population genetics is discussed. There is also a section on the chemical nature of the gene and the mechanism by which genes direct the synthesis of specific proteins. Genetic engineering is also discussed.

Energy and Life—This unit introduces the fundamental principles governing the flow of energy in living systems. Photosynthesis (the capture of the sun's radiant energy by green plants) and cellular respiration (release of the captured energy stored in food molecules for use in maintaining life functions) are dealt with in.

Plant Structure and Function—This unit focuses on the major structural and functional features of angiosperms. Anatomical details of roots, stems, leaves, flowers, and fruits are included, along with a study of plant growth and reproduction, physiological effects of auxins and other plant hormones, the transport of materials in plants, and the non-photosynthetic effects of light.

Animal Structure and Function—This unit deals with the structure and function of vertebrates, with emphasis on the frog and the fetal pig as representative types. Major organ systems are studied, including the digestive, respiratory, circulatory, urinary, genital, and nervous systems. A dissection of the fetal pig is an integral part of the unit.

Biology 124

This is the laboratory course associated with BIO 123. It includes inquiry-based exploration and practical application of concepts discussed in BIO 123. There is one laboratory session per week. Dissection is required

Pre- / Co-requisites

BIO 121 COREQ: BIO 122

BIO 123 COREQ: BIO 124

Course Objectives

- To give a broad introduction to biology.

- To learn about science as a way of exploring the natural world.

- To gain a deep understanding of the fundamental principles which underlie all of the life sciences.

Laboratory

BIO 122 serves as the laboratory section for General Biology I.

BIO 124 serves as the laboratory section for General Biology

II.

Required Materials

Campbell, Biology General Biology I and II, Custom Edition for Syracuse University ISBN-978-1- 323-90619-4. Includes Modified Mastering Biology and eText (available at SU Bookstore [other versions of Campbell Biology will require additional purchase of Mastering Biology]. Comparison pricing is available on the SU bookstore website).

Instructor Recommendations

N/A