



SYRACUSE UNIVERSITY

BIO 121 General Biology I (4 credits) BIO 123 General Biology II (3 credits) and BIO 124 Laboratory (1 credit) 2017-2018

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Biology 121-123/124 is a two-semester, eight-credit college course that 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.

BIO 121

I. 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.

II. 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.

III. How to Make Sense Out of the Diversity of Life

In this unit, the student learns about people's attempts to catalogue 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.

IV. 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.

V. 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.

- VI. **Microscopy and the Electron Microscope**
The student is introduced to the principles underlying the electron microscope, techniques used, technical limitations, and potentialities for use.
- VII. **The Architecture of Cells**
Cell structure and function are revealed using electron micrographs. The student also makes an extensive series of microscopic observations on a variety of cell types.
- VIII. **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 emphasized in the unit.
- IX. **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.
- X. **Proteins and Enzymes**
The structural and functional characteristics of proteins and enzymes are emphasized in this unit.
- XI. **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.
- XII. **Cell Reproduction**
This unit deals with mitosis and meiosis. Cancer and errors in division leading to chromosomal abnormalities are also discussed.
- XIII. **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

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- XIV. **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.
- XV. **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 this unit.
- XVI. **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.
- XVII. **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.

BIO 124

Laboratory course associated with BIO 123. Includes inquiry-based exploration and practical application of concepts discussed in BIO 123. One laboratory session per week. Dissection required.

Title/Author (Publisher)	Price Per Copy	Ordering Source
<i>Campbell Biology</i> , AP* Edition, 10 th Edition; Reece, Urry, Cain, Wasserman, Minorsky & Jackson Hard Text - ISBN: 0321775651 eText - ISBN: 0321833112	\$188.95 \$113.95	Pearson Phone: 800-848-9500 http://www.pearsoncustom.com/supa/
<i>Biology</i> , 10 th Edition: Solomon, Berg & Martin (Brooks/Cole) Hard Text - ISBN: 9781285423586 eText - ISBN: 9781285805535	\$225.00 \$82.99	Cengage Phone: 800-354-9706 https://www.vitalsource.com

*20% discount for SUPA schools on orders of 10 or more (the Individualized Biology Units are expendable and should be re-ordered for each new group).

In addition to the required materials specified above, schools must plan to equip study carrels with the following:

- Dissecting microscope
- Tape recorder or CD player with headset
- Compound microscope
- Assorted lab materials and supplies that are readily available from any biological supply company

Prices are subject to change.