

OPEN EDUCATIONAL RESOURCES: BIOLOGY

(Source: <https://libguides.wccnet.edu/oer-subjects/biology>)

1. TEXTBOOKS:

<https://openstax.org/details/books/biology-2e>

Description/Summary:

Biology 2e is designed to cover the scope and sequence requirements of a typical two-semester biology course for science majors. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. *Biology* includes rich features that engage students in scientific inquiry, highlight careers in the biological sciences, and offer everyday applications. The book also includes various types of practice and homework questions that help students understand—and apply—key concepts.

The 2nd edition has been revised to incorporate clearer, more current, and more dynamic explanations, while maintaining the same organization as the first edition. Art and illustrations have been substantially improved, and the textbook features additional assessments and related resources.

<https://cnx.org/contents/AK5sUWpu@1.1:GNNbYBSX@1/Global-Processes>

Description/Summary:

Atmosphere and Climate Regulation

Life on earth plays a critical role in regulating the earth's physical, chemical, and geological properties, from influencing the chemical composition of the atmosphere to modifying climate.

About 3.5 billion years ago, early life forms (principally cyanobacteria) helped create an oxygenated atmosphere through photosynthesis, taking up carbon dioxide from the atmosphere and releasing oxygen ([Schopf 1983](#); [Van Valen 1971](#)). Over time, these organisms altered the composition of the atmosphere, increasing oxygen levels, and paved the way for organisms that use oxygen as an energy source (aerobic respiration), forming an atmosphere similar to that existing today.

Carbon cycles on the planet between the land, atmosphere, and oceans through a combination of physical, chemical, geological, and biological processes (IPCC 2001). One key way biodiversity influences the composition of the earth's atmosphere is through its role in carbon cycling in the oceans, the largest reservoir for carbon on the planet (Gruber and Sarmiento, in press). In turn, the atmospheric composition of carbon influences climate. Phytoplankton (or microscopic marine plants) plays a central role in regulating atmospheric chemistry by transforming carbon dioxide into organic matter during photosynthesis. This carbon-laden organic matter settles either directly or indirectly (after it has been consumed) in the deep ocean, where it stays for centuries, or even thousands of years, acting as the major reservoir for carbon on the planet. In addition, carbon also reaches the deep ocean through another biological process -- the formation of calcium carbonate, the primary component of the shells in two groups of marine organism's coccolithophorids (a phytoplankton) and foraminifera (a single celled, shelled organism that is abundant in many marine environments). When these organisms die, their shells sink to the bottom or dissolve in the water column. This movement of carbon through the oceans removes excess carbon from the atmosphere and regulates the earth's climate.

<https://open.bccampus.ca/browse-our-collection/find-open-textbooks/?subject=Biology>

Microbiology (OpenStax)

Author(s): Nina Parker, Mark Schneegurt, Anh-Hue Thi Tu, Brian M.

Forster, et al.

Description/Summary:

Microbiology covers the scope and sequence requirements for a single-semester microbiology course for non-majors. The book presents the core concepts of microbiology with a focus on applications for careers in allied health. The pedagogical features of the text make the material interesting and accessible while maintaining the career-application focus and scientific rigor inherent in the subject matter. Microbiology's art program enhances students' understanding of concepts through clear and effective illustrations, diagrams, and photographs. Microbiology is produced through a collaborative publishing agreement between OpenStax and the American Society for Microbiology Press. The book aligns with the curriculum guidelines of the American Society for Microbiology.

<https://oer.galileo.usg.edu/biology-collections/11/>

BIOLOGICAL SCIENCES GRANTS COLLECTIONS

<https://oer.galileo.usg.edu/biology-collections/>

<https://openstax.org/details/concepts-biology>
Concepts of Biology

Description/Summary:

Concepts of Biology is designed for the typical introductory biology course for non-majors, covering standard scope and sequence requirements. The text includes interesting applications and conveys the major themes of biology, with content that is meaningful and easy to understand. The book is designed to demonstrate biology concepts and to promote scientific literacy.

2. US Government

Inside the Cell (<https://www.nigms.nih.gov/education/Booklets/Inside-the-Cell/Pages/Home.aspx>)

Inside the Cell is a science education booklet that explores the interior design of cells and vividly describes the processes that take place within its organelles and structures. Each chapter includes a few review questions.

The New Genetics (<https://www.nigms.nih.gov/education/Booklets/the-new-genetics/Pages/Home.aspx>)

The New Genetics, a science education booklet published by National Institute of General Medical Sciences, explains the role of genes in health and disease, the basics of DNA and its molecular cousin RNA, and new directions in genetic research.

3. Other Videos

- **BioInteractive** (<https://www.biointeractive.org/>)

Free resources for science teachers and students.

- **iBioSeminars** (<https://www.ibiology.org/>)

The world's leaders in biology present lectures that start with broad introductions and then progress to research questions and experiments.

- **Khan Academy - Biology**
(<https://www.khanacademy.org/science/biology>)

Covers topics seen in a first year college or high school biology course.

- **Secrets of the Sequence** (<https://www.sosq.vcu.edu/videos.aspx>)

Videos on the life sciences from Virginia Commonwealth University.

- **Sumanas, Inc.**
(<http://www.sumanasinc.com/webcontent/animations/biology.html>)

Key biological concepts animated as narrated and stepped tutorials, along with quizzes.

4. Images

The Cell: An Image Library (<http://www.cellimagelibrary.org/hom>)

The Cell: An Image Library™ is a freely accessible, easy-to-search, public repository of reviewed and annotated images, videos, and animations of cells from a variety of organisms, showcasing cell architecture, intracellular functionalities, and both normal and abnormal processes.

Exploring Life's Origins: A Virtual Exhibit (<http://exploringorigins.org/index.html>)

Funded by The National Science Foundation, the goal of this exhibit is to use molecular illustration and animation to help describe origins of life research and theories to broad audiences.

5. Tutorials

Animated Tutorials: General Biology

(<http://www.sumanasinc.com/webcontent/animations/biology.html>)

Sumanas, Inc. develops animated tutorials in a variety of formats for many scientific disciplines.

University of Utah Tour of the Basics

(<https://learn.genetics.utah.edu/content/basics/>)

"We are pleased to offer you a partial preview of our new Tour of Basic Genetics."

6. Courses

Biofundamentals 2.1

(<http://virtuallaboratory.colorado.edu/Biofundamentals/>)

A one-semester introductory evolutionary and molecular biology course

MIT OpenCourseWare (<https://ocw.mit.edu/courses/biology/>)

The Department of Biology offers undergraduate, graduate, and postdoctoral training programs ranging from general biology to more specialized fields of study and research.

7. Simulations

BioInteractive (<https://www.biointeractive.org/>)

Free resources for science teachers and students.

Cells Alive (<https://www.cellsalive.com/>)

CELLS alive! represents 30 years of capturing film and computer-enhanced images of living cells and organisms for education and medical research.

Biology Animations (<http://bio-alive.com/animations/biology.htm>)

Extensive list of biology animations and videos covering a wide range of topics from the BBC, McGraw Hill, Carnegie Mellon, and more.

PhET (<https://phet.colorado.edu/>)

PhET provides fun, interactive, research-based simulations of physical phenomena for free. The open source simulations are written in Java, Flash or HTML5, and can be run online or downloaded to your computer

8. Other Resources

Nucleic Acids and Chromatin from The Open University

(<https://www.open.edu/openlearn/science-maths-technology/science/biology/nucleic-acids-and-chromatin/content-section-0?active-tab=description-tab>)

This unit helps you understand the properties of nucleotides and how they contribute to secondary and tertiary structures of nucleic acids at the molecular level.

Molecular Biology Laboratory Manual

(https://archive.org/details/MolecularBiologyLaboratoryManual_456)

A free online lab manual that includes general laboratory procedures, equipment use and safety considerations.

9. Games

Click and Clone (<https://learn.genetics.utah.edu/>)

Try it yourself in the mouse cloning laboratory.

Build a Molecule (<https://phet.colorado.edu/en/simulation/build-a-molecule>)

"Starting from atoms, see how many molecules you can build. Collect your molecules and see them in 3D!"

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