Help students see biology’s relevance by focusing on core concepts

*Biology: The Core* presents essential biological concepts, using a visual and hybrid approach. The 12-chapter textbook uses dynamic illustrations organized into concise, self-contained two-page modules that focus students’ attention on what is most relevant. The text pairs with *Mastering Biology* to offer flexible assignment options and extensive support materials that allow instructors to tailor the content to the way they teach and maximize student engagement.
Build your course around...

Each core biological concept is presented as a two-page module that can stand on its own and be read in any order. Each module in the text contains only the most essential content for any concept. The efficient organization of each module helps students focus their attention on key information and guides them through—from the clearly stated concept at the start to the “core question” that checks their understanding at the end.

The evolution of antibiotic-resistant bacteria poses a significant health threat

Penicillin and other antibiotics—drugs that inhibit or kill bacteria—have saved countless lives. The discovery of penicillin in the 1940s prevented the deaths of millions of people with common infections. However, within a few decades, penicillin had become virtually useless in hospitals because of the evolution of penicillin-resistant bacteria. In response, new antibiotics were developed. By the 1990s, doctors began to discover bacteria that were resistant to many, even all, known antibiotics. Responding to the evolution of such multidrug-resistant strains is one of the most important health challenges facing our society.

ANTIBIOTICS

Staphylococcus aureus (SA, commonly called “staph”) is a species of bacteria. Like SA, all bacteria are prokaryotes, single-celled organisms with relatively simple structures, lacking membrane-enclosed organelles. The genus Staphylococcus is named for its shape: irregular clusters (staph-) of spheres (+coccal, or plural -coccus).

Staphylococcus aureus is a member of your normal flora, microorganisms that commonly live on or in your body. SA is found on your skin and within your respiratory tract, but it does not normally cause disease. However, certain mutant strains of SA are pathogens, species that can cause serious illness. If untreated, a staph infection can be life-threatening.

An antibiotic is a drug that kills or inhibits the growth of bacteria. How do antibiotics kill bacteria without harming human cells? Most antibiotics work by disabling a necessary component of bacterial cells that is not found in human cells.

How do antibiotics kill bacteria without harming human cells? Most antibiotics work by disabling a necessary component of bacterial cells that is not found in human cells.

- **RIBOSOMES**: Teriyazomean interferes with bacterial ribosomes, cellular structures that make proteins. Your ribosomes are different enough to be unaffected.
- **CELL WALL**: Penicillin disrupts the formation of bacterial cell walls, which your cells lack.
- **BACTERIAL CHROMOSOMES**: Ciprofloxacin works by disrupting an enzyme that helps organize bacterial DNA. Your version of this enzyme is unaffected by the drug.
- **CYTOPLASMIC ENZYMES**: Sulfa drugs inhibit the growth of bacteria by blocking an enzyme used to produce the nutrient folic acid. You can obtain folic acid from your diet and do not need to synthesize it.

Antibiotic-resistant bacteria infect more than 2 million people and cause 23,000 deaths in the United States each year.
relevant and current high interest topics

NEW! Core Issue Modules highlight relevant current issues like vaccinations, antibiotic resistance, cancer, and more. Each new module relates the core issue to biological concepts to help students see the relevancy of the course material, as well as connections across chapter concepts.

Each Core Issue Module is supported by a prebuilt assignment in Mastering Biology, while a Topic Guide and a Current Topic Lecture presentation in the Instructor Resources area of Mastering Biology helps instructors bring the issue into the classroom.

EVALUATION OF ANTIBIOTIC RESISTANCE

See after their discovery, antibiotics were heralded as “wonder drugs” with the potential to wipe out infections altogether. This has not come to pass due to the evolution of antibiotic resistance. By the early 2000s, doctors began to document a formidable “superbug” known as MRSA (multidrug-resistant Staphylococcus aureus). Bacteria can become resistant to multiple drugs in a stepwise fashion.

NEW! Core Issue Modules

Antibiotics are drugs that inhibit or kill bacteria. Most work by disrupting cellular structures found in bacteria but not human cells. Evolution of antibiotic resistance can occur in a stepwise fashion to yield multidrug-resistant bacteria.

Core Issue 4

Staphylococcus aureus is common in health-care facilities, where the extensive use of antibiotics creates a selection pressure in favor of antibiotic resistance. It is not surprising, then, that MRSA was first found in hospital settings. The Centers for Disease Control and Prevention (CDC) has tracked MRSA cases for over a decade. As you can see from the bar graph, the number of cases occurring in health-care settings (green bars) has decreased over that time. This is due to increased awareness and education leading to better preventative measures. But MRSA outbreaks also occur in community settings such as athletic facilities, schools, and military barracks. The CDC data show that the number of these community-associated cases is holding steady (purple bars). These data point to the need for greater education, awareness, and prevention among the general public.

Tracking MRSA

Looking at the bar graph, what does it mean that the total height of the bars is lowering but the purple bars are relatively steady?
Develop students’ scientific literacy skills

Evaluating Science in the Media Coaching Activities guide students through a step-by-step process for evaluating the authority, motivation, and reliability of online sources of scientific information. Topics include genetically modified organisms, head injuries, tanning and skin cancer, and more.

Graphit! Coaching Activities help students read, interpret, and create graphs that explore real environmental issues using real data. All 10 activities explore current topics such as the carbon footprint of food, fresh water availability, and ocean acidification in an entirely new mobile experience with accessible design.
Engage students with active learning

NEW! Ready-to-Go Teaching Modules make use of teaching tools for before, during, and after class, including new ideas for in-class activities. Each of the 10 modules for The Core highlights a specific current issue and suggests how to incorporate Mastering Biology, active learning resources including Learning Catalytics, and instructor resources. These modules can be accessed through the Instructor Resources area of Mastering Biology.

UPDATED! Guided Reading Activities are organized around each module and provide students with basic questions that guide them through the module, using an active reading approach. The worksheets offer an easy, low-tech way to assign work outside of or during class as a group work activity. These are available in the Mastering Biology Study Area, in the Instructor Resources, and in Pearson Collections.

4. Label the components of the chloroplast in the following diagram.
Reach every student with Pearson eText and Dynamic Study Modules

Dynamic Study Modules help students study effectively—and at their own pace. Each module poses a series of questions about a course topic, which adapt to each student’s performance and offer personalized, targeted feedback to help them master key concepts.

Students can easily review their answers and monitor their own progress and understanding of key concepts as they move through each module.

Pearson eText is a simple-to-use, mobile optimized, personalized reading experience available within Mastering. It allows students to easily highlight, take notes, and review key vocabulary all in one place—even when offline. Integrated videos engage students and give them help when they need it. Pearson eText is available within Mastering Biology when it comes with a new book; students can also purchase Mastering with Pearson eText online. For instructors not using Mastering, Pearson eText can also be adopted on its own as the main course material.
NEW and UPDATED! Guided Video Tours, developed and narrated by author Eric Simon, present a brief “mini-lecture” that walks students through key concepts and module content presented in the text. All Guided Video Tours can be assigned as a coaching activity with personalized feedback in Mastering Biology, and are also embedded in the eText.

NEW! Topic Overview videos, created by the author, introduce key concepts and vocabulary. These brief, engaging videos introduce topics that will be explored in greater depth in class. Topics include:

- Macromolecules
- Ecological Organization
- Mechanisms of Evolution
- An Introduction to Structure and Function
- Interactions Between the Respiratory and Circulatory Systems
- DNA Structure and Function
- And more!
Resources to help you build your class, your way

*Biology: The Core* includes a full suite of instructor support materials in the Instructor Resources area in Mastering Biology to help you build your course. Resources include Ready-to-Go Teaching Modules; current topic lecture slides and topic guides that help you integrate biology content with relevant current topics; an active learning resource guide; animations, videos, and lecture presentations to show in class; all images from the text; a testbank; and free access to our unique Instructor Exchange website, where you can share ideas with other non-majors biology faculty.
To the Student,

Being a college student today means juggling many priorities: work, school, extracurricular activities, family. If you’re reading this book, you’ve probably enrolled in your first college science course, and it may be the only one you’ll ever take. With so many priorities competing for your attention, you may be unsure how to fit studying biology into your busy life. Good news: This book is written specifically for you!

Over the years, I’ve seen students in my classes striving to succeed while also wishing to be as productive as possible with their study time. Biology: The Core was designed from the ground up to help you learn efficiently and thrive in this course. Only the most important and relevant information—the core of biology content—is included. These biological concepts are displayed in highly visual, consistent, and approachable two-page modules that guide you along a clear learning path, so that reading your textbook is more a pleasure than a chore.

You might also be wondering how this course—and biology in general—applies to your own life. Luckily, this is easy to address, since issues like nutrition, cancer, vaccines, and genetically modified foods directly affect you and those you care about. For the Third Edition, new modules were added that address these and other current issues directly, so that you may better see how biology is relevant to your life. Other modules help you critically evaluate the scientific-sounding claims that constantly bombard you, and how to distinguish valid scientific claims from bogus ones.

The Biology: The Core textbook is paired with a robust online library, Mastering Biology, that contains videos, animations, current events, and interactive tutorials that help you draw connections between the course material and the world around you. Questions you might have about many topics will be addressed in this online complement to your textbook. It is filled with helpful multimedia tools that allow you to gain a thorough understanding of the content so that you can succeed in your course. References to Mastering Biology at the top of many modules point you to the most helpful online tools.

I hope that Biology: The Core meshes with your goals and your priorities, acting as a useful guide for this course and addressing questions you run into in your broader life. Please feel free to drop me an email to tell me about your experience with Biology: The Core or to provide feedback (good or bad!) regarding the text or online resources.

Best wishes for a successful semester—and enjoy the big adventure of biology! It’s not only in the pages of this book, but everywhere around you.

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To the Instructor,

In a world with so many options for non-major biology textbooks, what makes this one different? The answer is: a focus on today's students. We've all watched our non-science-major students struggle with the depth of material and relating biology to their lives. Which concepts do non-science students need to know in order to understand the relevance of biology? If we pare down the content and focus on the most important take-home lessons—the information that we hope students will remember 10 years after your course—what remains is the core: a set of essential biological concepts that presents the big picture, providing students with a scientific basis for the issues they will confront throughout their lives.

Biology: The Core is a different kind of textbook, one that presents information in small chunks using a nonlinear, engaging, visual style. The book contains only the most essential content for each topic. All information is presented in stand-alone two-page modules that fully integrate text and art into a single teaching tool. Modules can be read in any order and each module stands alone (without references to other modules), allowing you the flexibility to assign topics in whatever sequence best suits your course.

For the Third Edition of Biology: The Core, content was revised based on feedback received from professors and students using the text from around the country. The specific changes are detailed on the next page, but the overall approach is to ensure that the core content is approachable and clearly connected to students' lives. Included in this new edition are a series of “Core Issue” modules. These ten special modules highlight current topics that your students may hear about frequently—vaccines, antibiotic resistance, diabetes, and cancer, to name a few—and tie them to the core content, showing students the relevancy of basic biology knowledge.

Over the last few years, in my communication with many instructors around the country, I've also observed that those of us teaching biology to non-majors are increasingly emphasizing science literacy skills above all else. For this reason, the Third Edition places particular emphasis on teaching students to think scientifically and helping them appreciate and apply critical thinking skills to their own lives. A largely rewritten Chapter 1 brings many of these important skills together.

The printed text is paired with Mastering Biology, an online tutorial platform that allows you to reinforce the book content and expand on the basic concepts presented in each module as needed. The activities and resources in Mastering Biology also offer you the flexibility to incorporate a wide variety of applications and current issues—including several ones new to this edition—into your teaching. Unlimited by the particular set of examples printed in a static textbook, a rich collection of online resources—including Current Topic PowerPoint presentations, news videos, Current Events news articles, and interactive tutorials—enables you to connect the core content to interesting, relevant, and timely issues that are important to you and your students. Forty—including 18 brand new, Guided Video Tours found within Mastering Biology—are designed to help students learn to use the textbook and to hone their study skills.

I hope that the aims of Biology: The Core resonate with the teaching and learning goals of your non-major introductory biology course. Feel free to send an email telling me about your course and your students, to provide feedback regarding the text or the online resources, or just to chat about the non-major course in general—it’s my favorite topic of conversation!

Best wishes for a successful semester,

ERIC J. SIMON, PH.D.
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Biology: The Core, Third Edition, contains many helpful updates

The Third Edition of Biology: The Core was created in response to extensive feedback from professors and students. The goal of the new edition is to enhance teaching and learning for non-major students by increasing the relevancy of the material and placing a greater emphasis on science literacy skills.

CHAPTER 1 AN INTRODUCTION TO THE SCIENCE OF LIFE

For many students, this introductory biology course is their only exposure to college-level science. Many instructors believe that the most important goal of such a course is to communicate how science is conducted and how the process of science can be used to make important decisions. In the Third Edition of Biology: The Core, we dedicate an entire chapter to covering this vital topic, with modules that present the process of science in a more realistic and relevant context. Chapter 1, “An Introduction to the Science of Life,” promotes critical thinking and demystifies how science works. A new presentation of the process of science emphasizes the lack of formality in the process and how it proceeds in the real world.

Additional updated and new modules help students distinguish hypotheses from theories and explain the meaning of the word “fact”; discuss basic research methods; distinguish scientific thought from pseudoscience; and explain how to recognize reliable sources and the process of peer review. This chapter should help students obtain a clearer picture of how scientific thinking differs from other ways of viewing the world and how it can be applied in their own lives.

Module 1.4 presents the process of science as it actually occurs.

NEW EXAMPLES AND PEDAGOGICAL IMPROVEMENTS

In addition to those already mentioned, many changes in the book were implemented to increase accuracy and currency. For example, module 6.14 includes new information about the CRISPR-Cas9 gene editing system.

Other examples of content updates include new data on the links between obesity and cancer, changes to human population growth patterns, and new data on the reliability of various methods of contraception. Throughout the book, photos and art were improved and updated to make them more attractive and better able to convey the pedagogical points. Every module contains a “fun fact” intended to invoke a “That's cool!” reaction from your students; many of these have been updated to be even more engaging.
CORE ISSUE MODULES

New to this edition are ten Core Issue modules. Each one presents a current relevant topic. This edition includes modules on nutrition, cancer, vaccines, athletic cheating, genetically modified organisms, agriculture, MRSA, climate change, biodiversity hot spots and diabetes. Each Core Issue module helps relate the basic biology content to the issue at hand.

In this example, the Core Issue: Nutrition module shows how the digestive system (Module 11.4) delivers small molecules (Modules 2.9–2.12) through the circulatory system (Module 11.9) to the mitochondria (Module 4.2).

Additionally, every Core Issue module includes a description of one or more relevant scientific studies. Data is presented, and the larger lessons of that study are discussed in relation to the material presented in Chapter 1. For example, the Core Issue: Biodiversity Hot Spots module introduces a study showing the relationship between forest fragmentation in the northeastern United States and the prevalence of mosquitoes that carry Lyme disease. For each Core Issue module, the chosen study illustrates one or more science skill presented in Chapter 1. In this example, students are led to understand independent and dependent variables, as originally discussed in module 1.6.

NEW MULTIMEDIA

The Biology: The Core textbook is designed to pair with the online resources (videos, animations, current issues, practice assignments, and more) available in Mastering Biology. New references within many modules point students toward the most helpful multimedia supplements. This edition of Biology: The Core includes 18 new Guided Video Tours, for a total of 40 videos that walk students through modules, teaching them how to organize their studying. These videos can be particularly helpful to help students working on their own (as part of flipped classrooms or distance learning, for example).

Mastering Biology

WATCH the Video Tutor Session for this module

Icons placed at the top of modules remind students to supplement their learning with online multimedia.

CORE IDEA

In response to feedback, the Third Edition of Biology: The Core improves teaching and learning by making the material clearer and more relevant to non-science-major students.