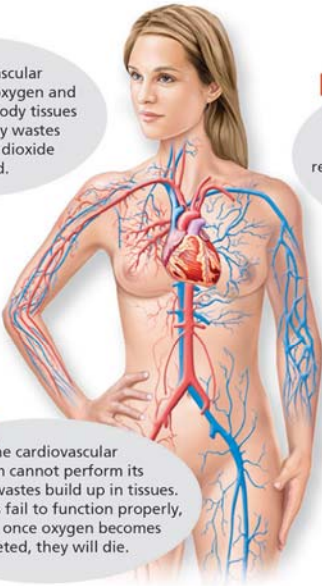


# Learn the Essential *What, How & Why* of Human Anatomy & Physiology

With the Twelfth Edition of *Essentials of Human Anatomy & Physiology*, science educator Suzanne Keller joins bestselling author Elaine Marieb in helping learners focus on the *What, How & Why* of A&P, without getting sidetracked in details.

## 11 The Cardiovascular System



**WHAT**  
The cardiovascular system delivers oxygen and nutrients to the body tissues and carries away wastes such as carbon dioxide via blood.

**HOW**  
The heart pumps blood throughout the body in blood vessels. Blood flow requires both the pumping action of the heart and changes in blood pressure.

**WHY**  
If the cardiovascular system cannot perform its functions, wastes build up in tissues. Body organs fail to function properly, and then, once oxygen becomes depleted, they will die.

**INSTRUCTORS**  
New Building Vocabulary Coaching Activities for this chapter are assignable in MasteringA&P®

**NEW! What, How & Why chapter previews** introduce key examples of anatomy and physiology concepts that will be covered in the chapter. This technique helps learners hone in on *what* they are studying, *how* it functions, and *why* it is important for them to learn.

**NEW! Building Vocabulary Coaching Activities** in MasteringA&P help students learn the essential language of A&P.

**W**hen most people hear the term *cardiovascular system*, they immediately think of the heart. We have all felt our own heart "pound" from time to time when we are nervous. The crucial importance of the heart has been recognized for ages. However, the **cardiovascular system** is much more than just the heart, and from a scientific and medical standpoint, it is important to understand *why* this system is so vital to life.

Night and day, minute after minute, our trillions of cells take up nutrients and excrete wastes. Although the pace of these exchanges slows during sleep, they must go on continuously: when they stop, we die. Cells can make such exchanges only with the interstitial fluid in their immediate vicinity. Thus, some means of changing and "refreshing" these fluids is necessary to renew the nutrients and prevent pollution caused by the buildup of wastes. Like a bustling factory, the body must have a transportation system to carry its various "cargoes" back and forth. Instead of roads, railway tracks, and subways, the body's delivery routes are its hollow blood vessels.

Most simply stated, the major function of the cardiovascular system is transportation. Using blood as the transport vehicle, the system carries oxygen, nutrients, cell wastes, hormones, and many other substances vital for body homeostasis to and from the cells. The force to move the blood

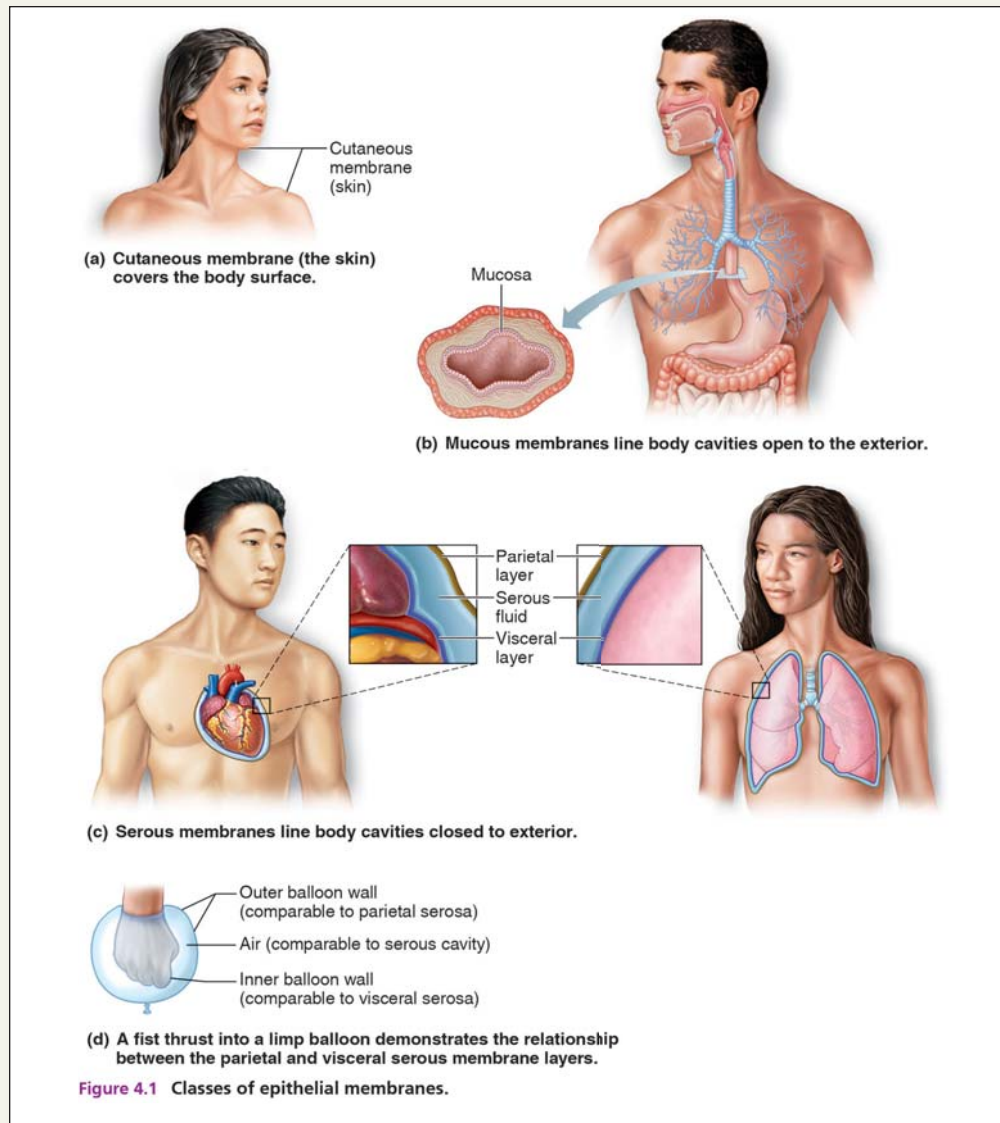
356

See p. 356.

# Focus on Essential A&P Concepts

Throughout every chapter, the text's conversational writing style and straightforward explanations have been strengthened with **familiar analogies** and **abundant mnemonic cues** to help students learn and remember concepts.

**UPDATED!**  
**Exceptionally clear photos and illustrations,** including dozens of new and improved figures, present concepts and processes at the right level of detail. Many figures from the text are assignable as Art-Labeling Activities in MasteringA&P.



See p. 111.

**Unique Concept Links** reinforce previously-learned concepts and help students make connections across body systems while learning new material.

## CONCEPTLINK

The terms for the connective tissue coverings of a nerve should seem familiar: We discussed similar structures in the muscle chapter (Figure 6.1, p. 183). Names of muscle structures include the root word *mys*, whereas the root word *neuro* tells you that the structure relates to a nerve. For example, the endomysium covers one individual muscle fiber, whereas the endoneurium covers one individual neuron fiber. ←

See p. 256.

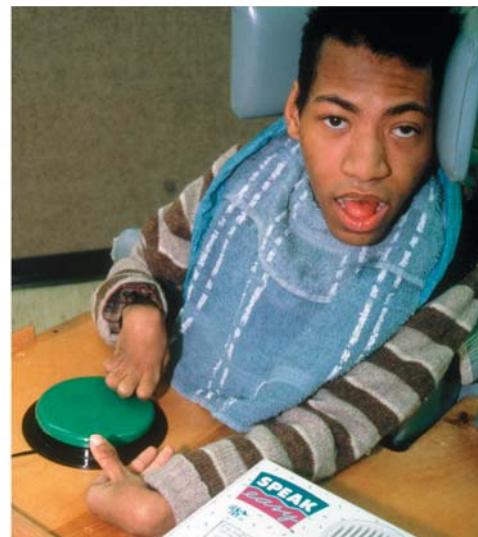
# Explore Essential Careers and Clinical Examples

To inspire and inform students who are preparing for future healthcare careers, **up-to-date clinical applications** are integrated in context with discussions about the human body.

**UPDATED! Homeostatic Imbalance discussions** are clinical examples that revisit the text's unique theme by describing how the loss of homeostasis leads to pathology or disease. Related assessment questions are assignable in MasteringA&P, along with Clinical Case Study coaching activities.

## Homeostatic Imbalance 7.11

In difficult deliveries, temporary lack of oxygen may lead to **cerebral palsy** (pawl'ze), but this is only one of the suspected causes. Cerebral palsy is a neuromuscular disability in which the voluntary muscles are poorly controlled and spastic because of brain damage. About half of its victims have seizures, are intellectually disabled, and/or have impaired hearing or vision. Cerebral palsy is the largest single cause of physical dis-



This adult patient with cerebral palsy presses a pad to communicate through a speaker.

See p. 269.

**Focus on Careers essays** feature conversations with working professionals and explain the relevance of anatomy and physiology course topics across a wide range of allied health careers. Featured careers include:

- Ch. 2 Pharmacy Technician
- Ch. 4 Medical Transcriptionist
- Ch. 5 Radiologic Technologist
- Ch. 8 Physical Therapy Assistant
- Ch. 10 Phlebotomy Technician
- Ch. 15 Licensed Practical Nurse

Students can visit the **MasteringA&P Study Area** for more information about career options that are relevant to studying anatomy and physiology.

### FOCUS ON CAREERS

## Pharmacy Technician

To recognize how medications affect patients, pharmacy technicians need a thorough understanding of anatomy and physiology.

When most people get a new medication, they open up the package and toss out the little pamphlet that goes into detail about how the medication works. Not Chris Green. "I love reading the package inserts," says Green, the lead pharmacy technician at a CVS drugstore in Birmingham, Alabama. Green's enthusiasm for these details is a lifesaver for his customers. Pharmacy technicians are a vital link in the chain between doctor and patient.

Green started working as a cashier at a drugstore... in high...

Pharmacy technicians must have a good grasp of anatomy and physiology to understand each drug's chemical properties.

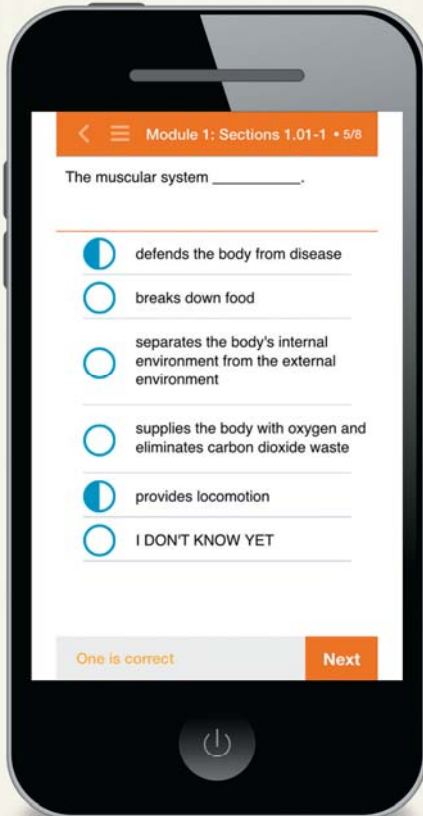


medication that could react badly with another medication the patient is already taking. Drug interactions happen commonly when you have multiple doctors. "Sometimes, we'll get two ACE inhibitors in the same category from two different doctors [pre-...], and that

See p. 56.

# Continuous Learning Before, During, and After Class

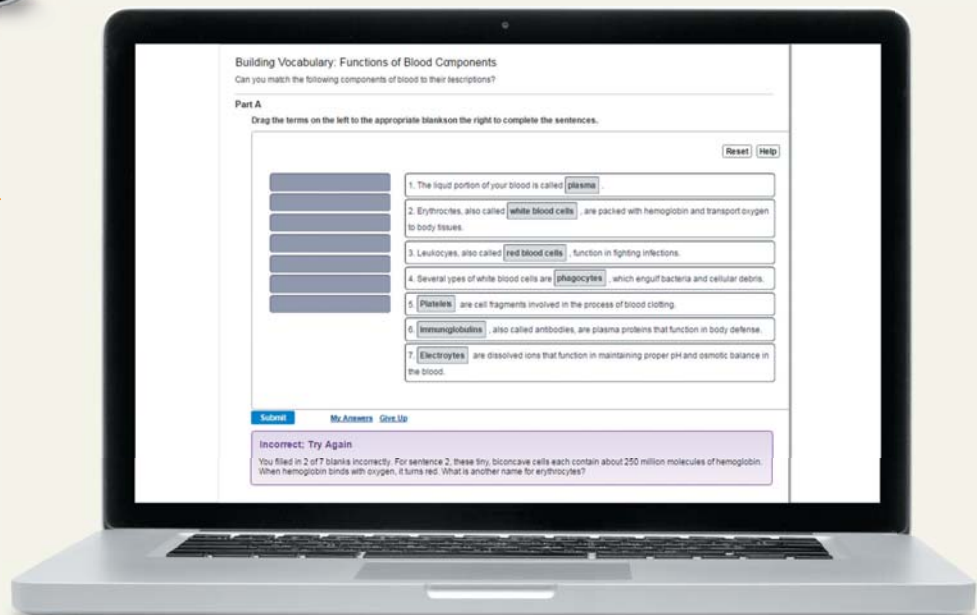
MasteringA&P improves results by engaging students before, during, and after class.



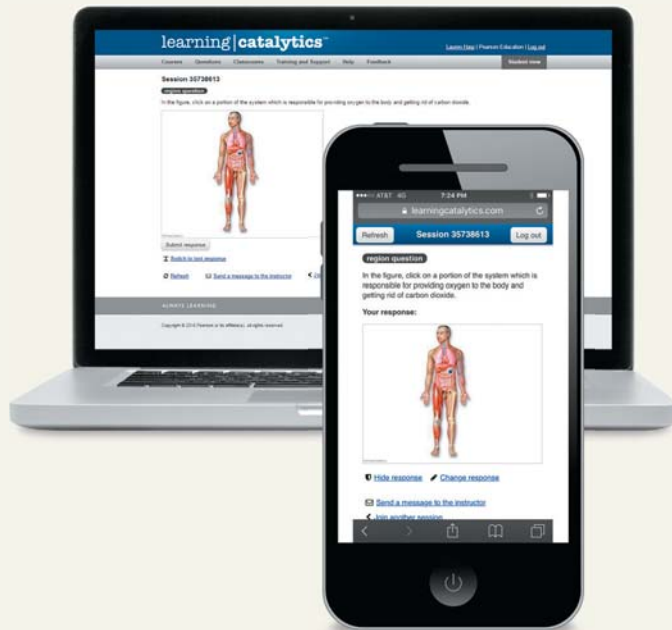
## Before Class

**Dynamic Study Modules** enable students to study more effectively on their own. With the Dynamic Study Modules mobile app, students can quickly access and learn the concepts they need to be more successful on quizzes and exams. **NEW!** Instructors can now select which questions to assign to students within each module.

Instructors can further encourage students to prepare for class by assigning **NEW! Building Vocabulary activities**, reading questions, art labeling activities, and more.



# with MasteringA&P



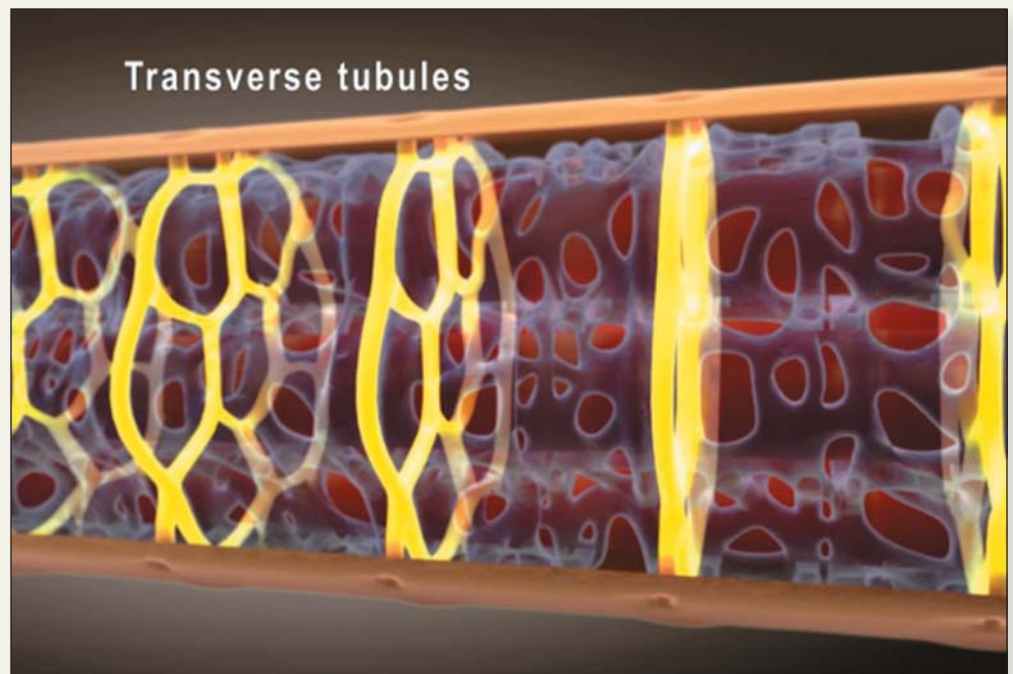
## During Class

**NEW! Learning Catalytics** is a “bring your own device” (laptop, smartphone, or tablet) engagement, assessment, and classroom intelligence system. Students use their device to respond to open-ended questions and then discuss answers in groups based on their responses. Visit [learningcatalytics.com](http://learningcatalytics.com) to learn more.

## After Class

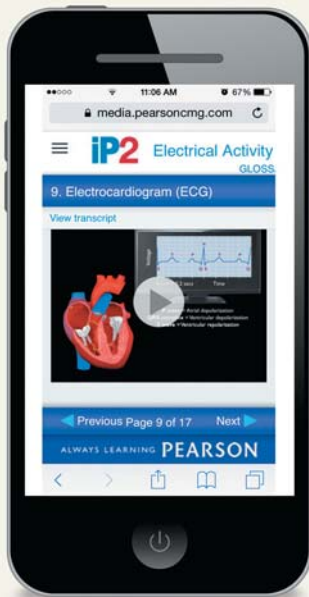
### A wide variety of interactive coaching activities

can be assigned to students as homework, including Art-Labeling Activities, Interactive Physiology 2.0 tutorials, Clinical Case Studies, and activities featuring **A&P Flix** 3-D movie-quality animations of key physiological processes.



# A&P concepts come to life with MasteringA&P

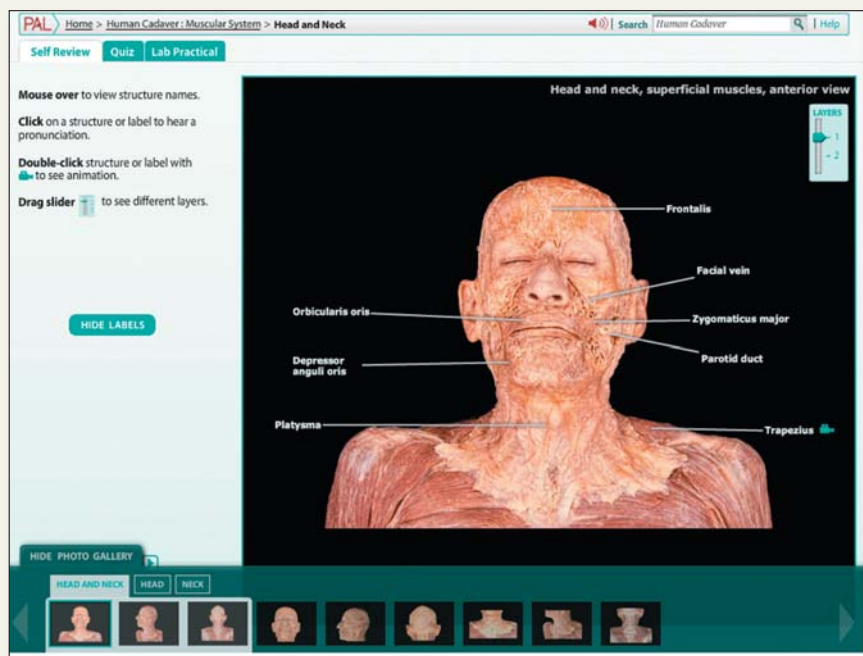
Media references in the text direct learners to digital resources in the MasteringA&P Study Area, including practice tests and quizzes, flashcards, a complete glossary, and more.



## NEW! Interactive Physiology 2.0

**NEW! Interactive Physiology 2.0** helps students advance beyond memorization to a genuine understanding of complex physiological processes. Fun, interactive tutorials, games, and quizzes give students additional explanations to help them grasp difficult concepts. IP 2.0 features brand-new graphics, quicker navigation, and more robust interactivity.

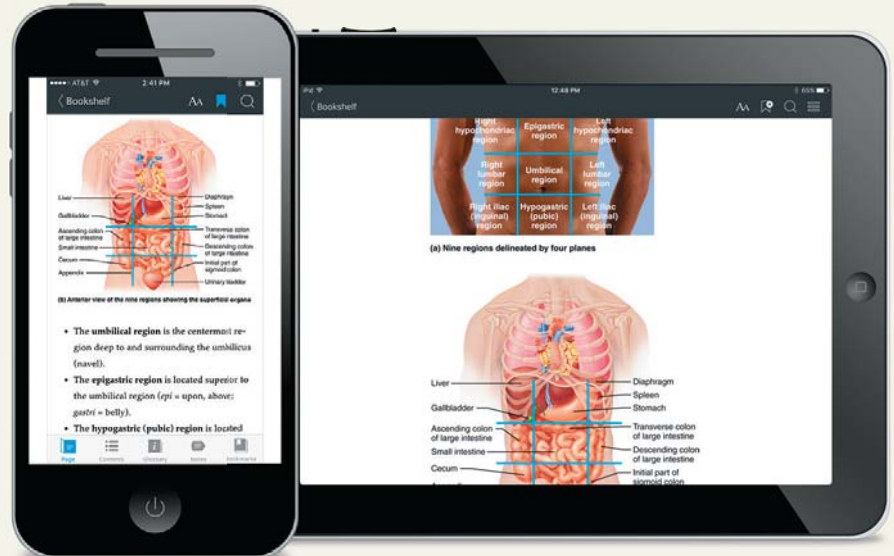
**Practice Anatomy Lab (PAL™ 3.0)** is a virtual anatomy study and practice tool that gives students 24/7 access to the most widely used lab specimens, including the human cadaver, anatomical models, histology, cat, and fetal pig. PAL 3.0 is easy to use and includes built-in audio pronunciations, rotatable bones, and simulated fill-in-the-blank lab practical exams.



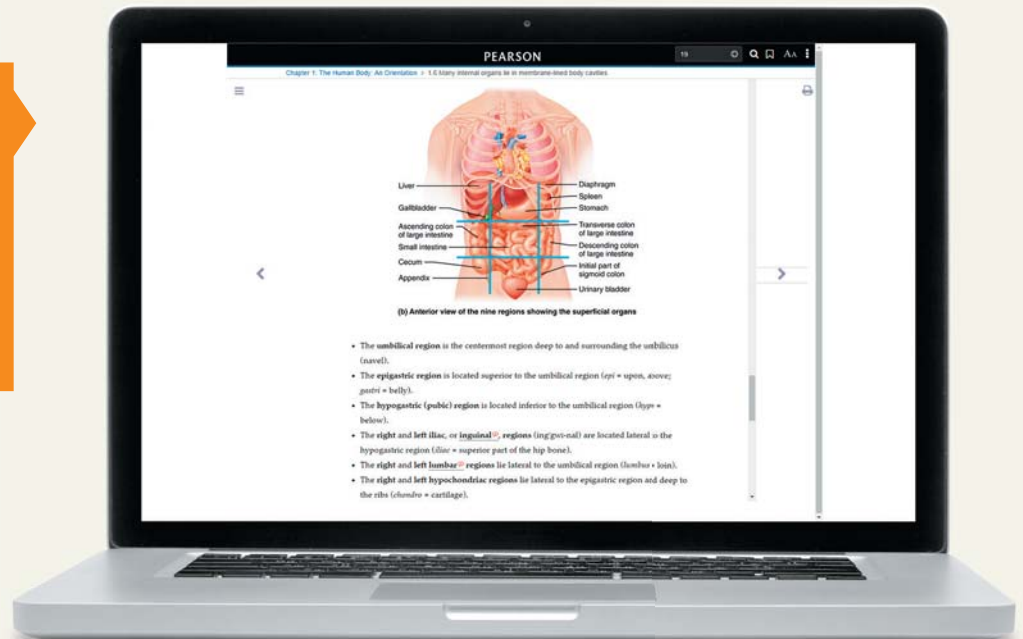
# Access the complete textbook on and offline with eText 2.0

**NEW!** The Twelfth Edition is available in Pearson's fully-accessible eText 2.0 platform.\*

**NEW!** The eText 2.0 mobile app offers offline access and can be downloaded for most iOS and Android phones and tablets from the iTunes or Google Play stores.

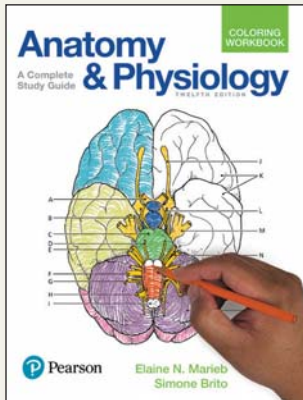


**Powerful interactive and customization functions** include instructor and student note-taking, highlighting, bookmarking, search, and links to glossary terms.



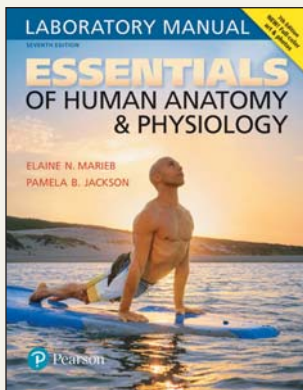
\*The eText 2.0 edition will be live for Fall 2017 classes.

# Additional Support for Students and Instructors



## **NEW! *Anatomy & Physiology Coloring Workbook Twelfth Edition* by Elaine N. Marieb and Simone Brito**

The perfect companion to *Essentials of Human Anatomy & Physiology*, this engaging interactive workbook helps students get the most out of their study time. The *Twelfth Edition* includes **NEW!** crossword puzzles for every chapter, along with coloring activities, self-assessments, “At the Clinic” questions, and unique “Incredible Journey” visualization exercises that guide learners into memorable explorations of anatomical structures and physiological functions.



## **NEW! IN FULL COLOR! *Essentials of Human Anatomy & Physiology Laboratory Manual Seventh Edition* by Elaine N. Marieb and Pamela B. Jackson**

This popular lab manual provides 27 exercises for a wide range of hands-on laboratory experiences, designed especially for a short A&P Lab course. This edition, which includes a Histology Atlas with 55 photomicrographs, features **NEW!** full-color illustrations, photos, and page design that help students navigate and learn the material faster and easier than ever before. Each concise lab exercise includes a Pre-Lab Quiz, brief background information, integrated learning objectives, student-friendly review sheets, and more.

## **The Instructor Resources Area in MasteringA&P includes the following downloadable tools:**

- All of the figures, photos, and tables from the text in JPEG and PowerPoint® formats, in labelled and unlabeled versions, and with customizable labels and leader lines
- Step-edit Powerpoint slides that present multi-step process figures step-by-step
- Clicker Questions and Quiz Show Game questions that encourage class interaction
- A&PFlix™ animations bring human anatomy and physiology concepts to life
- Customizable PowerPoint® lecture outlines save valuable class prep time
- A comprehensive Instructor’s Guide includes lecture outlines, classroom activities, and teaching demonstrations for each chapter.
- Test Bank provides a wide variety of customizable questions across Bloom’s taxonomy levels. Includes art labeling questions, and available in Microsoft® Word and TestGen® formats.