

Principles of ANATOMY & PHYSIOLOGY

15th Edition

GERARD J. TORTORA

Bergen Community College

BRYAN DERRICKSON

Valencia College

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About the Authors



JERRY TORTORA is Professor of Biology and former Biology Coordinator at Bergen Community College in Paramus, New Jersey, where he teaches human anatomy and physiology as well as microbiology. He received his bachelor's degree in biology from Fairleigh Dickinson University and his master's degree in science education from Montclair State College. He has been a member of many professional organizations, including the Human Anatomy and Physiology Society (HAPS), the American Society of Microbiology (ASM), American Association for the Advancement of Science (AAAS), National Education Association (NEA), and the Metropolitan Association of College and University Biologists (MACUB).

Above all, Jerry is devoted to his students and their aspirations. In recognition of this commitment, Jerry was the recipient of MACUB's 1992 President's Memorial Award. In 1996, he received a National Institute for Staff and Organizational Development (NISOD) excellence award from the University of Texas and was selected to represent Bergen Community College in a campaign to increase awareness of the contributions of community colleges to higher education.

Jerry is the author of several best-selling science textbooks and laboratory manuals, a calling that often requires an additional 40 hours per week beyond his teaching responsibilities. Nevertheless, he still makes time for four or five weekly aerobic workouts that include biking and running. He also enjoys attending college basketball and professional hockey games and performances at the Metropolitan Opera House.

To all my children: Lynne, Gerard Jr., Kenneth, Anthony, and Drew, whose love and support have been the wind beneath my wings. GJT



BRYAN DERRICKSON is Professor of Biology at Valencia College in Orlando, Florida, where he teaches human anatomy and physiology as well as general biology and human sexuality. He received his bachelor's degree in biology from Morehouse College and his Ph.D. in cell biology from Duke University. Bryan's study at Duke was in the Physiology Division within the Department of Cell Biology, so while his degree is in cell biology, his training focused on physiology. At Valencia, he frequently serves on faculty hiring committees. He has served as a member of the Faculty Senate, which is the governing body of the college, and as a member of the Faculty Academy Committee (now called the Teaching and Learning Academy), which sets the standards for the acquisition of tenure by faculty members. Nationally, he is a member of the Human Anatomy and Physiology Society (HAPS) and the National Association of Biology Teachers (NABT). Bryan has always wanted to teach. Inspired by several biology professors while in college, he decided to pursue physiology with an eye to teaching at the college level. He is completely dedicated to the success of his students. He particularly enjoys the challenges of his diverse student population, in terms of their age, ethnicity, and academic ability, and finds being able to reach all of them, despite their differences, a rewarding experience. His students continually recognize Bryan's efforts and care by nominating him for a campus award known as the "Valencia Professor Who Makes Valencia a Better Place to Start." Bryan has received this award three times.

To my family: Rosalind, Hurley, Cherie, and Robb. Your support and motivation have been invaluable to me. B.H.D.

Preface

Welcome to your course in anatomy and physiology! Many of you are taking this course because you hope to pursue a career in one of the allied health fields or nursing. Or perhaps you are simply interested in learning more about your own body. Whatever your motivation, ***Principles of Anatomy and Physiology, 15th edition*** and **WileyPLUS** have all the content and tools that you need to successfully navigate what can be a very challenging course.

Over the past fourteen editions of this text we have made every effort to provide you with an accurate, clearly written, and expertly illustrated presentation of the structure and function of the human body and to explore the practical and relevant applications of your knowledge to everyday life and career development. This fifteenth edition remains true to these goals. It distinguishes itself from prior editions with updated and new illustrations and enhanced digital online learning resources.

Engaging Digitally

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study plan, assess your progress along the way, and access the content and resources you need to master the material. WileyPLUS provides immediate insight into your strengths and problem areas with visual reports that highlight what's most important for you to act on.

Many dynamic programs integrated into the course help build your knowledge and understanding, and keep you motivated. Fifteen **3-D Physiology** animations were developed around the most difficult physiological concepts to help students like you understand them more effectively. **Muscles in Motion** are animations of the seven major joints of the body, helping you learn origin, insertion, and movements of muscles surrounding those joints. **Real Anatomy** is 3-D imaging software that allows you to dissect through multiple layers of a real human body to study and learn the anatomical structures of all body systems. And **Anatomy Drill and Practice** lets you test your knowledge of structures with easy drag-and-drop or fill-in-the-blank labeling exercises. You can practice labeling illustrations, cadaver photographs, histology micrographs, or anatomical models.

WileyPLUS also includes **ORION** – integrated adaptive practice that helps you build proficiency and use your study time most effectively.

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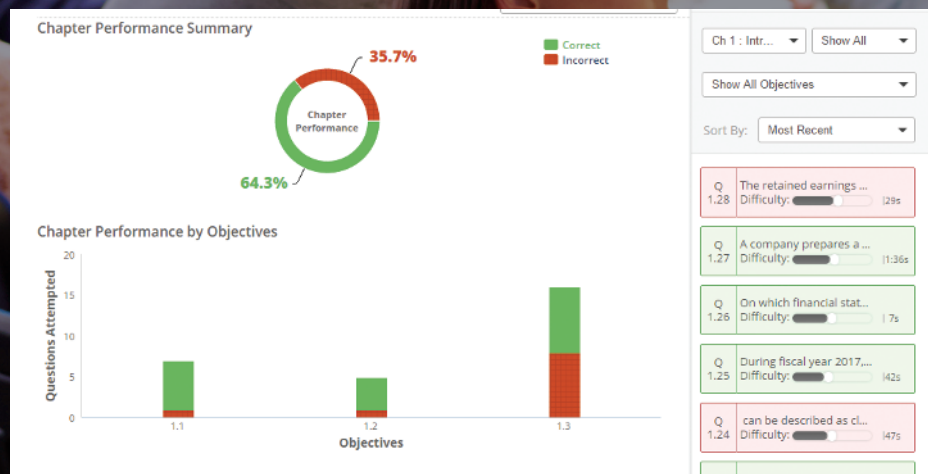


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