

INSTRUCTOR'S MANUAL

Lori K. Garrett

PARKLAND COLLEGE

Visual Anatomy & Physiology Lab Manual

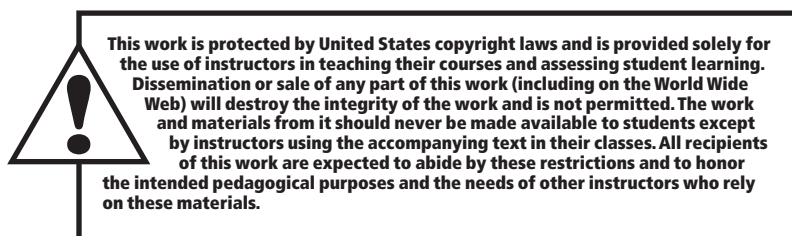
Stephen N. Sarikas

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Preface

Anatomy and physiology (A&P) are the foundation of any medical, allied health, exercise, or physical fitness career. Thorough knowledge of these disciplines is essential for any further learning in these academic fields. Yet, too often, students are unclear on how to approach and master the course content in A&P, opting instead, and often for lack of recognizing a better way, to merely memorize bits of information and to try to muddle their way through, just “getting by” to earn the minimum required grade.

Unfortunately, the design and delivery of most A&P courses often does little to foster in-depth learning. The traditional separated lecture and laboratory format of delivery often leads students to view lectures and labs as if they are separate courses. As anatomy and physiology educators, one of our primary goals should be to ensure that laboratory activities are neither viewed nor performed in a vacuum but rather are clearly integrated with the rest of the course content. Stephen Sarikas’ *Visual Anatomy & Physiology Lab Manual* takes that goal seriously.

Dr. Sarikas’ approach to the lab experience focuses on connected learning, through which students perform laboratory activities that are clearly and purposefully related to what they are learning in lecture and from their textbooks. The lab exercises in this new manual are presented in a refreshingly visual approach that emphasizes learning the concepts over memorizing facts. Each laboratory exercise is broken into smaller, more manageable Activities, with each typically covered in a concise two-page spread that is richly illustrated. Now, students will have a greater sense of making progress through a lab as they complete one Activity before moving on to the next. This mini-modular approach gives them a greater sense of accomplishment and I believe will help them use their time in lab more efficiently.

The artwork is superb and its extensive usage will make it easier for students to translate what they are being asked to do to what they actually have in front of them in lab. Numbered text boxes surround the artwork and provide clear explanations that are directly related to the visual content. Background information for each exercise puts the activities into proper context within the course content. Most importantly, students are frequently asked to draw conclusions, make comparisons, and hypothesize. In short, the *Visual Anatomy & Physiology Lab Manual* will help your students get in the habit of *thinking*, not memorizing.

This instructor’s manual is written to aid you, the instructor, in getting the most out of using Dr. Sarikas’ superb laboratory manual. It is concise so as not to be overwhelming, and its features will guide you through each laboratory exercise. Each chapter in this manual has the same basic organization:

- **Time Estimates for Completing this Lab.** Because the length of laboratory classes varies from one school to another, each chapter in this manual begins with an estimate of the amount of time that your students will likely require to complete the entire laboratory exercise, as well as each individual activity within the laboratory exercise. This feature allows you to accurately construct your laboratory schedule to incorporate the various activities within the constraints of your meeting time.

- **List of Materials.** The laboratory manual includes a list of the materials your students will need for each laboratory exercise. However, in this manual I recommend specific quantities of the materials you should supply. These recommendations are based on a traditional lab setup of six tables, each with four chairs, so I estimate how much of each item will be needed per lab, based on 24 students per section. You can easily tailor your setup to your number of students and the number of sections of the lab you teach.
- **To Do in Advance.** This feature provides a checklist of tasks to complete before your lab begins. It includes basic laboratory setup, topics to review, and other advance preparations that will be beneficial.
- **Tips and Trouble Spots.** This feature addresses each activity within a laboratory exercise. I suggest discussion topics, point out areas that are often problematic to students, and recommend ways to further their learning by keeping them actively engaged. I also address logistics, such as alternative plans if all the students in the room must share a single model. This feature should help you anticipate any problems that might arise, either while conducting the activities or in your students' learning processes, so that you are prepared to address them.
- **Answers to Questions.** Each Exercise is composed of multiple activities, and embedded within the activities are a wide variety of questions for the students to answer. In addition, each Activity ends with a Making Connections integration-type question meant to get your students thinking about what they are doing and its relevance. This manual provides answers to all the questions in the Activities so you can guide your students through their explorations.
- **Answers to Review Sheet.** Each laboratory exercise ends with a separate Exercise Review Sheet that your students can complete, tear out, and turn in for a grade. To assist you in grading these assignments, this manual provides all the answers.

As a general approach to using the *Visual Anatomy & Physiology Lab Manual*, I recommend that you read each laboratory exercise thoroughly, consulting this manual for tips on each activity. Anticipate your students' questions and be prepared to assist them in performing the laboratory activities. Strive to keep them actively engaged, and constantly question them, guiding them as they try to tie together the concepts they are learning.

Depending on the activity, you may opt to have your students work alone, in pairs, or perhaps as a group. The traditional lab setup promotes group work, with four students seated at the same table forming a group. An advantage of group work is that it gets your students talking about the material. They will question and correct each other, which enhances the learning process. A downside to group work, though, is that occasionally one or two people do most of the work while others in the group merely socialize. If you observe that, realize that those who are not participating may be intentionally opting not to, or they may be confused. As an instructor, a simple way to try to get these students involved is to observe what, if anything, they are doing and ask them to explain it to you. Or, you can ask them to show you something through the microscope or on a model. You can also merely ask them if they have any questions.

If your students do work in groups, you can lighten your grading load if you have each group, or pair of students, turn in only one review sheet. If you have multiple laboratory sections and very large numbers of students, this can significantly reduce your grading load. If you use this approach, it is even more important that you walk around while the activities are performed and ensure that all students are participating. Knowing that their grade depends on working with others often is motivation enough to get students to actively participate.

I hope you find this instructor's manual beneficial and that it makes your job as the laboratory instructor easier. You have selected an excellent laboratory manual, but keep in mind that the _____ instructor sets the tone for the class. If you want your students to be engaged in their learning, you

need to be actively engaged as well. To get them to connect what they do in lab with what they are learning from lecture, you need to guide them with questions. Remember that the fun of lab is in the discovery of new knowledge. As instructors, our goal is to keep our students constantly in that pursuit.

Acknowledgments

I want to thank Dr. Stephen Sarikas for his tremendous work in writing the *Visual Anatomy & Physiology Lab Manual*. I have had the pleasure of working with him on this and previous projects and admire him deeply for his dedication to our discipline, to his students, and to improving the way we all do this. Stephen, all the long hours were more than worth it—as always, the book is excellent! Thanks for getting me on board again. And thanks so much for your lightning-quick responses on this project.

I would also like to thank the editors and other publishing professionals at Pearson: Leslie Berriman, Executive Editor; Sharon Kim, Supplement Editor; and Dorothy Cox, Project Manager. It was truly a pleasure working with all of you.

At home, I thank my students, because it was with them in mind that I wrote this. Finally, I thank John Hoagland just 'cause, but also for the laughs and hugs that continue to keep me going during some tough times.

An Overview of the *Visual Anatomy & Physiology Lab Manual* and Resources

The *Visual Anatomy & Physiology Lab Manual* brings all of the strengths of the revolutionary *Visual Anatomy & Physiology* book to the lab. This lab manual combines a visual approach with a modular organization to maximize learning. The lab practice consists of hands-on activities in the lab manual and assignable content in MasteringA&P. Main, Cat, and Pig versions are available.

Features of the Lab Manual

Three key features distinguish this lab manual: the modular organization, the visual approach, and the frequent practice.

Modular Organization

The time-saving modular organization presents each lab exercise in a series of two-page lab activity modules. This organization gives students an efficient framework for managing their time and tracking their progress through the lab activities within the larger lab exercise. Students can see everything for an individual lab activity at a glance without the page flipping that often contributes to students losing their way and then getting confused.

- The top of the page begins with the lab activity title, which is correlated by number to a Learning Outcome on the exercise-opening page.
- Red-boxed letters guide students through the different parts of the lab activity.
- Green-circled numbers walk students through every step of the lab procedures.
- Instead of long columns of narrative text that refer to visuals, brief text is built right into the visuals. Students read while looking at the corresponding visual, which means:
 - No long paragraphs
 - No page flipping
 - Everything in one place
- Making Connections questions wrap up each lab activity and give students the opportunity to pause, internalize information, and apply their understanding.

Visual Approach

The unique visual approach allows the illustrations to be the central teaching and learning element, with the text built directly around them. The visual approach breaks out of the text-heavy model of other two-semester A&P lab manuals. Instead of long columns of narrative text that refer to visuals, this lab manual integrates visuals with the text. Students can't read

without seeing the corresponding visual, and they can't look at a visual without reading the corresponding text. This lab manual has true text-art integration, which encourages reading and enhances understanding.

- Descriptions, key terms, instructions, and lab procedures are embedded in the art.
- Manageable amounts of information that are linked to visuals guide students through the lab activities.

Frequent Practice

Numerous places to stop and check understanding help students reinforce their learning throughout the lab exercise.

- **Before You Begin, Consider This...** launches each lab exercise and asks students to think critically about the content before they begin their first lab activity.
- **Pencil-to-paper tasks within each lab activity** are marked with a black arrow to indicate where students need to write answers, fill in tables, record data, label, calculate, or draw.
- **Making Connections** questions appear at the end of every module to encourage students to think critically about the lab activity they completed.
- **Review Sheets** appear at the end of each lab exercise and offer a series of questions that assess students on all of the lab activities in the exercise. They include a combination of labeling, matching, fill-in-the-blank, short answer, multiple-choice, coloring, and calculation questions. The Review Sheets can be removed from the lab manual and turned in for credit. Assignable versions of the Review Sheet questions (except for the coloring questions) are available in MasteringA&P.

Additional practice is available online in the MasteringA&P Study Area. The **MasteringA&P reference page** near the end of each lab exercise shows students exactly which Study Area resources are appropriate for that exercise.

Support for Students

These invaluable resources will help students get quickly up to speed in their A&P lab course, give them the support they need during the course, and track their progress as they gain a greater understanding of A&P.

MasteringA&P Study Area

MasteringA&P includes a Study Area that will help students review, practice, and get ready for tests with its simple three-step approach. For every lab exercise, students can:

1. **Take a Pre-lab Quiz** and obtain a personalized study plan.
2. **Learn and practice** with labeling activities, animations, and interactive tutorials.
3. **Take a Post-lab Quiz** to check their understanding.

The following items are available in the MasteringA&P Study Area. For more details about these resources, please see the opening pages of the lab manual.

- **Practice Anatomy Lab™ (PAL™) 3.0**
- **A&P Flix™ for Anatomy Topics**
- **Bone and Dissection Videos**
- **PhysioEx™ 9.1**

Student Supplements

The following supplements are available for students. For more details about these supplements, please see the opening pages of the lab manual.

- **eText**
- **Practice Anatomy Lab™ (PAL™) 3.0 DVD**
by Ruth Heisler, Nora Hebert, Jett Chinn, Karen Krabbenhoft, and Olga Malakhova
- **PAL™ 3.0 Lab Guide**
by Ruth Heisler, Nora Hebert, Jett Chinn, Karen Krabbenhoft, and Olga Malakhova
- **PhysioEx™ 9.1: Laboratory Simulations in Physiology**
by Peter Zao, Timothy Stabler, Lori A. Smith, Andrew Lokuta, and Edwin Griff

Support for Instructors

In addition to this *Instructor's Manual*, there are a variety of ancillaries available for instructors to use in lecture planning, presentation, and assessment. Contact your Pearson representative for more information: www.pearsonhighered.com/relocator.

MasteringA&P Assignable Content

The following items are assignable in MasteringA&P. For more details about these resources, please see the opening pages of the lab manual.

- **PAL™ 3.0 and Assessments**
- **PhysioEx™ 9.1 and Assessments**
- **A&P Flix™ Activities for Anatomy Topics**
- **Bone and Dissection Video Coaching Activities**
- **Assignable Review Sheets**
- **Interactive and Adaptive Capabilities**
 - **Dynamic Study Modules**
 - **Learning Catalytics**
- **Get Ready for A&P Video Tutor Coaching Activities**
- **Pre-lab and Post-lab Quizzes**
- **Art-labeling Activities**

Instructor Supplements

The following supplements are available for instructors. For more details about these supplements, please see the opening pages of the lab manual.

- **eText with Whiteboard Mode**
- **Instructor Resource DVD (IRDVD)**
- **Instructor's Manual**
by Lori K. Garrett

Learning Outcomes

This quick reference lists the Learning Outcomes that appear on the exercise-opening page of each exercise and indicates the corresponding page number in the book where the relevant content for the Learning Outcome is presented.

Exercise 1: Body Organization and Terminology **Textbook Page**

1.1	Describe and demonstrate anatomical position, and use anatomical terminology to describe relative positions of structures in the human body.	2
1.2	Describe and demonstrate the various anatomical planes and sections.	4
1.3	Summarize functions of each organ system, and list the organs in each.	6
1.4	Name the anatomical regions of the body.	8
1.5	Identify the body cavities and the organs that are located in each.	10
1.6	Describe the arrangement of the serous membranes associated with the pericardial, pleural, and abdominopelvic cavities.	12

Exercise 2: Care and Use of the Compound Light Microscope **Textbook Page**

2.1	Identify the parts of a compound light microscope and explain their functions.	18
2.2	Demonstrate the proper method for viewing a specimen with the compound microscope.	20
2.3	Describe the principle of inversion of image.	22
2.4	Understand the concept of depth of field.	23
2.5	Measure the diameter of the field of view and estimate the size of structures in a tissue section.	24

Exercise 3: Cell Structure and Cell Division **Textbook Page**

3.1	Describe the structure and function of the nucleus and major organelles in a eukaryotic cell.	30
3.2	Prepare a wet mount of cells derived from your own cheek.	32

3.3	Compare and contrast light microscopic and electron microscopic observations of cell structure.	34
3.4	Identify and describe the stages of mitosis.	36

Exercise 4: Membrane Transport **Textbook Page**

4.1	Explain how temperature and membrane permeability can affect the rate of diffusion.	42
4.2	Summarize the fundamental principles of osmosis.	44

Exercise 5: Tissues **Textbook Page**

5.1-5.3	Describe the structure, functions, and locations of the various types of epithelial tissue.	50
5.4-5.8	Prepare a wet mount of cells derived from your own cheek.	56
5.9	Compare and contrast light microscopic and electron microscopic observations of cell structure.	64
5.10	Identify and describe the stages of mitosis.	66

Exercise 6: The Integumentary System **Textbook Page**

6.1	Describe the organization of the epidermis, dermis, and hypodermis.	74
6.2	Describe the structure and function of the accessory structures of the skin.	76
6.3	Compare the three-dimensional organization of the integumentary system with microscopic observations.	78
6.4	Explain how fingerprints are formed and observe the variation in fingerprint patterns among individuals.	80
6.5	Describe the structure of nails.	81

Exercise 7: Introduction to the Skeletal System and the Axial Skeleton **Textbook Page**

7.1	Classify bones according to their shapes.	86
7.2	Differentiate between the axial skeleton and appendicular skeleton.	87
7.3	Describe the microscopic structure of compact and spongy bone.	88
7.4	Describe the arrangement of compact and spongy bone in the bones of the skeleton.	90
7.5	Understand the functions of bone markings on bones.	91
7.6-7.9	Identify the bones of the skull and their bone markings from various views.	92
7.10	Compare the bones of the fetal skull and the adult skull.	99
7.11	Recognize the general features of the vertebral column.	100

7.12-7.13	Compare the unique features of vertebrae from different regions of the vertebral column.	102
7.14	Describe the structure of the thoracic cage.	106

Exercise 8: The Appendicular Skeleton **Textbook Page**

8.1-8.3	Identify the bones of the upper limb and their bone markings and explain how these bones articulate.	114
8.4-8.6	Identify the bones of the lower limb and their bone markings and explain how these bones articulate.	120

Exercise 9: Articulations **Textbook Page**

9.1	Describe and provide examples of the different types of fibrous joints.	132
9.2	Describe and provide examples of the different types of cartilaginous joints.	134
9.3-9.4	Demonstrate the types of movements at synovial joints.	136
9.5-9.7	Provide examples of the six types of synovial joints and compare the movements possible at each type.	140
9.8	Discuss the structure and function of synovial joints in the upper limb.	146
9.9	Discuss the structure and function of synovial joints in the lower limb.	148

Exercise 10: Introduction to Skeletal Muscle **Textbook Page**

10.1	Identify the principal microscopic features of skeletal muscle.	156
10.2	Describe the structure of a neuromuscular junction and discuss the sequence of events that occur there.	158
10.3-10.4	Predict how ATP and various ions affect skeletal muscle contraction, and test your prediction.	160

Exercise 11: Muscles of the Head, Neck, and Trunk **Textbook Page**

11.1	Explain how skeletal muscles produce movement by using bones as levers.	166
11.2	Identify and explain the functions of the head: muscles of facial expression and mastication.	168
11.3	Identify and explain the functions of the head: extrinsic eye muscles, extrinsic tongue muscles and muscles of the pharynx.	170
11.4	Identify and explain the functions of the muscles of the neck.	172
11.5	Identify and explain the functions of the trunk: muscles of the thorax.	174
11.6	Identify and explain the functions of the trunk: muscles of the abdominal wall.	176

11.7	Identify and explain the functions of the trunk: deep back muscles.	178
11.8	Identify and explain the functions of the trunk: muscles of the pelvic floor.	180

Exercise 12: Muscles of the Upper and Lower Limbs **Textbook Page**

12.1	Identify and explain the actions of the muscles of the shoulder that move the scapula.	188
12.2	Identify and explain the actions of the muscles of the shoulder that move the arm.	190
12.3	Identify and explain the actions of the muscles of the arm.	192
12.4	Identify and explain the actions of the muscles of the anterior forearm.	194
12.5	Identify and explain the actions of the muscles of the posterior forearm.	196
12.6	Identify and explain the actions of the intrinsic muscles of the hand.	198
12.7	Identify and explain the actions of the muscles of the gluteal region.	200
12.8	Identify and explain the actions of the muscles of the anterior thigh.	202
12.9	Identify and explain the actions of the muscles of the medial thigh.	204
12.10	Identify and explain the actions of the muscles of the posterior thigh.	206
12.11	Identify and explain the actions of the muscles of the anterior and lateral leg.	208
12.12	Identify and explain the actions of the muscles of the posterior leg.	210
12.13	Identify and explain the actions of the intrinsic muscles of the foot.	212
12.14	Identify the surface anatomy of upper limb muscles by palpation.	214
12.15	Identify the surface anatomy of lower limb muscles by palpation.	216

Exercise 13: Physiology of the Muscular System **Textbook Page**

13.1	Explain the difference between isotonic and isometric muscle contractions, and the interactions between muscles that contract concentrically and eccentrically.	224
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13.3	Describe a motor unit and explain the functional significance of motor unit recruitment.	227
13.4	Explain how muscle fatigue affects normal muscle activity.	228
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Exercise 14: Nervous Tissue **Textbook Page**

14.1	Discuss the structure and function of the different types of neurons and neuroglia.	236
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14.3	Identify important microscopic structures in the cerebellum.	240
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Exercise 15: The Brain and Cranial Nerves **Textbook Page**

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16.4	Examine spinal nerve function by testing general sensory function in dermatomes.	286

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18.3	Describe the gross and microscopic anatomy of gustatory structures.	310
18.4	Test gustatory sensations.	312
18.5	Identify and explain the function of accessory eye structures.	314
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18.7	Dissect a cow eye.	318

18.8	Describe the microscopic structure of the retina.	320
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19.4-19.7	Describe the microscopic anatomy of various endocrine glands.	350

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