# BIOL 251 Human Anatomy & Physiology I w/ Lab — 4 credits

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**Prerequisites:** General biology and chemistry

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**Contact Information:** Faculty may be contacted through the Canvas messaging system

**Additional Information:** www.portagelearning.edu[1*]

**Course Meeting Times:** BIOL 251 is offered continuously

**Course Description**: This is the first course in a sequence of two covering human anatomy and physiology. Human Anatomy and Physiology I introduces basic concepts of human anatomy and physiology and discusses several major concepts, including various tissue types in the body and the structure and function of the integumentary, skeletal, muscular, nervous, endocrine, and sensory systems. Case studies throughout the course provide experience applying these concepts to real-world scenarios. In addition, the laboratory component of this course is delivered using virtual labs and interactive simulations with detailed instruction and demonstrations from an experienced instructor.

**Course Outcomes**: After successful completion of the coursework, students should be able to:

- Describe the studies of anatomy and physiology, mechanisms of homeostasis, and basic principles related to cellular and metabolic processes (Module 1).
- Explain the anatomy and physiology of the integumentary system and the structure and function of the different tissue types within the human body (Module 2).
- Describe the gross and microscopic anatomy of the skeletal system, its function and development, as well as the pathological conditions related to this system (Module 3).
- Define the structure and roles of the various types of articulations in the body and pathological conditions related to these structures (Module 4).
- Discuss the gross and microscopic anatomy of skeletal muscle, as well as the physiology of contraction and differences in smooth muscle function (Module 5).

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[1*] Portage Learning college courses are offered by Geneva College, which is accredited by the Middle States Commission on Higher Education and Bushnell University, which is accredited by Northwest Commission on Colleges and Universities. The Faculty Senate of both institutions have vetted and approved the courses as part of their curriculum.

- Identify the organization of major anatomical structures of the nervous system, as well as the roles of neurons and neurotransmitters in nervous function (Module 6).
- Explain the structure and function of the peripheral nervous system, including the roles of reflexes and the physiology of the autonomic nervous system (Module 7).
- Describe the anatomy and physiology of the olfactory, gustatory, auditory, vestibular, and visual systems (Module 8).
- Describe the anatomical structures of the endocrine system, their functions, and the roles of the various hormones produced by this system (Module 9).

*Please see the *Module & Lab Topics* section below for expanded course outcomes.

Each of these BIOL 251 student learning outcomes is measured:

Directly by: (1) Module application problems (with instructor feedback)
(2) Module exams
(3) Case studies
(4) Lab quizzes
(5) Adaptive Learning Exercises
(6) Cumulative final exam

Indirectly by an end of course student-completed evaluation survey

**Course Delivery:** This course is asynchronously delivered online and is composed of 65 - 75 hours of written material, video lectures, laboratory components, and several assignments with instructor feedback, and 20 contact hours of secure online module exams.

**Course Progression:** It is the policy for all Portage Learning courses that only one (module lecture/final) exam is to be completed within a 48-hour period. Research on the best practices in learning indicates that time is needed to process material for optimal learning. This means that once an exam has been completed, the next exam may not be opened or taken until 48 hours after the submission of the previous module exam. This allows for instructor feedback/class expectations as the student moves through the material. Instructors, like the College, are not available during the weekend; grading, therefore, is M-F and may take up to 72 hours during these days. Also, it is the policy of Portage Learning to support a minimum of 28 days to complete a course; this is not a negotiable time period. Please plan your time accordingly.

**Note**: Professors reserve the right to reset any exam taken in violation of these guidelines.

**Required readings, lectures and assignments:** Portage courses do not use paper textbooks. Students are required to read the online lesson modules written by the course author which contain the standard information covered in a typical course. Please note the exam questions are based upon the readings. Video lectures

which support each lesson module subject should be viewed as many times as is necessary to fully understand the material.

*We do not support the use of outside resources to study, except for the ones listed in the syllabus under "Suggested External References"*. If you have questions about the material or would like further explanation of the concepts, please contact your instructor.

**Academic Integrity** is a serious matter. In the educational context, any dishonesty violates freedom and trust, which are essential for effective learning. Dishonesty limits a student's ability to reach his or her potential. Portage places a high value on honest independent work. We depend on the student's desire to succeed in the program he or she is entering. It is in a student's own best interests not to cheat on an exam or put their work into question, as this would compromise the student's preparation for future work. It is the student's responsibility to review the **Student Handbook** and all policies related to academic integrity. If clarification is necessary, the student should reach out to their instructor for further explanation **before** initiating module one.

**Required Computer Accessories**: It is recommended that students use a desktop or laptop computer, PC or Mac, when taking the course. Some tablet computers are potentially compatible with the course, but not all features are available for all tablet computers. The latest full version of Google Chrome, Firefox, Edge, or Safari browser is required for the optimal operation of the Canvas Learning Management System. In addition, this course will use the Respondus Lockdown Browser for exams; a strong internet connection is needed. You are also **required to use LockDown Browser with a webcam**, which will record you during an online, nonproctored exam. (The webcam feature is sometimes referred to as "Respondus Monitor.") **Your computer must have a functioning webcam and microphone. Additionally, students will need a photo ID that includes your picture and full name is required. Please note, Chromebooks and tablets (other than iPad) are not compatible on exams using the Lockdown Browser.** Instructions on downloading and installing this browser will be given at the start of the course. We highly recommend using a high-speed Internet connection to view the video lectures and labs. You may experience significant difficulties viewing the videos using a dial-up connection.

For more information on basic system and browser requirements, please reference the following:
Canvas browser and system requirements: https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66
Respondus Requirements: https://web.respondus.com/he/lockdownbrowser/resources/
Respondus Monitor Requirements: https://web.respondus.com/he/monitor/resources/

## Module & Lab Topics

### Module 1: Introduction to Anatomy and Physiology

This module will cover an introduction to the fields of anatomy and physiology and will discuss the basic principles of homeostasis, cellular structure and function, and the basic chemistry of life.

The student will be able to:

- Explain the definitions and differences between anatomy and physiology and how they interrelate in the study of the human body.
- Describe the mechanisms of homeostasis, including feedback systems, and examples of how homeostatic imbalances can affect the human body.
- Identify the major components of a cell, its functions, and how cells contribute to the overall function of tissues and organs.
- Explain the structure of the plasma membrane and the principles of membrane transport, including diffusion, osmosis, and active transport, as well as how these processes are vital to cellular function.
- Explain key elements and molecules essential to life, basic chemical reactions, and how these chemical principles apply to biological processes and structures.

As a result of completing the lab for this module, the student will be able to:

- Explain the anatomical position and why it is used in the study of anatomy.
- Recall the vocabulary used to refer to the surface anatomy, directionality, and planes of the body.
- Describe the organ systems of the body, including their major organs and function.
- Describe the body cavities and their membrane linings.

### Module 2: Tissues and Skin

This module will explain the anatomy and physiology of the integumentary system and will describe the structure and function of the various tissue types in the human body.

The student will be able to:

- Describe the four basic types of tissues and the significance of histology in the study of tissues.
- Explain the characteristics of epithelial tissue, including classification and glandular epithelia.
- Explain the common characteristics of connective tissue and the various types based on their structure and function.
- Describe the basic characteristics and functions of nervous tissue and muscle tissue.
- Explain the physiological processes involved in tissue repair, including the regenerative capacity of different tissue types.
- Describe the structure and components of the integumentary system.
- Identify the layers of the epidermis, dermis, and their derivative structures.
- Explain the functions of the integumentary system, including protection, sensation, thermoregulation, and vitamin D synthesis.

As a result of completing the lab for this module, the student will be able to:

- Describe the functions of each organ system and the major organs in the human body and the dissected specimen.
- Describe the structure, function, and locations of the 4 types of tissues within the body.
- Explore the features of skin associated with its functions.

**Module 3: Bones and Skeletal Tissue**

This module will introduce the skeletal system and will discuss the structure, function, and development of bones, as well as pathological conditions related to the skeletal system.

The student will be able to:

- Describe the basic structure, types, and locations of skeletal cartilages.
- Explain cartilage growth and development.
- Classify bones based on their shapes and structures.
- Describe the various functions of bones, including support, mineral storage, and hematopoiesis.
- Describe the histological structure of bones, including the osteon.
- Explain the process of bony skeleton formation during development and postnatal bone growth.
- Describe the processes involved in bone remodeling and repair.
- Describe homeostatic imbalances of the skeletal system such as osteomalacia, rickets, osteoporosis, and Paget's disease.

As a result of completing the lab for this module, the student will be able to:

- Describe the location of the 3 major cartilages of the skeleton.
- Recall the types of bone markings and their functions.
- Identify the bones of the skeleton and their bone markings.

**Module 4: Articulations**

This module will cover the articulations in the human body and will describe the different types of joints and ligaments, as well as pathological conditions of these structures.

The student will be able to:

- Classify joints based on their structure and function.
- Describe the characteristics and types of fibrous joints, including sutures, syndesmoses, and gomphoses.
- Identify the characteristics and types of cartilaginous joints, including synchondroses and symphyses.
- Describe the classifications and general structure of synovial joints, including the roles of bursae, tendon sheaths, and ligaments.
- Explain the anatomy of specific examples of synovial joints and their functions, including the shoulder, hip, and knee.
- Analyze common homeostatic imbalances of joints such as injuries, inflammatory, and degenerative conditions.

As a result of completing the lab for this module, the student will be able to:

- Describe the components of a synovial joint.
- Define the various movements of synovial joints in light of their structures.

**Module 5: Skeletal Muscle Tissue**

This module will discuss anatomy and physiology of skeletal muscle tissues, as well as a brief introduction to smooth muscle structure and function.

The student will be able to:

- Identify the major muscle groups of the axial and appendicular skeletons, including the origin, action, and insertion.
- Compare and contrast the types, characteristics, and functions of the three types of muscle tissue.
- Identify the gross anatomy of skeletal muscle tissue, including nerve and blood supply, connective tissue sheaths, and attachments.
- Identify the microscopic anatomy of muscle fibers.
- Explain the sliding filament model of contraction and excitation-contraction coupling.
- Describe muscle metabolism and sources of ATP.
- Describe the effect of exercise on muscles, including aerobic and anaerobic exercise.
- Identify the microscopic structure of smooth muscle tissue.
- Describe contraction of smooth muscle tissue.

As a result of completing the lab for this module, the student will be able to:

- Define the terms agonist/antagonist, synergist, fixator, and origin/insertion in relationship to skeletal muscles.
- Recall the terms used in the naming of skeletal muscles.
- Identify the major skeletal muscles with their action/function and the origin/insertion for prime movers.

**Module 6: Nervous System, Nervous Tissue, and the CNS**

This module will cover the anatomy and physiology of the nervous system and will explain the major anatomical structures of the nervous system, as well as the functions of neurons and neurotransmitters.

The student will be able to:

- Describe the major functions and divisions of the nervous system and the histology of nervous tissue.
- Explain the concept of membrane potentials and their role in nerve signal transmission.
- Describe electrical and chemical synapses, including postsynaptic potentials.
- Classify the structure and function of neurotransmitters and their receptors.
- Describe the regions and organization of the brain, including the ventricles, cerebral hemispheres, diencephalon, brain stem, and cerebellum.
- Explain the higher mental functions of language and memory.
- Describe the roles of the meninges, cerebrospinal fluid, and blood-brain barrier.
- Identify the gross anatomy, protections, and cross-sectional anatomy of the central nervous system.
- Analyze central nervous system injury, disorders, and diseases.

As a result of completing the lab for this module, the student will be able to:

- Identify the major regions of the brain and spinal cord, along with describing their functions.
- Distinguish the differences between gyri, fissures, and sulci.
- Identify the 3 meninges.
- Describe the differences between the human brain and a sheep brain.
- Describe an electroencephalogram and why they are used clinically.
- List the types of brain waves and how they are affected by different stimuli.

**Module 7: Peripheral Nervous System, Reflex Activity, and the ANS**

This module will continue to discuss the nervous system, specifically the peripheral nervous system, and will explain the mechanisms underlying reflexes, as well as the physiology of the autonomic nervous system.

The student will be able to:

- Describe the types and functions of sensory receptors, in addition to the process of sensory integration.
- Explain the structure and function of nerves and associated ganglia, including cranial and spinal nerves.
- Explain the structure of peripheral motor endings and the process of motor integration.
- Compare the structure and function of the somatic nervous system (SNS) and the autonomic nervous system (ANS).
- Describe the craniosacral and thoracolumbar divisions of the autonomic nervous system.
- Explain the role of neurotransmitters and receptors in ANS physiology, the effects of drugs, and control of ANS functioning.
- Analyze how the autonomic divisions interact, including homeostatic imbalances related to the ANS.

As a result of completing the lab for this module, the student will be able to:

- Define the 3 general types of sensory receptors: exteroceptors, interoceptors, and proprioceptors.
- Describe how and why sensory adaptation of receptors occurs and how the distribution of receptors affects tactile location and perception.
- Define vocabulary terms associated with reflexes like contralateral, ipsilateral, and consensual reflexes and responses.
- Describe a reflex arc and how the different types of somatic and autonomic reflexes are tested in the laboratory, including their clinical significance.
- Explain why referred pain occurs and how it differs from direct pain sensation.
- List the cranial nerves, their functions, and how to test for dysfunction in each nerve.

**Module 8: The Special Senses**

This module will describe the special senses, specifically highlighting the olfactory, gustatory, auditory, vestibular, and visual systems.

The student will be able to:

- Describe the structure, function, and innervation of the visual system.
- Describe the structure and function of the auditory and vestibular systems and their innervation.
- Define the structure and function of the olfactory and gustatory systems and their innervation.
- Describe pathologies of the visual and auditory systems.

As a result of completing the lab for this module, the student will be able to:

- Describe structures of the eye anatomy on diagrams and in the cow eye dissection, and their functions in vision.
- Discuss the similarities and differences between cow and human eye anatomy.
- Explain the visual pathway and how disturbances can affect vision.
- Understand various aspects of vision, including blind spots, the process of accommodation, visual acuity, detection of astigmatism, and color blindness.
- Explain the reflex actions of the eye, such as pupil dilation and constriction in response to light and accommodation reflex.
- Understand the roles of tastants and odorants in the gustatory pathway.
- Describe the anatomy of the ear, identifying parts such as the tympanic membrane, ossicles, cochlea, and auditory nerve and their functioning.
- Explain basic audiometry tests used to understand hearing acuity and frequency range.

**Module 9: The Endocrine System**

This module will cover an introduction to the endocrine system and will discuss the anatomical structures of this system and the effects of the various hormones produced by this system on the human body.

The student will be able to:

- Describe the anatomy and location of the major endocrine organs.
- List the types of hormones, their actions on target cells, how they exhibit target cell specificity, and how they affect intracellular signaling.
- Describe the hypophyseal-pituitary axis, including the hormones released by the hypothalamus and pituitary gland, their target organs, mechanism of action, and negative feedback regulation.
- For the thyroid, parathyroid, adrenal cortex and medulla, pineal, pancreas, and gonads, list the hormones the organ secretes, the hormone's target, and effect on the target.
- Describe the homeostatic imbalances and endocrine disorders that can occur when the major hormones are hypo- or hyper-secreted, including their typical signs and symptoms.

As a result of completing the lab for this module, the student will be able to:

- Describe the relationship between the hypothalamus and the pituitary gland and the regulatory hormones released by each.
- Name the tropic hormones, their target tissues, and functions.
- Identify an unknown hormone based on analysis of its effect on tissues.

**Required labs and assignments:**

The laboratory portion of this course will be delivered using virtual labs and interactive simulations led by an experienced lab instructor. Students will be assessed on the content presented in the lab portion of each module. The following lab components are required for all students:

- Students must read all lab content and should be able to demonstrate mastery of all student objectives on the module exam.
- Students must watch all lab video demonstrations in their entirety.
- Students must complete the laboratory quiz for each module.

**Suggested Timed Course Schedule** (to complete the course within a typical college semester)

All Portage courses are offered asynchronously with no required schedule to better fit the normal routine of adult students, but the schedule below is suggested to allow a student to complete the course within a typical college semester. Students may feel free to complete the course on a schedule determined by them within the parameters outlined under "Course Progression."

| Time Period | Assignments | Subject Matter |
|---|---|---|
| Days 1-11 (1.5 weeks) | Module 1 | Introduction to anatomy and physiology |

| | | |
|---|---|---|
| Days 12-22 (1.5 weeks) | Module 2 | Tissue and skin |
| Days 23-33 (1.5 weeks) | Module 3 | Bones and skeletal tissue |
| Days 34-44 (1.5 weeks) | Module 4 | Articulations |
| Days 45-55 (1.5 weeks) | Module 5 | Skeletal muscle tissue |
| Days 56-66 (1.5 weeks) | Module 6 | Nervous system, nervous tissue, and the CNS |
| Days 67-77 (1.5 weeks) | Module 7 | Peripheral nervous system, reflex activity, and the ANS |
| Days 78-88 (1.5 weeks) | Module 8 | Special senses |
| Days 89-99 (1.5 weeks) | Module 9 | Endocrine system |
| Days 100-110 (1.5 weeks) | Final Exam | Based upon module material |

## Grading Rubric:

| | |
|---|---|
| Check for Understanding = | 1 pt. |
| 9 Module Problem Sets = 5 pts. each x 9 = | 45 pts. |
| 9 Module Exams = 150 pts. each x 9 = | 1,350 pts. |
| 9 Lab Quizzes = 5 pts. each x 9 = | 45 pts. |
| 9 Case Studies = 10 pts. each x 9 = | 90 pts. |
| Final Exam = 200 pts. | 200 pts. |
| Total | 1,730 pts. |

The current course grade and progress is continuously displayed on the student desktop.

## Grading Scale:

96.5% - 100% = A+
92.5% - 96.4% = A
89.5% - 92.4% = A-
86.5% - 89.4% = B+
82.5% - 86.4% = B
79.5% - 82.4% = B-
76.5% - 79.4% = C+
72.5% - 76.4% = C
69.5% - 72.4% = C-
66.5% - 69.4% = D+
62.5% - 66.4% = D
59.5% - 62.4% = D-
0% - 59.4% = F

## External References:

If the student desires to consult a reference for additional information, the following textbooks are recommended as providing complete treatment of the course subject matter.

- Elaine N. Marieb and Katja Hoehn, **Anatomy & Physiology**, Pearson
- Frederic Martini, Judi L. Nath, and Edwin F. Bartholomew, **Fundamentals of Anatomy & Physiology,** Pearson

**NOTE:** We do not support the use of outside resources to study, except the ones listed above.

## Learning Support Services:

Each student should be sure to take advantage of and use the following learning support services provided to increase student academic performance:

**Video lectures:** Supports diverse learning styles in conjunction with the text material of each module

**Messaging system**: Provides individual instructor/student interaction

**Tech support:** Available by submitting a help ticket through the student dashboard

## Accommodations for Students with Learning Disabilities:

Students with documented learning disabilities may receive accommodations in the form of an extended time limit on exams, when applicable. To receive the accommodations, the student should furnish documentation of the learning disability at the time of registration, if possible. Scan and e-mail the documentation to studentservices@portagelearning.edu. Upon receipt of the learning disability documentation, Portage staff will provide the student with instructions for a variation of the course containing exams with extended time limits. This accommodation does not alter the content of any assignments/exams, change what the exam is intended to measure or otherwise impact the outcomes of objectives of the course.

## One-on-one Instruction:

Each student is assigned to his/her own instructor. Personalized questions are addressed via the student dashboard messaging system.

Online learning presents an opportunity for flexibility; however, a discipline to maintain connection to the course is required; therefore, communication is essential to successful learning. **Check your messages daily.** Instructors are checking messages daily Monday-Friday to be sure to answer any questions that may arise from you. It is important that you do the same, so you do not miss any pertinent information from us.

**Holidays:**

During the following holidays, all administrative and instructional functions are suspended, including the grading of exams and issuance of transcripts.

- New Year's Day
- Easter
- Juneteenth
- Labor Day
- Christmas Break
- MLK Day
- Memorial Day
- Independence Day
- Thanksgiving weekend

The schedule of holidays for the current calendar year may be found under the Student Services menu at www.portagelearning.edu

**Code of Conduct**: Students are expected to conduct themselves in a way that supports learning and teaching and promotes an atmosphere of civility and respect in their interactions with others. Verbal and written aggression, abuse, or misconduct is prohibited and may be grounds for immediate dismissal from the program.

This is a classroom; therefore, instructors have the academic freedom to set forth policy for their respective class. Instructors send a welcome e-mail detailing the policy of their class, which students are required to read prior to beginning the course.

**Grievances:** If a student has a complaint about the coursework or the instructor, the student is advised to first consult the instructor, who will be willing to listen and consider your concern. To file a formal grievance for consideration by the Academic Review Committee, the process must be initiated by requesting an appeal form from academics@portagelearning.edu.

**Remediation:** At Portage Learning we allow a "one-time" only opportunity to re-take an alternate version of **one** module exam on which a student has earned a grade lower than 70%. This option must be exercised before the final exam is started. If an exam is retaken, the original exam grade will be erased, and the new exam grade will become a permanent part of the course grade. However, before scheduling and attempting this retest, the student must resolve the questions they have regarding the material by reviewing both the old exam and the lesson module material. Once ready to attempt the retest of the exam they must contact their instructor to request that the exam be reset for the retest. Remember, any module retest must be requested and completed **before** the final exam is opened.

**Note**: Exams on which a student has been penalized for a violation of the academic integrity policy may not be re-taken.

Syllabi are subject to change as part of ongoing educational review practices.  Students are responsible for accessing and using the most recent version of the course syllabus.