



Technical College of the Lowcountry
921 Ribaut Road
Beaufort, SC 29901

Arts and Sciences Division
Building 9, Room 102
843-525-8281

BIO 210

Anatomy and Physiology I

Course Description

This is the first in a sequence of courses, including intensive coverage the body as an integrated whole. All body systems are studied.

Prerequisites: ENG 100, MAT 102, RDG 100 and one of the following: BIO 102, BIO 112, CHM 105.

4.0 Cr (3.0 lect/pres, 3.0 lab, 0 other)

Course Focus

The student will gain insight into the function of the human body based on knowledge of the body's structure, both microscopic and macroscopic. The student will be able to demonstrate knowledge of the structural components and physiological processes of the integumentary, skeletal, muscular, and nervous systems as well as an understanding of the levels of organization of the human body.

Text and References

Required:

Marieb, Elaine and Hoehn, Katja. Anatomy and Physiology, loose-leaf, 6th Edition. Benjamin Cummings, Inc., 2016. ISBN: 0-1342-8340-6.

Marieb, Elaine and Mitchell, Susan. Human Anatomy and Physiology Laboratory Manual, Cat Version and Mastering Anatomy & Physiology, Integrated, 12th Edition. Pearson, 2016. ISBN: 978-978-0134156767.

Recommended:

Rust, Thomas. A Guide to Anatomy and Physiology Lab, 2nd Edition. Southwest Education Enterprises, 1986. ISBN: 0-937-02900-9

Core Curriculum Competencies

All courses approved for the general education core curriculum help students develop communication skills and/or critical thinking. Students will demonstrate achievements by assessments on the departmental final exam and on testing developed by individual instructors.

This course develops critical thinking skills through instruction that emphasizes the understanding of the scientific disciplines of human anatomy and physiology, as demonstrated in the following:

- A formal research paper requiring the student to find, evaluate, and synthesize credible information on a given topic.
- This research project allows the student to:
 - Apply standard scientific methods and interpret laboratory observations and data
 - Make inferences justified by data and observations
 - Explain relevance of findings to anatomical principles, physiological principles, or expected results
 - Identify key assumptions of anatomy and physiology

Course Goals

The following list of course goals will be addressed in the course. These goals are directly related to the performance objectives. (*designates a CRUCIAL goal)

1. Explain how cells of the adrenal medulla supplement the autonomic nervous system.
2. Specify important physiological functions of the skin.
3. Explain how hair cells in the vestibular apparatus and cochlea respond to head tilt rotation and sound.
4. Summarize the microscopic organization of compact bone and spongy bone.
5. Discern the cell types found in bone and their role in bone growth and control of bone mass.
6. Distinguish axial skeleton from appendicular skeleton and name the bones of each.
7. Locate and identify the bones that make up the skull, spine, upper limb, pectoral girdle and pelvis.
8. Define major traits of the somatic nervous system. *
9. Verify function and location of cardiac, skeletal, and smooth muscle.
10. Know the neurotransmitter associated with each segment of the nervous system.
11. Compare and contrast the structure, function, and location of cells that make up various tissue types
12. Distinguish between somatic senses and special senses. *
13. Know that senses are classified by the sensory receptors that are activated. *
14. Name the components of a skeletal muscle fiber and describe its functions.
15. Review how thick and thin filaments are organized in the sarcomere.
16. Consider the chemical and molecular processes that provide energy for a muscle to contract and relax.
17. Differentiate between various functional types of neurons; and explain the function of each component.
18. Verify mathematically the intracellular and extracellular concentrations of sodium and potassium *
19. Discuss the permeability of the plasma membrane to negatively charged ions and sodium and potassium
20. Understand that molecules make the fabric of living cells, which in turn, make up tissues.
21. Compare and contrast the microscopic structure of cardiac, smooth, and skeletal muscles.
22. Specify the traits of the parasympathetic and sympathetic nervous systems.
23. Recall the anatomical position and the terms that describe positions, body planes and regions.
24. Specify the role of adhesion molecules. *
25. Review ways substances cross the plasma membrane, including osmosis and endocytosis.

26. Compare and contrast ways substances cross the plasma Membrane including exocytose and active transport *
27. Evaluate the importance of proteins in cell function and structure.
28. Study accessory structures of the skin: hair, nails, and glands.
29. Know the physiology and structure of bones and skeletal muscles as they interact and support the body.
30. Learn the physiology of the bones and skeletal muscles as they provide movement. *
31. Isolate the structure of skin, including the different layers of the epidermis.
32. Show how joints allow for movement.
33. Contrast and compare epithelial and synovial membranes.
34. Verify the body cavities, their membranes and the organs within each cavity.
35. Detect organ systems and their roles in the functioning of the body.
36. Distinguish bones according to their shape and describe the major functions of a bone.
37. Discern the structure of a long bone and indicate how each part functions in bone growth. *
38. Name major types of joints in terms of their mobility and the tissues that hold them together.
39. Name the structures that make up a synovial joint; describe synovial fluid and its properties.
40. Give specific examples of proteins and their function and describe how they are synthesized.
41. Evaluate the general structure of an epithelium, including the basement membrane.
42. Categorize types and locations of epithelia.
43. Describe endocrine and exocrine glands and their development from granular epithelium.
44. Understand the chemical and microscopic structure of bone; its development, repair and growth. *
45. Evaluate various types of spinal reflexes and discuss their importance to pain and posture. *
46. Give the functions of the various structures that make up the cerebrum.
47. Identify the major muscles on a diagram of the body's musculature and describe their movements.
48. Review hemispheric dominance.
49. Describe structure and function of the cerebellum and its nuclei regarding postural control. *
50. List structure and function of the cerebellum and its nuclei regarding motor learning.
51. Characterize major traits of the autonomic nervous system. *
52. Indicate the functions and locations of cerebrospinal fluid. *
53. Define a motor unit and its importance in the controlling of force and velocity of a muscle contraction.
54. Categorize the five segments of the spinal cord.
55. Discuss the components of the brain stem and diencephalon.
56. Describe various types of spinal reflexes and discuss their importance for the avoidance of pain. *
57. Explain what is meant by sensory receptor adaptation and give examples related to everyday experience.
58. Identify the structure, function, and location of olfactory and taste receptor cells.
59. Name parts of the eye and describe the functions involved in light detection. *
60. Observe the cells found in the neural retina. *
61. Learn the functional dependence of the rods and cones on pigmented epithelium.
62. Compare the structure of the rods and cones to visual acuity, night vision, color vision and color blindness.
63. Appreciate regions of the ear.
64. Observe the structure and function of the vestibular apparatus from the auditory apparatus.
65. Delineate how sound is transmitted from the external auditory meatus to the cochlea.
66. Determine functions of the spinal cord.
67. State three basic types of activity in the nervous system.

68. Describe the neuromuscular junction at the time the neurotransmitter is released.
69. Differentiate between isotonic and isometric contractions of skeletal muscle. *
70. Observe how muscle contractions are amplified by the use of lever systems.
71. Explain what is meant by muscular hypertrophy and atrophy and the causes of these conditions.
72. Recognize that the nervous and endocrine system together control and integrates the bodily functions.*
73. Recognize that nerve cells are the functional units of the nervous system.
74. Recognize that the activity of nerve cells calls for rapid transmission of information.
75. Determine function and location of the motor, sensory, and association areas of the cerebral cortex.
76. Characterize oligodendrocyte and Schwann cells.
77. Describe the secretion, flow pathways, and absorption of cerebrospinal fluid.
78. Delineate the role of excitatory and inhibitory neurotransmitters in a synapse.
79. Explain why it is important to remove a neurotransmitter after it has been released.
80. Understand that the nervous system has two components, the peripheral and central systems
81. Identify the structure and functions of the sub-divisions of the brain.
82. Review diseases of the brain can cause marked impairment of motor function.
83. Know that the cerebellum may play an important part in the learning of motor skills.
84. Observe the organization of the grey and white matter; and dorsal and ventral roots of the spinal cord.*
85. Detect the cavities in which the brain and spinal cord are found.
86. Locate the meninges that cover the brain and spinal cord.
87. Locate the ventricles in the brain and explain how they are interconnected.
88. State different types of neuroglia cells, their functions, locations and structure.

Student Contributions:

Classes are designed to employ a variety of teaching techniques. In order to maximize learning, required readings should be done prior to a unit. If a student is falling behind in lab performance or academic achievement, it is imperative to seek immediate assistance from the instructors.

Course Evaluation

- Student progress will be evaluated through a series of tests, quizzes in-class and out of class assignments and will be detailed in the attachment to this syllabus.
- Blackboard: lecture notes, handouts, podcasts, study hints, tutor information, syllabi, and other course information is available on the course blackboard page.
- Laboratory Component: This course has a required lab component which supplements the information presented in lecture. The lab will be independently evaluated primarily through lab practicals, in class and out of class lab assignments (such as research papers). For specific details about lab evaluations, please refer to the attachment to this syllabus.

TCL GRADING SCALE:

90-100 =	A
80-89 =	B
70-79 =	C
60-69 =	D
Below 60=	F

Course Schedule

Approved/Revised/Updated: 03/01/2017

The class meets for 2.5 lecture/presentation hours and 3 lab hours per week.

ADA STATEMENT

The Technical College of the Lowcountry provides access, equal opportunity and reasonable accommodation in its services, programs, activities, education and employment for individuals with disabilities. To request disability accommodation, contact the counselor for students with disabilities at (843) 525-8219 or (843) 525-8242 during the first ten business days of the academic term.

ACADEMIC MISCONDUCT

There is no tolerance at TCL for academic dishonesty and misconduct. The College expects all students to conduct themselves with dignity and to maintain high standards of responsible citizenship.

It is the student's responsibility to address any questions regarding what might constitute academic misconduct to the course instructor for further clarification.

The College adheres to the Student Code for the South Carolina Technical College System. Copies of the Student Code and Grievance Procedure are provided in the *TCL Student Handbook*, the Division Office, and the Learning Resources Center.

ATTENDANCE

The College's statement of policy indicates that students must attend ninety percent of total class hours or they will be in violation of the attendance policy.

- Students not physically attending class during the first ten calendar days from the start of the semester must be dropped from the class for NOT ATTENDING.
 - Students taking an online/internet class must sign in **and** complete an assignment designated by the instructor within the first ten calendar days from the start of the semester to indicate attendance in the class. Students not attending class during the first ten calendar days from the start of the semester must be dropped from the class for NOT ATTENDING.
 - Reinstatement requires the signature of the division dean.
 - In the event it becomes necessary for a student to withdraw from the course **OR if a student stops attending class, it is the student's responsibility to contact the instructor via e-mail requesting to be withdrawn from the class.** Withdrawing from class may have consequences associated with financial aid and time to completion. Students are strongly encouraged to consult with Financial Aid prior to withdrawing from any class, particularly if the student is currently on a warning or probation status.
 - When a student exceeds the allowed absences, the student is in violation of the attendance policy. The instructor **MUST** withdraw the student with a grade of "W", "WP", or "WF" depending on the date the student exceeded the allowed absences and the student's progress up to the last date of attendance
- or*
- Under extenuating circumstances and at the discretion of the faculty member teaching the class, allow the student to continue in the class and make-up the work. This exception must be documented at the time the allowed absences are exceeded.
 - Absences are counted from the first day of class. There are no "excused" absences. All absences are counted, regardless of the reason for the absence.

Approved/Revised/Updated: 03/01/2017

- A student must take the final exam or be excused from the final exam in order to earn a non-withdrawal grade.
- A copy of TCL's **STATEMENT OF POLICY NUMBER: 3-1-307 CLASS ATTENDANCE (WITHDRAWAL)** is on file in the Division Office and in the Learning Resources Center.

ONLINE ATTENDANCE PROCEDURE

For all online courses, students must complete an assignment designated by the instructor during the first week of classes. The instructor will drop the student from the course if the initial assignment is not completed.

Instructors will withdraw students from the class when 90% attendance is not maintained. Attendance in an online course is defined by regular course access and by timely completion of assignments as required by the instructor. Each student will be expected to access the web class at least once a week and complete 90% of assignments on time. Additional access is encouraged and may be necessary for successful completion of classes.

Failure to log in and complete assignments will result in the student being withdrawn from the course. The instructor will assign a grade of "W," "WP," or "WF" based upon the student's academic standing as the last date of attendance, which is the last login. Students are responsible for any financial matters associated with an administrative withdrawal. If a student fails to email the instructor (using the my.tcl.edu email account) requesting to be dropped from the course and has not submitted the initial assignment required during the first week of class, the instructor will assign a "Never Attended" code in the student information system (web-advisor) no later than ten calendar days after the first day of the class. Students who are dropped as a result of never attending the course are still responsible for all fees associated with the course.

HAZARDOUS WEATHER

In case weather conditions are so severe that operation of the College may clearly pose a hardship on students and staff traveling to the College, notification of closing will be made through the following radio and television stations: WYKZ 98.7, WGCO 98.3, WGZO 103.1, WFXH 106.1, WWVW 106.9, WLOW 107.9, WGZR 104.9, WFXH 1130 AM, WLVH 101.1, WSOK 1230 AM, WAEV 97.3, WTOC TV, WTGS TV, WJWJ TV, and WSAV TV. Students, faculty and staff are highly encouraged to opt in to the Emergency Text Message Alert System. <http://www.tcl.edu/current-students/text-alert>

EMERGENCY TEXT MESSAGE ALERT

Students, faculty and staff are highly encouraged to opt in to the Emergency Text Message Alert System. Participants receive immediate notification of emergency events and weather cancellations via text messaging on their cell phones. Participants can also opt in to receive non-emergency news and announcements. Go to www.tcl.edu. On the homepage, click on "emergency TextAlert at TCL" and fill out the form or go to <http://www.tcl.edu/current-students/text-alert>

GRADING METHODOLOGY

The final grade must be 70 or more (a grade "C" or better) in order to pass the course and progress to the next course. Students absent from an examination or presentation will receive a "0" grade for the examination unless other arrangements are made with the individual instructor prior to the examination or presentation day or on the examination or presentation day before the test/presentation is scheduled to be given.

The student is responsible for notifying the instructor for the reason of the absence. It is also the responsibility of the student to contact the appropriate instructor to arrange to make up the examination. Arrangements may be completed by telephone.

If the instructor is not available, a message should be left on the instructor's voice mail AND with another member of the faculty or administrative assistant. The make-up exam will be scheduled and the instructor will decide the method of examination. Messages sent by other students are unacceptable.

SAFETY ADDENDUM

Purpose

The purpose of this safety addendum is to provide each student with safety guidelines during an incident, emergency, or disaster at TCL. In addition, it provides students guidelines for lockdown procedures, evacuation procedures, and active shooter.

Definitions

An incident is any event, potential or actual, that may impact normal operations but has no immediate health or life threatening consideration or serious effect on the overall functional capacity of the College. An event of this nature should be reported to the Office of the Vice President for Administrative Services. Also notify the off-site campus administrator if applicable.

An emergency is any incident, potential or actual, which may endanger life or health or which affects an entire building or buildings, and will disrupt the overall operations of the College. Outside emergency services will probably be required, as well as major efforts from campus support services. Major policy considerations and decisions will usually be required from the college administration during times of crises. An emergency should be reported immediately by directly using **911** if life or health/injury considerations exist and then to the Office of the President or Vice President for Administrative Services as quickly as possible. Also notify the off-site campus administrator if applicable.

A disaster is any event or occurrence that has taken place and has seriously impaired or halted the operations of the College. In some cases, mass personnel casualties and severe property damage may be sustained. A coordinated effort of all campus-wide resources is required to effectively control the situation. Outside emergency services will be essential. In all cases of disaster, an Emergency Control Center will be activated, and the appropriate support and operational plans will be executed. The disaster should be immediately reported, first by calling **911** and then to the Office of the President or Vice President for Administrative Services. Also notify the off-site campus administrator if applicable.

Types of Emergencies

- Hurricane
- Tornado
- Fire
- Biochemical or Radiation Spill
- Explosion/Bomb
- Downed Aircraft (crash which directly impacts campus operations)
- Utility Failures
- Violent or criminal behavior
- Psychological Crisis

Procedures:

Active Shooter

Run/hide/fight (<http://www.fbi.gov/about-us/cirg/active-shooter-and-mass-casualty-incidents/run-hide-fight-video>)

Building Evacuation

1. Building evacuations occur when an alarm sounds and/or upon notification by Security or the Emergency Director.
2. When the building evacuation alarm is activated during an emergency, individuals should exit according to the building evacuation plan and alert others to do the same.
3. Once outside, individuals should proceed to a clear area that is at least 500 feet away from the affected building. Streets, fire lanes, hydrant areas and walkways should be kept clear for emergency vehicles and personnel.
4. Individuals should not return to an evacuated building unless told to do so by Security or the Emergency Director.
5. Individuals should assist persons with disabilities in exiting the building. Elevators are reserved for disabled persons

Campus Evacuation

1. A uniformed Security Guard, the Emergency Director, or an Emergency Resource Team member will announce evacuation of all or part of the campus grounds.
2. All persons (students and staff) are to immediately vacate the campus, or in the case of a partial evacuation relocate to another part of the campus grounds as directed.

Lockdown

1. Clear the halls
2. Report to the nearest classroom/office
3. Assist those needing special assistance
4. Ensure classroom/office doors are closed and locked
5. Turn off lights
6. Stay away from doors and windows (out of the line of sight)
7. BE QUIET and follow instructor's directions
8. Silence cell phones
9. Wait for the "All Clear" before leaving