



## **BIOLOGY 221 Course Syllabus: Human Anatomy and Physiology I Spring – 2019**

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**Text Book: Human Anatomy and Physiology, 11<sup>th</sup> Ed. (Marieb and Hoehn)**

Textbook is your main source of reference, review and learning.

Other Recommended Resources: Complete Anatomy (app), Mastering A&P (Pearson)

### **Lecture time and location:**

**Lecture** will meet in Room 154 in the Rita Liddy Hollings Science Center (RITA) from 8:00 am to 9:15 am on Tuesday and Thursday each week.

### **Course Description:**

BIOL 221, Human Anatomy & Physiology I, explores the gross morphology, microscopic anatomy, structure and function of the integumentary, skeletal, nervous (neuron and neuroglia), muscular (skeletal, cardiac, and smooth) and endocrine systems of the human body. In addition, the lab presents the histology and gross anatomy of these tissues, organs and organ systems, and provides hands-on experience for learning the topics and principles of physiology presented in the lecture. This course is intended for pre-allied health, pre-nursing, and physical education majors.

Prerequisites: Biology 111 and 112 with labs.

**Course Objectives and Student Learning outcomes:**

- Students will attain a basic understanding of the human body as well as structure-function relationships between different parts of the body
- Students will learn the essential terminology necessary to properly describe the fundamental relationships and orientation of structures in the human body.
- Students will be able to relate physiology to human health and disease.
- Demonstrate an understanding of the scientific method and experimental design
- Demonstrate the ability to effectively communicate and work collaboratively together with peers in the laboratory.
- Students will demonstrate continued development of written, oral, and computational skill sets

**Grading:**

**Lecture grades**

- **Lecture exams:** 3 exams 100 points each .....300pts
- **Final Exam**.....240pts
- **Quizzes** 3 quizzes 20 points each .....60pts

**Laboratory Grades**

- **Lab practical I (Midterm)** .....100pts
- **Lab practical II** .....100pts
- **Lab Final** ..... 100pts
- **Quizzes** ..... 80pts
- **Participation** ..... 20pts
- Letter grades are based on the following scale (percentage):
  - A 93 - 100
  - A- 90 - 92
  - B+ 87 - 89
  - B 83 - 86
  - B- 80 - 82
  - C+ 77 - 79
  - C 73 - 76
  - C- 70 - 72
  - D+ 67 - 69
  - D 63 - 66
  - D- 60 - 62
  - F less than 60

You are encouraged to take advantage of the Center for Student Learning's academic support services. You will be offered a variety of services, including study strategies, speaking and writing strategies, and course content. The center provides tutoring, supplemental instruction, and workshops. A SI will also be available for lectures.

### **Attendance Policy:**

Before attending the class, you must meet all the prerequisites and officially register for this course. **Attendance is mandatory.** Class distractions should be kept to a minimum. Tardiness causes distraction in the learning environment. Therefore, students will only have a 5 minute period after class is in session to settle down. Lastly, your success is dependent upon your effort and study techniques. I will review the main concepts with you in my lectures through my PowerPoints. However, these PowerPoints will usually contain mostly figures. Thus, you need to take thorough notes in class and come prepared by reading the textbook before class.

Test make-ups are strongly discouraged and will not generally be allowed unless the student can properly justify the absence with documentation. Only one make-up exam is allowed, and only with a valid, documented excuse. There will also be **NO MAKE-UPS** for the laboratory practical.

**Disabilities:** The College will make reasonable accommodations for individuals with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible.

### **Academic Dishonesty:**

Academic dishonesty is not tolerated at College of Charleston. Academic dishonesty includes, but is not limited to, inappropriate use of a college computer or cellphone, unauthorized collaboration, plagiarism, and falsification of information. Students are responsible for adhering to all the policies and procedures in the College of Charleston Student Handbook.

Guidelines for this course will follow the College of Charleston Undergraduate Catalog policies for Academic Integrity and the Honor Code, Student Code of Conduct, and Classroom Code of Conduct. Students can find the complete Honor Code and all related processes in the *Student Handbook* at <http://www.cofc.edu/generaldocuments/handbook.pdf>

When a student is suspected of violating the Honor Code, he or she will be reported to the Dean of Students by the instructor. Furthermore, students will receive a XXF for the course to indicate course failure as a result of academic dishonesty. This notation will remain for two years, after which the student may petition to have it expunged. However, the F will remain on the student's record. Individuals may also be subject to disciplinary probation, suspension, or expulsion from College of Charleston by the Honor Board.

### **Use of Cell Phones and Computers:**

Cell phones are encouraged only when it is during an activity where students are engaged with materials and may want to reference lab materials. There will be a penalty for students caught using their cell phones in a manner not related to lecture or lab. **Turn all electronic devices off or on vibrate before entering the class.** Computers will be allowed **only to take notes.** If I see you using your computer for

other assignments or anything else not related to this lecture, you will be penalized 2 points each time I see you.

**Bio 221 Lecture Schedule  
Spring, 2019  
(Subject to change with notice)**

<b>Week of</b>	<b>Chapter</b>	<b>Subject</b>	<b>Exam</b>
1/7	1	Introduction; Homeostasis	
1/14	3;4	Cell; Tissues	
1/21	4	Tissues; Review	<b>Quiz 1</b> 1/24
1/28	5	Integumentary system	<b>Exam 1 (Chapters 1;3;4)</b> 1/31
2/4	6	Bone – Structure	
2/11	6	Bone – Development/ Growth	<b>Quiz 2</b> 2/14
2/18	8	Skeletal system; Joints; Review	
2/25	3;11	Excitable cell Physiology	<b>Quiz 3</b> 2/26 <b>Exam 2</b> <b>(Chapters 5;6;8)</b> 2/28
3/4	11	Excitable cell Physiology; Neurons; Aps; Gps	
3/11	9; 10	Muscle – skeletal	
3/18			<b>Spring Break</b>
3/25	9;18	Muscle – skeletal, Cardiac and Smooth	
4/1	18	Muscle – Cardiac and Smooth	<b>Quiz 4</b> 4/2 <b>Exam 3</b> <b>(Chapters 3;9-11;18)</b> 4/4
4/8	24;16	Metabolism; Endocrine system	
4/15	16	Endocrine system; Review	Last week of class
5/2			<b>Final Exam (Cumulative)</b> <b>5/2 (8am -11am)</b>

**Lab attendance is mandatory.**

Lab absences will incur a **30-point penalty**. You are allowed one absence (excused or unexcused) from lab without this penalty. Each lab you miss thereafter will incur a 30 point penalty, in addition to those points lost from missing lab quizzes (or practical exams!). Outside of the scheduled lab sections on Monday through Thursday, the lab will be open on Fridays and weekends to allow additional time to study and learn the anatomy.

No food or drinks are allowed inside the lab and please wear closed toed shoes.

Before leaving the laboratory organize and clean your lab area.

Report any accident or injury to your teaching assistant, instructor, or lab supervisor immediately.

**Bio 221 Lab Schedule  
Spring, 2019  
(Subject to change with notice)**

Week	Chapters	Subject
1/7		No lab
1/14	1; 3; 4	Introduction; Microscopy; Cell; Histology
1/21	4	Histology <b>Quiz 1</b>
1/28	4; 5	Histology; Integument <b>Quiz 2</b>
2/4		<b>Lab Practical I (Chapters 1, 3 and 4)</b>
2/11	6; 7	Bone; Skeleton <b>Quiz 3</b>
2/18	7; 8	Skeleton; Joints <b>Quiz 4</b>
2/25	9; 10	Micro Anatomy of muscle; Muscle Gross Anatomy – head <b>Quiz 5</b>
3/4		<b>Lab Practical II (Chapters 5 – 8)</b>
3/11	9; 10	Muscle – torso; Electromyography experiment <b>Quiz 6</b>
3/18		<b>Spring break; No Lab</b>
3/25	10	Muscle – arms, legs; Reflex latency experiment <b>Quiz 7</b>
4/1	10; 16	Muscle; Endocrine <b>Quiz 8</b>
4/8	16	Endocrine; Review <b>Quiz 9</b>
4/15		<b>Lab practical III (Chapters 9, 10 and 16)</b>

### **Additional Information:**

- **Make sure that you check your college Email Daily!**
  - All communication pertaining to the lecture and lab will be done through your college e-mail and OAKS account.
  - You are responsible for all the information provided in the e-mails sent to you, and you must check for messages on a daily basis throughout the entire semester, including the weekend.
- **Where to find your grades:**
  - The grades will be posted on OAKS.
- **PowerPoints will be posted on OAKS.**
- **Extra Credit Policy:**
  - I do not offer any additional work for extra credit

### **Important Dates:**

- **Monday January 14** – Drop/Add
- **Monday March 25** – last day to withdraw with a “W” grade
- **Thursday May 2** – Final Exam (8:00am – 11:00am) in your regular classroom (RITA/154)

### **Learning Objectives:**

#### **Intro, Homeostasis**

- Form determines function (**Ch. 1.1**)
- Overview of levels of biological organization (**Ch. 1.2**)
  - Organ system overview (*Fig. 1.4*)
- Requirements for life (**Ch. 1.3**)
- Homeostasis (**Ch. 1.4**)
  - Components of homeostatic control (*Fig. 1.5*)
  - Negative (*Fig. 1.6*) and positive (*Fig. 1.7*) feedback mechanisms
- Anatomical position (**Ch. 1.5**; *Fig. 1.8*)
- Anatomical vocabulary (Table 1.1)

#### **Cell**

- Cell theory (**Ch. 3.1**)
- Fluid mosaic model of the plasma membrane (**Ch. 3.2**)
  - Phospholipids
  - Glycolipids
  - Cholesterol
  - Membrane proteins (**Ch. 3.2**)
- Cell junctions (**Ch. 3.4**)
  - Tight junctions
  - Desmosomes
  - Gap junctions
- Organelles (**Ch. 3.7**)
  - Mitochondria

- Ribosomes
- Endoplasmic reticulum (rough and smooth)
- Golgi apparatus
- Peroxisomes
- Lysosomes
- Cytoskeleton
  - Microfilaments
  - Intermediate filaments
  - Microtubules
  - Centriole
  - Cilia
  - Microvilli
  - Flagella

Nucleus (**Ch. 3.9**)

DNA (*Fig. 3.26*)

RNA (**Ch. 3.11**)

Transcription (*Figs. 3.29, 3.30*)

Translation (*Figs. 3.32, 3.33, focus fig 3.5*)

## **Tissues**

Four primary tissue types – epithelium, connective tissue, muscle, nervous.

Epithelium (**Ch. 4.2**)

Simple

Squamous

Cuboidal

Columnar

## **Tissues**

Epithelium (**Ch. 4.2**)

Stratified

Squamous

Cuboidal

Columnar

Pseudostratified

Transitional

Connective tissue (**Ch. 4.3; Fig. 4.11**)

Connective Tissue Proper

Areolar

Adipose

Dense regular and irregular CT

Cartilage

Elastic

Hyaline

Fibrocartilage

Bone

Blood

Muscle (**Ch. 4.4; Fig. 4.12**)

Skeletal

Cardiac

Smooth

Nervous tissue (**Ch. 4.5; Fig. 4.13**)

- Neurons
- Neuroglia
  - Astrocytes
  - Microglia
  - Schwann cells and oligodendrocytes
  - Ependymal cells

### **Integumentary System**

- Layers of the skin (**Ch. 5.1**; *Fig. 5.1*)
- Epidermis (**Ch. 5.2**)
  - Cells
    - Keratinocytes
    - Melanocytes
    - Dendritic cells
    - Tactile cells
  - Layers (*Fig. 5.2*)
    - Stratum basale
    - Stratum spinosum
    - Stratum granulosum
    - Stratum lucidum
    - Stratum corneum.
- Dermis (**Ch. 5.3**; *Fig. 5.3*)
  - Papillary layer
  - Reticular layer
- Skin pigmentation (**Ch. 5.4**)
- Structure of hair and the hair follicle (**Ch. 5.5**; *Fig. 5.6*)
- Structure of nails (**Ch. 5.6**; *Fig. 5.7*)
- Exocrine glands
  - Eccrine sweat glands
  - Apocrine sweat glands
  - Sebaceous glands
- Functions of the integumentary system (**Ch. 5.8**)
  - Protection/immune
  - Regulation of body temperature
  - Cutaneous sensation
  - Metabolism
  - Blood reservoir
  - Excretion
- Repair of integument (**Ch. 4.7**; *Fig. 4.15*)

### **Bone - Structure**

- Intro to skeletal system, cartilages (**Ch. 6.1**)
- Functions of bones (**Ch. 6.2**)
- Axial and appendicular skeleton, classification of bone (**Ch. 6.3**)
- Bone Structure (**Ch. 6.4**)
  - Compact (cancellous) bone
  - Spongy (trabecular)
  - Structure of long bone (*Fig. 6.5*)
  - The osteon (Haversian system) (*Figs. 6.8, 6.9*)
    - Cells of bone tissue (*Fig. 6.6*)
  - Chemical composition of bone



Bone markings (Table 6.2)

### **Bone - Development/Growth**

Bone development (**Ch. 6.5**; *Figs. 6.10, 6.11*)

Bone growth (*Figs. 6.12, 6.13*)

Bone remodeling (**Ch. 6.6**; *Figs. 6.14, 6.15*)

Repair of fractures (*Fig. 6.16*; Table 6.3).

Bone disorders (**Ch. 6.8**; *Figs. 6.17, 6.18*)

### **Skeleton, Joints**

Classifications of joints (**Ch. 8.1**)

Synarthroses

Amphiarthroses

Diarthroses

Fibrous joints (**Ch. 8.2**)

Sutures (*Figs. 8.1a, 7.5a&b, 7.4*)

Syndesmoses (*Figs. 8.1b; 7.29b&c, 7.34*)

Gomphosis (*Figs. 8.1c, 7.11, 23.12*)

Cartilaginous joints (**Ch. 8.3**)

Synchondroses (*Figs. 8.2a, 7.23a, 6.8, 6.11*)

Symphyses (*Figs. 8.2b, 7.17, 7.31*)

Synovial joints (**Ch. 8.4**)

Structure (*Figs. 8.3, 8.4*)

Movements (*Figs. 8.5, 8.6*)

Types (**Ch. 8.5**; Focus Figure 8.1)

Joint injuries and disorders (**Ch. 8.6**; *Figs. 8.13, 8.14*)

### **Excitable Cell Physiology**

Passive and active transport

Diffusion (**Ch. 3.3**; *Figs. 3.5, 3.6*)

Fick's Law of Diffusion

Osmosis (*Figs. 3.7, 3.8*)

Na<sup>+</sup>/K<sup>+</sup> ATPase (**Ch. 3.4**; Focus Figure 3.2).

Excitable cells

Resting membrane potential (**Ch. 3.5, Ch. 11.4**; *Fig. 3.13*; Focus Figure 11.1)

### **Excitable Cell Phys - Neuron, Graded Potentials and Action Potentials**

Graded Potentials (**Ch. 11.5**; *Figs. 11.9 and 11.10*)

Action Potentials (**Ch. 11.6**; Focus Figure 11.2; *Fig. 11.11*)

Synapse (**Ch. 11.7**; Focus Figure 11.3)

Refractory Periods (*Fig. 11.13*)

Encoding (*Fig. 11.12*)

### **Muscle - Skeletal**

Review of muscle tissue (**Ch. 9.1**)

Organization of skeletal muscle (**Ch. 9.2**; *Fig. 9.1*; Table 9.1)  
Micro-structure and sliding filament theory (**Ch. 9.3**; *Figs. 9.2, 9.3, 9.4, 9.6*)  
Muscle stimulation (**Ch. 9.4**; Focus Figure 9.1; *Figs. 9.8, 9.9*)  
Excitation-Contraction coupling (*Figs. 9.5, 9.7*; Focus Figure 9.2)  
Contraction (Focus Figure 9.3)

### **Muscle – Skeletal**

Wave summation and motor unit recruitment (**Ch. 9.5**)  
    Muscle twitch  
    Summation (*Figs. 9.11, 9.12*)  
    Motor units (*Fig. 9.10*)  
    Recruitment (*Figs. 9.13 and 9.14*)  
Factors that affect maximum muscle performance (**Ch. 9.7**; *Figs. 9.18, 9.19, 9.20, 9.21*;  
Table 9.2).  
How muscles are named (**Ch. 10.2**)  
Fascicle arrangements (**Ch. 10.3**; *Fig. 10.1*)  
Muscle actions (Focus Figure 10.1)  
Lever systems (**Ch. 10.4**; *Fig. 10.3*)

### **Muscle – Cardiac and Smooth**

Smooth Muscle (**Ch. 9.9**; *Figs. 9.22, 9.23, 9.24, 9.25*)  
Cardiac Muscle (**Ch. 18.4, Ch. 18.5**; Table 18.1)  
    Micro-anatomy (*Fig. 18.11*)  
    Autorhythmic myocardium (*Fig. 18.12*)  
    Contractile myocardium (*Fig. 18.5*)  
    Excitation-contraction coupling

### **Metabolism**

Metabolic pathways and muscle performance (**Ch. 9.6**; *Figs. 9.16, 9.17*)  
    Fatigue  
    Excess post-exercise oxygen consumption (EPOC)  
Metabolism  
    Anabolism and catabolism (**Ch. 24.3**; *Fig. 24.3*)  
    ATP synthesis (**Ch. 24.4**; *Figs. 24.4, 24.5*)  
        glycolysis (*Fig. 24.6*)  
        Krebs cycle (**Ch. 24.7**)  
        Electron transport chain (Focus Figure 24.1; *Figs. 24.8, 24.9, 24.10*)  
    Glycogenesis/glycogenolysis (*Fig. 24.13*)  
    Lipid metabolism (*Figs. 24.16, 24.15*)  
    Protein metabolism (*Figs. 24.17, 24.19*)

### **Endocrine System**

Endocrine overview (**Ch. 16.1**; *Fig. 16.1*)  
Chemical structure of hormones (**Ch. 16.2**)  
Mechanisms of action (**Ch. 16.3**)  
    Secondary messenger system (*Fig. 16.2*)  
    Direct gene activation (*Fig. 16.3*)

Endocrine stimuli/control (**Ch. 16.4**; *Fig. 16.4*)

Stimuli

Humoral

Neural

Hormonal

Positive vs negative feedback loops

Hormone interactions

Permissiveness

Synergism

Antagonism

Hypothalamus and pituitary gland (**Ch. 16.6**; Focus Figure 16.1; Table 16.3)

Regulation of Growth Hormone (*Fig. 16.5*)

Thyroid

Regulation of Thyroid Hormone (*Figs. 16.7, 16.8, 16.9*; Table 16.4)

Regulation of Calcitonin

Parathyroid

Regulation of Parathyroid hormone (*Figs. 16.11, 16.12*)

Adrenal gland hormones

Regulation of Water Volume and Blood Pressure

Anti-diuretic hormone (ADH)

Regulation of aldosterone (*Fig. 16.4*)

Humoral control

Renin-angiotensin pathway

ACTH

Atrial natriuretic peptide

Pancreas and regulation of blood glucose (**Ch. 16.11**; *Figs. 16.16, 16.17, 16.18*)

Insulin

Glucagon

Type 1 vs Type 2 Diabetes.