

CURRICULUM TRANSMITTAL COVER PAGE

Department: Biological Sciences

Date: 3/27/2020

Title Of Course/Degree/Concentration/Certificate: BIO 1100 - Human Anatomy and Physiology I

Change(s) Initiated: (Please check)

- | | |
|---|--|
| <input type="checkbox"/> Closing of Degree | <input type="checkbox"/> Change in Degree or Certificate |
| <input type="checkbox"/> Closing of Certificate | <input type="checkbox"/> Change in Degree: Adding Concentration |
| <input type="checkbox"/> New Certificate Proposal | <input type="checkbox"/> Change in Degree: Deleting Concentration |
| <input type="checkbox"/> New Degree Proposal | <input checked="" type="checkbox"/> Change in Prerequisite, Corequisite, and/or Pre/Co-requisite |
| <input type="checkbox"/> New Course | <input type="checkbox"/> Change in Course Designation |
| <input type="checkbox"/> New 82 Course (Pilot Course) | <input type="checkbox"/> Change in Course Description |
| <input type="checkbox"/> Deletion of Course(s) | <input checked="" type="checkbox"/> Change in Course Title, Number, Credits and/or Hours |
| | <input type="checkbox"/> Change in Academic Policy |
| | <input type="checkbox"/> Pathways Submission: |
| | <input type="checkbox"/> Life and Physical Science |
| | <input type="checkbox"/> Math and Quantitative Reasoning |
| | <input type="checkbox"/> A. World Cultures and Global Issues |
| | <input type="checkbox"/> B. U.S. Experience in its Diversity |
| | <input type="checkbox"/> C. Creative Expression |
| | <input type="checkbox"/> D. Individual and Society |
| | <input type="checkbox"/> E. Scientific World |
- Change in Program Learning Outcomes
- Other (please describe): _____

PLEASE ATTACH MATERIAL TO ILLUSTRATE AND EXPLAIN ALL CHANGES

DEPARTMENTAL ACTION

Action by Department and/or Departmental Committee, if required:

Date Approved: 3/27/2020 Signature, Committee Chairperson: 

If submitted Curriculum Action affects another Department, signature of the affected Department(s) is required:

Date Approved: _____ Signature, Department Chairperson: _____

Date Approved: _____ Signature, Department Chairperson: _____

I have reviewed the attached material/proposal

Signature, Department Chairperson: 

Kingsborough Community College
The City University of New York

Modifications in Credits/Hours for an Existing Course Form

1. Course Number and Title: **BIO 1100- HUMAN ANATOMY AND PHYSIOLOGY I**

2. This Course is **currently** listed as:

4 Credits

7 Hours (include break-down of lecture, lab, or gym)

3. **Proposed** Change in Credits/Hours (Please check **ONE** appropriate box below based on credits):

It is recommended that you refer to the “College Credits Assigned for Instructional Hours” PDF at <http://kingsborough.edu/aa/Pages/forms.aspx>

Hours are hours per week in a typical 12-week semester

1-credit:	<input type="checkbox"/> 1 hour lecture
	<input type="checkbox"/> 2 hours lab/field/gym

2-credits:	<input type="checkbox"/> 2 hours lecture
	<input type="checkbox"/> 1 hour lecture, 2 hours lab/field
	<input type="checkbox"/> 4 hours lab/field

3-credits:	<input type="checkbox"/> 3 hours lecture
	<input type="checkbox"/> 2 hours lecture, 2 hours lab/field
	<input type="checkbox"/> 1 hour lecture, 4 hours lab/field
	<input type="checkbox"/> 6 hours lab/field

4-credits:	<input type="checkbox"/> 4 hours lecture
	<input type="checkbox"/> 3 hours lecture, 2 hours lab/field
	<input checked="" type="checkbox"/> 2 hours lecture, 4 hours lab/field
	<input type="checkbox"/> 1 hour lecture, 6 hours lab/field
	<input type="checkbox"/> 8 hours lab/field

More than 4-credits:	<input type="checkbox"/> Number of credits: ____ (explain mix lecture/lab below)
	____ Lecture ____ Lab
Explanation:	_____

4. Rationale/Justification for the change in credits/hours for this course:

BIO 11 is currently offered as a 4 credit course with 7 student contact hours. The current contact hours are 3 for lecture and 4 for lab, resulting in a disparity between the number of credits and contact hours (which should be 1 credit/contact hour for lecture and ½ credit/contact hour for lab). This is out of compliance with Middle States, New State Department of Education, and CUNY guidelines and is also a disservice to our students. The proposed changes will adjust the number of contact hours to 2 for lecture and 4 for lab for a total of 6 contact hours and the correct number of credits.

5. Include the **Current**Syllabus/Topical Course Outline and the **Proposed** Syllabus/Topical Course Outline for the course. **Highlight** areas that have been modified and serve as the justification for the proposed change in credits/hours for the course.

Please see attached two documents

ORIGINAL BIOLOGY 11 SYLLABUS

Human Anatomy and Physiology (4 credits and 7 hours)

Spring 2020 / Summer 2020

SYLLABUS AND COURSE INFORMATION

COURSE CO-COORDINATORS FOR BIOLOGY 11 & 12

Dr. Sherrye Glaser	S222	368-5748
Dr. Anna Rozenboym	S132	368-6703

Required textbook and Laboratory manual:

Textbook for Biology 11.

Students will be using openstax ebook needed for this course. Details will be explained by instructors in class.

Laboratory Manual for Biology 11 and 12:

Elaine N. Marieb, and Lori A. Smith. Human Anatomy and Physiology Laboratory Manual (Pig version, Thirteenth edition), 2018. Pearson Publishing.

BIOLOGY 11: HUMAN ANATOMY AND PHYSIOLOGY

PROGRAM GOALS FOR STUDENT OUTCOMES

Allied Health Programs

1. Demonstrate knowledge of basic concepts in anatomy and physiology.
2. Demonstrate proficiency in use of basic laboratory equipment and instruments.
3. Apply knowledge to distinguish normal from homeostatic imbalances.
4. Demonstrate basic computer skills and competence utilizing the Internet for solving problems.
5. Solve a biomedical problem through analysis and interpretation of tabulated and graphical data.
6. Demonstrate understanding of the scientific literature related to allied health fields through presentation of findings in written form and to an audience.

COURSE GOALS

Course goals for Bio 11

1. Demonstrate proficiency in the use of basic laboratory instruments including the microscope, triple beam balance, pipettes, and glassware, and basic tools for analysis of physiological signs, including relevant computer-based equipment and software.
2. Apply the scientific method when thinking and learning about human anatomy and physiology.
3. Recognize and explain the principle of homeostasis and the use of feedback loops to control the physiology of the body systems.
4. Demonstrate an understanding of basic chemical and biochemical concepts inherent to the function of the human body.
5. Develop the anatomical/physiological vocabulary essential to success in this course.
6. Understand the fundamentals of the cell and its components, and cell specializations in various body systems.
7. Understand the relationship between cells, tissues and organs.
8. Recognize and explain the interrelationships within and between anatomical and physiological aspects of the integumentary, skeletal, muscular, nervous, and endocrine systems, and of the interrelations between these systems as they maintain homeostasis.

Statement to the Students

Course Prerequisites:

Placement at the English 12 and Math 09 levels on the CUNY assessment tests.

Course Description:

Biology 11 is the first semester of a one-year course in Human Anatomy and Physiology. Both Biology 11 and Biology 12 are designed to provide students with a thorough understanding of the basic principles inherent in the study of human anatomy and physiology, and is intended for students majoring in the allied-health professions, e.g. nursing, pre-physical therapy, pre-physicians assistant, etc. The emphasis of this course will be concerned with understanding the structural and functional relationships of the major organ systems of the human body. A special effort will be made to understand the concept of homeostasis and how the individual organ systems of the body interact with each other in the maintenance of the normal functioning of the entire organism.

Biology 11 combines both lecture and laboratory experiences over a twelve week period. Each week, **the class meets for a three-hour lecture session, a four hour laboratory session.**

There will be a writing assignment(s) during the semester relating to an aspect of human anatomy and physiology. Details will be provided by your instructor.

Plagiarism as a violation of academic integrity is the intentional use of another's intellectual creation(s) without attribution. Determination and penalty—ranging from grade reduction to course failure—is at the sole discretion of the faculty member. If a faculty member suspects that a student has committed a violation of CUNY or KCC's Academic Integrity Policy, he/she shall notify the student of the facts and circumstances of the suspected violation whenever possible. It is then at his/her discretion to seek an academic or disciplinary sanction.

Required Materials

Textbook for Biology 11

Students will be using openstax ebook needed for this course. Details will be explained by instructors in class.

Laboratory Manual for Biology 11 and 12:

Elaine N. Marieb, and Lori A. Smith. Human Anatomy and Physiology Laboratory Manual (Pig version, Thirteenth edition), 2018. Pearson Publishing.

Following materials are required for lab:

1. Dissecting Kit for laboratory dissections
2. Full length Laboratory Coat
3. Disposable Non-Latex Gloves
4. Goggles
5. No open-toed shoes in lab

Reading Assignments

To obtain the maximum advantage from the required readings, you should complete the readings **before** coming to class for the week in which the assignments are given. The lecture syllabus lists the reading assignments that will prepare you for the lectures and laboratory exercises for that particular week and refers to reading assignments in your textbook. The sequence of laboratory exercises lists reading assignments in the laboratory manual. It is very important for you to be familiar with the laboratory exercises before performing the experiments or procedures described in the manual. The benefits that you will derive by completing the readings for lecture and laboratory **prior** to the week for which they are assigned are as follows:

1. You will find that it is easier to understand the lecture and laboratory material because you already have some background regarding the topics that are to be covered.
2. The reading assignments for lecture and laboratory are directly related to the topics that will be covered. If you are already familiar with these topics, you will find that you will be able to take fewer and better notes and pay more attention to what the lecturer is saying.
3. Prior reading of the assignments can help you to pinpoint areas in which may be giving you some difficulty. You then can pay very special attention to what the lecturer is saying when discussing these same topics.
4. Reading the assigned material for the laboratory in both the textbook and laboratory manual **prior** to coming to laboratory will help you to get the maximum benefits from your laboratory experiences. Having relevant background information will help you to better understand the laboratory exercises.

Grade Determination:

1. **Laboratory:** The laboratory portion of Biology 11 represents 50% of the course grade. The grade for laboratory will be based on your quiz grades, the writing assignments, and other factors that will be explained to you by your laboratory instructor.
2. **Lecture:** There will be several unit exams that will be administered during the semester **determined by the individual instructor.** The unit examinations will represent 30% of your grade. The final examination will account for 20% of your grade.

3. **Summary of the grading procedures:**

Laboratory quizzes; lab practicals and reports etc	=	50%
Unit examinations	=	30%
Final examination	=	<u>20%</u>
<hr/>		
Total	=	100%

Lecture Syllabus (*openstax ebook*)

Week

1. **An Introduction to Human body:** Overview of Anatomy and Physiology. Structural Levels of organization. Homeostasis. Anatomical terminology. Medical Imaging **Chapter 1.**
2. **The Chemical level of organization:** Chemistry: Elements and atoms. Chemical bonds. Chemical reactions. **Chapter 2.**
3. **The Chemical level of organization:** Inorganic and organic compounds. **Chapter 2.**
4. **The Cellular level of organization:** Cell membrane. Cytoplasm and cellular organelles. The nucleus and DNA replication. Protein synthesis. Cell growth and Division. Cellular differentiation **Chapters 3.**
5. **The Tissue level of organization:** Types of tissues. Epithelial, connective, nervous & muscle and tissues. Tissue injury and aging. **Chapter 4.**
6. **The Integumentary System:** Layers of skin. Accessory structures of skin. Functions of the integumentary system. Diseases, Disorders and Injuries of Integumentary system **Chapter 5.**
7. **Bones Tissue and Skeletal system:** Functions of skeletal system. Bone Classification. Bone structure. Bone formation and development. Fracture. Exercise, nutrition, hormones and bone tissue. Calcium homeostasis. **Chapter 6.**
8. **Joints:** Classification. Fibrous, cartilaginous and synovial joints. Types of body movements. Anatomy of selected joints. **Chapter 9.**
Muscle tissue: Overview of muscle tissue. **Chapter 10.**
9. **Muscle tissue:** Skeletal muscle. Muscle fiber and contraction and relaxation. Nervous system control of muscle tension. Types of muscle fibers. Exercise and muscle performance. Cardiac muscle. Smooth muscle. Development and regeneration of muscle tissue. **Chapter 10.**
10. **The Nervous system and Nervous tissue:** Basic structure and function of nervous system. Nervous tissue. The Action potential. Communication between neurons. **Chapter 12.**
11. **Anatomy of Nervous System.** The Embryological perspective. The Central Nervous system. Circulation and the Central nervous system. The peripheral nervous system. **Chapters 13.**
12. **The Autonomic Nervous System.** Divisions of Autonomic Nervous system. Autonomic reflexes and homeostasis. Central control. Drugs that affect autonomic system. **Chapter 15.**

Laboratory Syllabus (*Laboratory Manual*)

Week

- 1. Scientific method and metric system.** *See handout.*
The language of anatomy: Anatomical position, surface anatomy, body planes and sections, body cavities. *Exercise 1*
- 2. Organ system overview:** Rat dissection. Identification of the major organ using the dissected rat and the torso models. *Exercise 2.*
Matter and Energy. Elements, atomic structure, chemical bonds, pH. *See departmental handouts*
Chemistry: Chemical reactions, synthesis of iron sulfate.
- 3. Properties of water,** lab exercises.
Introduction to macromolecules: structures and synthesis. **Macromolecules:** study and chemical detection. *See departmental handouts*
- 4. The microscope.** *OMIT ACTIVITY 5 (Cheek cell has been moved to week 5)* *Exercise 3, Act. 1, 2, 3 and 4)*
The Cell. Transport mechanisms and cell permeability: **Passive processes** (diffusion-osmosis and filtration), **Active processes** *Exercise 5, act. 1; act. 2 (demo); act. 3 (demo). Act. 5. Exp. 2)*
- 5. The cell:** Anatomy of the composite cell. Differences and similarities in cell structure. Cell division. *Exercise 4, act. 1, 2, 3, 4, and 5*
Cheek cell smear. *Exercise 3, activity 3*
Scientific drawings of Epithelial tissue. Classification of covering and lining membranes. *Exercise 6 (pp.69-74)*
- 6. Connective Tissue.** Scientific drawings *Exercise 6 (pp. 75-82)*
Introduction to the integumentary system and the skin. Basic structure of the skin and accessory organs of the skin. Cutaneous glands. *Exercise 7*
- 7. Introduction to the study of the skeletal system.** Study of the appendicular and axial skeleton. Assembly of disarticulated skeleton. The fetal skeleton. *Exercises 8, 9 and 10*
- 8. Articulations and body movements.** Study of the three major types of articulations, joint disorders and types of body movement. *Exercise 11*
- 9. Gross and microscopic study of the three muscle types.** Identification of selected muscle groups using the human torso model. **Physiology of skeletal muscle. Muscle Physiology Computerized Simulations.** *Exercises 6 (pp. 83-85), 12, 13, 14 act 4 Biopac*
- 10. Histology of nervous tissue. Gross neuroanatomy: Sheep brain dissection.** Study of the preserved human brain and models of the human brain. *Exercise 15, 17, 18 (act 2 Biopac), Ex 20 act 3 Biopac*
- 11. Gross anatomy, histology and physiology of the spinal cord.** Study of the anatomical aspects of the Autonomic Nervous System. **Reflex physiology and Computerized Reflex Simulations.** *Exercises 6 (pp. 82-83), 15,19, Exercise 21 and activity 10 Biopac*

12 Senses: Vision: Gross anatomy of the eye Dissection of the cow eye. Visual acuity and color blindness tests. Microscopic examination of the retina. **Exercise 23 and**

24

Audition: Hearing and equilibrium. Gross anatomy of the human ear (using models of the human ear). Auditory acuity and equilibrium tests. Microscopic anatomy of the Organ of Corti. Selected experiments dealing with the gustatory and olfactory senses. **Exercises 25 and 26**

LEARNING OBJECTIVES

Human Body: Orientation and Homeostasis

1. List and briefly describe the following branches of the science of biology and their origins: anatomy, gross anatomy, comparative anatomy, cytology, histology, physiology, and biochemistry.
2. Name and define 10 characteristics (qualities) of life.
3. Describe the levels of organization of matter in the universe with at least 2 specific examples for each level.
4. Define the following anatomical terms: (a) anterior, (b) posterior, (c) superior, (d) inferior, (e) dorsal, (f) ventral, (g) medial, (h) lateral, (i) proximal (j) distal, (k) superficial, (l) deep.
5. Explain how the body or an organ is cut in each of the following planes: longitudinal, sagittal, mid-sagittal, frontal (coronal), transverse (cross-sectional).
6. Describe the quadrants of the human abdomen and the organs underlying each quadrant.
7. List all the cavities within the dorsal cavity of the human body and all the organs in those cavities.
8. List all the cavities within the ventral cavity of the human body and all the organs in those cavities.
9. Define the location of the following serous membranes: parietal and visceral membranes
10. Name all the organ systems of the human body and state their main functions.
11. Complete the exercises on the Foundations of Human Anatomy and Physiology website to review principles of the metric system and medical terminology.
12. Define the following terms: homeostasis, negative feedback and positive feedback.
13. Explain how homeostasis is maintained by negative feedback mechanisms using 3 different examples from the human body.
14. Describe two examples of positive feedback from the human body.
15. Identify the following microscope parts: light source, stage, condenser, iris diaphragm & diaphragm lever, objective & ocular lenses, coarse adjustment, fine adjustment & body tube.
16. Define the following microscopic terms: total magnification & par focal.

17. Demonstrate the ability to focus the letter “e” slide and prepare drawings under 4x, 10, & 40x.

Essential Basic chemical Concepts

1. Define and give examples of the following terms using one sentence each: matter (substance), element, atom, compound, and molecule, mixture.
2. In a short paragraph, describe the differences between kinetic and potential energy.
3. Define the following terms using one sentence each and explain how they interact to form an atom: proton, neutron, and electron.
4. In a short paragraph, explain the difference between atomic number and atomic mass, and explain how they are calculated.
5. In a paragraph, describe the relationship between the rule of eights and the number of bonds an atom makes.
6. In a short paragraph, define ions, and describe the relationship between cations and anions, and how hydrogen bonding contributes to their formation in solution. Give an example of a biologically important ion.
7. In a paragraph, differentiate between the following types of chemical bonds: (a) ionic, (b) covalent, (c) polar covalent and (d) hydrogen. Give an example of each.
8. Describe in a paragraph how each of the following properties of water is important for human life: solvency, cohesion, adhesion, thermal stability, and chemical reactivity.
9. Describe in a paragraph the three major types of mixtures: suspensions, colloidal dispersions, and true solutions and give examples of each in the body.
10. Calculate the molecular weight of a molecule when given its formula.
11. Calculate the amount of solute and solvent required to make solutions with concentrations presented as a) weight of solute per unit volume, and b) percent solutions.
12. Define in a paragraph the term mole, and explain how this metric unit relates to the molar concentration of a solution.
13. Calculate the molecular weight of a molecule when given its formula.
14. In a paragraph, define pH, and differentiate between acids and bases.
15. In a paragraph, define the term buffer and explain how a buffer works using bicarbonate buffer as your example.
16. Use simple equations to illustrate, and provide an example of, the following types of reactions: a. decomposition, b. synthesis and c. reversible.
17. In a paragraph, explain the effects of the following on the rate of a chemical reaction: concentration of reactants, temperature, pH, catalysts.

Essential Basic Biochemical Concepts

1. In a paragraph, contrast the monomers and polymers for proteins, carbohydrates, lipids, and nucleic acids. Describe the general structures and biological functions of each type of macromolecule.
2. In a paragraph, illustrate and give an example of the role of a dehydration synthesis reaction and a hydrolysis reaction in forming and breaking down polymers.
3. In a paragraph, describe the four levels of protein structure.
4. In a paragraph, describe the role of enzymes and how they affect the rate of chemical reactions.
5. In a paragraph, describe the important role of ATP synthesis and decomposition in cellular functions.

Cytology: Description, cell cycle and transport across the plasma membrane

1. State the Modern Cell Theory and discuss its development.
2. Describe cell shapes from their descriptive terms.
3. Discuss factors that limit cell size.
4. Explain how advances in microscopy have led to a better understanding of cell structure.
5. Draw a typical animal cell, and label its components.
6. Describe the structural components of the plasma membrane, and state their functions.
7. Distinguish between integral and peripheral proteins, and state their functions.
8. Describe the components and functions of the cytoskeleton.
9. Describe the composition and functions of the glycocalyx.
10. Describe the structure and functions of microvilli, cilia, and flagella.
11. Distinguish between membranous and non-membranous organelles, provide examples of each.
12. Describe the structure and functions of the following organelles: nucleus, smooth endoplasmic reticulum, rough endoplasmic reticulum, ribosomes, Golgi complex, mitochondria, centrioles, peroxisomes, lysosomes.
13. Contrast the differences between organelles and inclusions, provide some examples of inclusions.
14. Define the following terms: cytoplasm, cytosol, extra cellular fluid.
15. Describe G1, S and G2 of the typical “cell cycle”.
16. Describe the following stages of mitosis: prophase, metaphase, anaphase, telophase, and the process of cytokinesis.
17. Define diffusion
18. Define osmosis. Explain why osmosis is considered a specific type of diffusion.
19. Define the words, isotonic, hypertonic, and hypotonic,
20. Define filtration

21. Define facilitated diffusion. Define active transport. Explain the difference between symport and antiport membrane carriers.
22. Define bulk transport, endocytosis, and exocytosis.
23. Define the following terms: (a) phagocytosis and (b) pinocytosis. Explain the steps involved in (a) phagocytosis and (b) pinocytosis

Tissues

1. List the 4 basic tissue types and state their basic functions in the human body.
2. Name and state the derivatives of the 3 embryonic tissues
3. Define: squamous, cuboidal, columnar, simple, stratified and keratinized with respect to epithelial tissue.
4. Describe the following 3 types of cellular junctions and a tissue that utilizes them: tight junctions, desmosomes, and gap junctions.
5. List common characteristics shared by all types of epithelial tissues,
6. State the 3 fundamental characteristics of connective tissue.
7. Describe and illustrate the structural arrangement of a generalized connective tissue including the terms: ground substance, fibers, matrix, and cells.
8. Explain the difference between collagen, elastin and reticular fibers.
9. Explain the differences in function of the following cells found in connective tissues: fibroblasts, fixed macrophages, other leukocytes, mast cells and adipocytes.
10. Describe the structural arrangement and the functions of the areolar connective tissue underlying all epithelial surfaces.
11. Explain the difference between dense irregular and dense regular connective tissue.
12. Explain the functions of the following types of dense irregular connective tissue: investing fascia, deep fascia and organ capsules.
13. Explain the functions of the following types of dense, regular connective tissue: ligaments, tendons, tendon sheaths, bursae and aponeuroses.
14. List the 3 types of cartilage and where they are found
15. Explain why cartilage heals slowly
16. Compare bone matrix to other connective tissue matrices.
17. Describe the structure and function of adipose tissue
18. List and describe the three muscle types of the body.
19. State the major characteristics of nervous tissue.
20. Explain the function of the following types of membranes: mucous, serous and synovial.
21. Explain the difference between endocrine and exocrine glands.

Integumentary system

1. State the different organs that belong to integumentary system.
2. Describe the major functions of integumentary system in reference to its role in protection, insulation, Vitamin D synthesis, thermoregulation and excretion.
3. Describe the structures and features of the epidermis, dermis and hypodermis as they relate their functions. Including
 - a. Location and Type of cells and Connective tissue
 - b. Layers present in thick vs thin skin
4. Describe the location and functions of sensory organs in the hair, skin and nails
5. Describe the role of the exocrine glands in the skin with respect to protection and thermoregulation.
6. Describe the consequences of high UV radiation exposure in reference to melanin production and Dna structure
7. In a small paragraph, relate the different stages of burning and their consequences.

Skeletal System

1. List and explain the six primary functions of the skeletal system.
2. List the major components of the axial and appendicular skeleton.
3. State the specific functions each of the axial and appendicular divisions.
4. Classify bones of the human skeletal system based on their shape. Give two examples of each group.
5. Describe the microscopic structure of bone.
6. Discuss the role of hormones and bone cells in bone remodeling.
7. Cite the regions of the vertebral column and list the number vertebrae in each region of the adult vertebral column.
8. List the bones that form the cranium and the sutures that join them.
9. Explain the importance of fontanel in the fetal skeleton.
10. Distinguish between endochondrial and intramembranous bone development.

Articulations

1. Explain how joints can be classified according to the type of tissue that binds the bones together.
2. Describe the general structure of a synovial joint and the function of synovial fluid.

3. List six types of freely movable (synovial) joints and describe the actions possible at each of these joints and locate and cite an example of each type that you have mentioned.
4. Describe the location, structure and function of bursae and tendon sheaths.
5. Distinguish between the three types of fibrous joints and cite an example and location for each of the three types you have mentioned.
6. Distinguish between the three types of cartilaginous joints, cite an example of each of the three types and indicate the location of the joint you have mentioned.
7. Clearly indicate the difference between the origin and insertion point of a muscle on a bone.
8. Define the term “articulation” and identify the factors that determine the degree of movement at a joint.
9. Clearly distinguish between the three following terms that are used to classify joints based upon the degree of movement they permit: a. synarthroses, b. amphiarthroses; and c. diarthroses.

Muscle System-

1. Explain the characteristics of muscle tissue.
2. Diagram, label and explain the components of a muscle fiber.
3. Diagram, label and explain the components of a sarcomere and how they relate to muscle contraction, as well as being able to explain the sliding filament theory.
4. Diagram, label and explain all the structures located at the neuromuscular junction and their role as it relates to muscle contraction.
5. Explain the differences and give examples of large motor units vs. small motor units.
6. Explain the events of excitation-contraction coupling and the stages of muscle contraction in detail.
7. Diagram, give examples and explain what is meant by the length tension relationship.
8. Diagram, label and explain all of the components of a muscle twitch.
9. List various ways muscle contraction strength can be increased.
10. Explain and demonstrate the differences between Isometric and Isotonic contractions.
11. Explain and give examples of when and how the various energy systems are used (immediate, short-term and long-term)
12. List the factors responsible for muscles fatigue.
13. Compare and contrast the structure and function of slow twitch and fast twitch muscle fibers.
14. List the main structural and functional differences between cardiac, smooth and skeletal muscle.
15. Identify assigned muscles and be familiar with their origin, insertion and action.
16. Explain criteria used for naming muscles.

17. Give examples and explain the relationship between muscles, antagonists, synergists, and fixators.

Nervous System

1. List three major functions of nervous system.
2. Name the two subdivisions of nervous system. List the anatomical structures that are found in these two divisions.
3. Distinguish between
4. afferent/sensory and efferent/motor pathway.
5. Somatic nervous system and autonomic nervous system.
6. List 2/3 things.
7. Draw a generalized neuron and label structures specific/unique/exclusive for it
8. List four types of neuroglia in CNS and two types of neuroglia in PNS. Provide one function of each type.
9. Give two roles that myelin sheath plays in conduction of electrical signal through an axon.
10. Describe in a paragraph the mechanism of nerve fiber regeneration.
11. Explain difference in CNS vs PNS
12. Distinguish chemical gradient and electrical gradient
13. Define resting membrane potential and indicate chemical concentration gradients for sodium and potassium ions.
14. Define depolarization. Describe the role of Sodium ions in depolarizing a neuron.
15. Define repolarization. Describe role of potassium ions in repolarization, hyperpolarization and maintenance of resting membrane potential.
16. Describe the role of ligand and voltage gated channels in generating action potential.
17. Draw a graph of an action potential and indicate absolute and relative refractory period. Explain functional difference between the two.
18. Define a chemical synapse. Draw a labeled diagram of synapse. Describe role of calcium ions in release of neurotransmitter from the synaptic knob.
19. Differentiate between excitatory and inhibitory synapses. Give one example each of excitatory and inhibitory neurotransmitter. What structure within the synapse determines whether it will be excitatory or inhibitory synapse?
20. Define EPSP's and IPSP's
21. List three different types of neuronal circuits and give one example of each.
22. Differentiate between temporal and spatial summation.

Central Nervous System (CNS)

1. Distinguish between grey and white matter.
2. Describe the regions and cross-sectional anatomy of the spinal cord.
3. Differentiate between ascending and descending spinal pathways.
4. Define reflex and the general components of a typical reflex arc.
5. Differentiate between flexor and crossed-extensor reflexes.
6. Describe the embryonic development of the CNS and relate this to adult brain anatomy.
7. Describe the meninges of the brain.
8. Describe the ventricular system of the brain.
9. Discuss the production, circulation, and function of the cerebrospinal fluid.
10. Explain the origin significance of the blood-brain barrier system.
11. Describe the major anatomical features and functions of each adult brain region.
12. List the 12 cranial nerves by name and number.
13. State the functions of each cranial nerve.

Peripheral Nervous Systems (PNS)

1. Describe the gross anatomy of a spinal nerve.
2. Describe the formation and structure of the myelin sheath and relate its importance to a peripheral nerve.
3. List the five major nerve plexuses and describe the general anatomy of each.
4. Describe the neural pathways involved in a simple reflex.
5. Define receptor and sense organ.
6. List the four kinds of information obtained from sensory receptors.
7. Outline three ways of classifying receptors.
8. Describe the seven types of somesthetic receptors.
9. Explain how taste and smell receptors are stimulated, and describe their neural pathways.
10. Describe the gross and microscopic anatomy of the ear and the functions of each part.
11. Explain how the ear converts vibrations to nerve signals.
12. Explain how the vestibular apparatus enables the brain to interpret the body's positions and movements.
13. Describe the anatomy of the eye and its accessory structures, and the function of each.
14. Describe the structure of the retina and its receptor cells.
15. Explain how an image is projected on the retina and how this image is converted into nerve impulses.
16. Differentiate between the function of the cells involved in day and night vision.

17. Differentiate between a nucleus, a ganglia, a nerve and a tract.

Autonomic Nervous System (ANS)

1. Explain how the autonomic and somatic nervous systems differ in form and function.
2. Explain how the two divisions of the ANS differ in general function.
3. Distinguish between preganglionic and postganglionic fibers of the autonomic nervous system.
4. Name the neurotransmitters used at different synapses of the ANS.
5. Describe the different classes of receptors in the ANS and how they relate to autonomic responses.
6. Explain how the ANS controls many target organs through dual innervations, and how control is exerted in the absence of dual innervations.
7. Compare and contrast the locations of sympathetic and parasympathetic neuron cell bodies, dendrites and axons.
8. Compare and contrast the specific anatomical and physiological roles of the sympathetic and parasympathetic nervous systems.

UPDATED BIOLOGY 11 SYLLABUS

Human Anatomy and Physiology

(4 credits and 6 hours)

Spring 2020 / Summer 2020

SYLLABUS AND COURSE INFORMATION

COURSE CO-COORDINATORS FOR BIOLOGY 11 & 12

Dr. Sherrye Glaser	S222	368-5748
Dr. Anna Rozenboym	S132	368-6703

Required textbook and Laboratory manual:

Textbook for Biology 11.

Students will be using openstax ebook needed for this course. Details will be explained by instructors in class.

Laboratory Manual for Biology 11 and 12:

Elaine N.Marieb, and Lori A. Smith. Human Anatomy and Physiology Laboratory Manual (Pig version, Thirteenth edition), 2018. Pearson Publishing.

BIOLOGY 11: HUMAN ANATOMY AND PHYSIOLOGY

PROGRAM GOALS FOR STUDENT OUTCOMES

Allied Health Programs

1. Demonstrate knowledge of basic concepts in anatomy and physiology.
2. Demonstrate proficiency in use of basic laboratory equipment and instruments.
3. Apply knowledge to distinguish normal from homeostatic imbalances.
4. Demonstrate basic computer skills and competence utilizing the Internet for solving problems.
5. Solve a biomedical problem through analysis and interpretation of tabulated and graphical data.
6. Demonstrate understanding of the scientific literature related to allied health fields through presentation of findings in written form and to an audience.

COURSE GOALS

Course goals for Bio 11

1. Demonstrate proficiency in the use of basic laboratory instruments including the microscope, triple beam balance, pipettes, and glassware, and basic tools for analysis of physiological signs, including relevant computer-based equipment and software.
2. Apply the scientific method when thinking and learning about human anatomy and physiology.
3. Recognize and explain the principle of homeostasis and the use of feedback loops to control the physiology of the body systems.
4. Demonstrate an understanding of basic chemical and biochemical concepts inherent to the function of the human body.
5. Develop the anatomical/physiological vocabulary essential to success in this course.
6. Understand the fundamentals of the cell and its components, and cell specializations in various body systems.
7. Understand the relationship between cells, tissues and organs.
8. Recognize and explain the interrelationships within and between anatomical and physiological aspects of the integumentary, skeletal, muscular, nervous, and endocrine systems, and of the interrelations between these systems as they maintain homeostasis.

Statement to the Students

Course Prerequisites:

Placement at the English 12 and Math 09 levels on the CUNY assessment tests.

Course Description:

Biology 11 is the first semester of a one-year course in Human Anatomy and Physiology. Both Biology 11 and Biology 12 are designed to provide students with a thorough understanding of the basic principles inherent in the study of human anatomy and physiology, and is intended for students majoring in the allied-health professions, e.g. nursing, pre-physical therapy, pre-physicians assistant, etc. The emphasis of this course will be concerned with understanding the structural and functional relationships of the major organ systems of the human body. A special effort will be made to understand the concept of homeostasis and how the individual organ systems of the body interact with each other in the maintenance of the normal functioning of the entire organism.

Biology 11 combines both lecture and laboratory experiences over a twelve week period. Each week, the class meets for a **two-hour lecture session, and a four-hour laboratory session.**

There will be a writing assignment(s) during the semester relating to an aspect of human anatomy and physiology. Details will be provided by your instructor.

Plagiarism as a violation of academic integrity is the intentional use of another's intellectual creation(s) without attribution. Determination and penalty—ranging from grade reduction to course failure—is at the sole discretion of the faculty member. If a faculty member suspects that a student has committed a violation of CUNY or KCC's Academic Integrity Policy, he/she shall notify the student of the facts and circumstances of the suspected violation whenever possible. It is then at his/her discretion to seek an academic or disciplinary sanction.

Required Materials

Textbook for Biology 11

Students will be using openstax ebook needed for this course. Details will be explained by instructors in class.

Laboratory Manual for Biology 11 and 12:

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Following materials are required for lab:

1. Dissecting Kit for laboratory dissections
2. Full length Laboratory Coat
3. Disposable Non-Latex Gloves
4. Goggles
5. No open-toed shoes in lab

Reading Assignments

To obtain the maximum advantage from the required readings, you should complete the readings **before** coming to class for the week in which the assignments are given. The lecture syllabus lists the reading assignments that will prepare you for the lectures and laboratory exercises for that particular week and refers to reading assignments in your textbook. The sequence of laboratory exercises lists reading assignments in the laboratory manual. It is very important for you to be familiar with the laboratory exercises before performing the experiments or procedures described in the manual. The benefits that you will derive by completing the readings for lecture and laboratory **prior** to the week for which they are assigned are as follows:

1. You will find that it is easier to understand the lecture and laboratory material because you already have some background regarding the topics that are to be covered.
2. The reading assignments for lecture and laboratory are directly related to the topics that will be covered. If you are already familiar with these topics, you will find that you will be able to take fewer and better notes and pay more attention to what the lecturer is saying.
3. Prior reading of the assignments can help you to pinpoint areas in which may be giving you some difficulty. You then can pay very special attention to what the lecturer is saying when discussing these same topics.
4. Reading the assigned material for the laboratory in both the textbook and laboratory manual **prior** to coming to laboratory will help you to get the maximum benefits from your laboratory experiences. Having relevant background information will help you to better understand the laboratory exercises.

Grade Determination:

1. **Laboratory:** The laboratory portion of Biology 11 represents 50% of the course grade. The grade for laboratory will be based on your quiz grades, the writing assignments, and other factors that will be explained to you by your laboratory instructor.
2. **Lecture:** There will be several unit exams that will be administered during the semester **determined by the individual instructor.** The unit examinations will represent 30% of your grade. The final examination will account for 20% of your grade.

3. **Summary of the grading procedures:**

Laboratory quizzes; lab practicals and reports etc	=	50%
Unit examinations	=	30%
Final examination	=	<u>20%</u>
<hr/>		
Total	=	100%

Lecture Syllabus (*openstax ebook*)

Week

- 1. An Introduction to Human body:** Overview of Anatomy and Physiology. Structural Levels of organization. Homeostasis. Anatomical terminology. Medical Imaging **Chapter 1.**
- 2 The Chemical level of organization:** Chemistry: Elements and atoms. Chemical bonds. Chemical reactions. **Chapter 2.**
- 3 The Chemical level of organization:** Inorganic and organic compounds. **Chapter 2.**
- 4 The Cellular level of organization:** Cell membrane. Cytoplasm and cellular organelles. The nucleus and DNA replication. Protein synthesis. Cell growth and Division. Cellular differentiation **Chapters 3.**
- 5 The Tissue level of organization:** Types of tissues. Epithelial, connective, nervous & muscle and tissues. Tissue injury and aging. **Chapter 4.**
- 6 The Integumentary System:** Layers of skin. Accessory structures of skin. Functions of the integumentary system. Diseases, Disorders and Injuries of Integumentary system **Chapter 5.**
- 7 Bones Tissue and Skeletal system:** Functions of skeletal system. Bone Classification. Bone structure. Bone formation and development. Fracture. Exercise, nutrition, hormones and bone tissue. Calcium homeostasis. **Chapter 6.**
- 8 Joints:** Classification. Fibrous, cartilaginous and synovial joints. Types of body movements. Anatomy of selected joints. **Chapter 9.**
Muscle tissue: Overview of muscle tissue. **Chapter 10.**
- 9 Muscle tissue:** Skeletal muscle. Muscle fiber and contraction and relaxation. Nervous system control of muscle tension. Types of muscle fibers. Exercise and muscle performance. Cardiac muscle. Smooth muscle. Development and regeneration of muscle tissue. **Chapter 10.**
- 10 The Nervous system and Nervous tissue:** Basic structure and function of nervous system. Nervous tissue. The Action potential. Communication between neurons. **Chapter 12.**
- 11 Anatomy of Nervous System.** The Embryological perspective. The Central Nervous system. Circulation and the Central nervous system. The peripheral nervous system. **Chapters 13.**
- 12 The Autonomic Nervous System.** Divisions of Autonomic Nervous system. Autonomic reflexes and homeostasis. Central control. Drugs that affect autonomic system. **Chapter 15.**

Laboratory Syllabus (*Laboratory Manual*)

Week

- 1. Scientific method and metric system.** *See handout.*
The language of anatomy: Anatomical position, surface anatomy, body planes and sections, body cavities. *Exercise 1*
- 2. Organ system overview:** Rat dissection. Identification of the major organ using the dissected rat and the torso models. *Exercise 2.*
Matter and Energy. Elements, atomic structure, chemical bonds, pH. *See departmental handouts*
Chemistry: Chemical reactions, synthesis of iron sulfate.
- 3. Properties of water,** lab exercises.
Introduction to macromolecules: structures and synthesis. **Macromolecules:** study and chemical detection. *See departmental handouts*
- 4. The microscope.** *OMIT ACTIVITY 5 (Cheek cell has been moved to week 5)* *Exercise 3, Act. 1, 2, 3 and 4)*
The Cell. Transport mechanisms and cell permeability: **Passive processes** (diffusion-osmosis and filtration), **Active processes** *Exercise 5, act. 1; act. 2 (demo); act. 3 (demo). Act. 5. Exp. 2)*
- 5. The cell:** Anatomy of the composite cell. Differences and similarities in cell structure. Cell division. *Exercise 4, act. 1, 2, 3, 4, and 5*
Cheek cell smear. *Exercise 3, activity 3*
Scientific drawings of Epithelial tissue. Classification of covering and lining membranes. *Exercise 6 (pp.69-74)*
- 6. Connective Tissue.** Scientific drawings *Exercise 6 (pp. 75-82)*
Introduction to the integumentary system and the skin. Basic structure of the skin and accessory organs of the skin. Cutaneous glands. *Exercise 7*
- 7. Introduction to the study of the skeletal system.** Study of the appendicular and axial skeleton. Assembly of disarticulated skeleton. The fetal skeleton. *Exercises 8, 9 and 10*
- 8. Articulations and body movements.** Study of the three major types of articulations, joint disorders and types of body movement. *Exercise 11*
- 9. Gross and microscopic study of the three muscle types.** Identification of selected muscle groups using the human torso model. **Physiology of skeletal muscle. Muscle Physiology Computerized Simulations.** *Exercises 6 (pp. 83-85), 12, 13, 14 act 4 Biopac*
- 10. Histology of nervous tissue. Gross neuroanatomy: Sheep brain dissection.** Study of the preserved human brain and models of the human brain. *Exercise 15, 17, 18 (act 2 Biopac), Ex 20 act 3 Biopac*
- 11. Gross anatomy, histology and physiology of the spinal cord.** Study of the anatomical aspects of the Autonomic Nervous System. **Reflex physiology and Computerized Reflex Simulations.** *Exercises 6 (pp. 82-83), 15,19, Exercise 21 and activity 10 Biopac*

12 Senses: Vision: Gross anatomy of the eye Dissection of the cow eye. Visual acuity and color blindness tests. Microscopic examination of the retina. **Exercise 23 and**

24

Audition: Hearing and equilibrium. Gross anatomy of the human ear (using models of the human ear). Auditory acuity and equilibrium tests. Microscopic anatomy of the Organ of Corti. Selected experiments dealing with the gustatory and olfactory senses. **Exercises 25 and 26**

LEARNING OBJECTIVES

Human Body: Orientation and Homeostasis

1. List and briefly describe the following branches of the science of biology and their origins: anatomy, gross anatomy, comparative anatomy, cytology, histology, physiology, and biochemistry.
2. Name and define 10 characteristics (qualities) of life.
3. Describe the levels of organization of matter in the universe with at least 2 specific examples for each level.
4. Define the following anatomical terms: (a) anterior, (b) posterior, (c) superior, (d) inferior, (e) dorsal, (f) ventral, (g) medial, (h) lateral, (i) proximal (j) distal, (k) superficial, (l) deep.
5. Explain how the body or an organ is cut in each of the following planes: longitudinal, sagittal, mid-sagittal, frontal (coronal), transverse (cross-sectional).
6. Describe the quadrants of the human abdomen and the organs underlying each quadrant.
7. List all the cavities within the dorsal cavity of the human body and all the organs in those cavities.
8. List all the cavities within the ventral cavity of the human body and all the organs in those cavities.
9. Define the location of the following serous membranes: parietal and visceral membranes
10. Name all the organ systems of the human body and state their main functions.
11. Complete the exercises on the Foundations of Human Anatomy and Physiology website to review principles of the metric system and medical terminology.
12. Define the following terms: homeostasis, negative feedback and positive feedback.
13. Explain how homeostasis is maintained by negative feedback mechanisms using 3 different examples from the human body.
14. Describe two examples of positive feedback from the human body.
15. Identify the following microscope parts: light source, stage, condenser, iris diaphragm & diaphragm lever, objective & ocular lenses, coarse adjustment, fine adjustment & body tube.
16. Define the following microscopic terms: total magnification & par focal.

17. Demonstrate the ability to focus the letter “e” slide and prepare drawings under 4x, 10, & 40x.

Essential Basic chemical Concepts

1. Define and give examples of the following terms using one sentence each: matter (substance), element, atom, compound, and molecule, mixture.
2. In a short paragraph, describe the differences between kinetic and potential energy.
3. Define the following terms using one sentence each and explain how they interact to form an atom: proton, neutron, and electron.
4. In a short paragraph, explain the difference between atomic number and atomic mass, and explain how they are calculated.
5. In a paragraph, describe the relationship between the rule of eights and the number of bonds an atom makes.
6. In a short paragraph, define ions, and describe the relationship between cations and anions, and how hydrogen bonding contributes to their formation in solution. Give an example of a biologically important ion.
7. In a paragraph, differentiate between the following types of chemical bonds: (a) ionic, (b) covalent, (c) polar covalent and (d) hydrogen. Give an example of each.
8. Describe in a paragraph how each of the following properties of water is important for human life: solvency, cohesion, adhesion, thermal stability, and chemical reactivity.
9. Describe in a paragraph the three major types of mixtures: suspensions, colloidal dispersions, and true solutions and give examples of each in the body.
10. Calculate the molecular weight of a molecule when given its formula.
11. Calculate the amount of solute and solvent required to make solutions with concentrations presented as a) weight of solute per unit volume, and b) percent solutions.
12. Define in a paragraph the term mole, and explain how this metric unit relates to the molar concentration of a solution.
13. Calculate the molecular weight of a molecule when given its formula.
14. In a paragraph, define pH, and differentiate between acids and bases.
15. In a paragraph, define the term buffer and explain how a buffer works using bicarbonate buffer as your example.
16. Use simple equations to illustrate, and provide an example of, the following types of reactions: a. decomposition, b. synthesis and c. reversible.
17. In a paragraph, explain the effects of the following on the rate of a chemical reaction: concentration of reactants, temperature, pH, catalysts.

Essential Basic Biochemical Concepts

1. In a paragraph, contrast the monomers and polymers for proteins, carbohydrates, lipids, and nucleic acids. Describe the general structures and biological functions of each type of macromolecule.
2. In a paragraph, illustrate and give an example of the role of a dehydration synthesis reaction and a hydrolysis reaction in forming and breaking down polymers.
3. In a paragraph, describe the four levels of protein structure.
4. In a paragraph, describe the role of enzymes and how they affect the rate of chemical reactions.
5. In a paragraph, describe the important role of ATP synthesis and decomposition in cellular functions.

Cytology: Description, cell cycle and transport across the plasma membrane

1. State the Modern Cell Theory and discuss its development.
2. Describe cell shapes from their descriptive terms.
3. Discuss factors that limit cell size.
4. Explain how advances in microscopy have led to a better understanding of cell structure.
5. Draw a typical animal cell, and label its components.
6. Describe the structural components of the plasma membrane, and state their functions.
7. Distinguish between integral and peripheral proteins, and state their functions.
8. Describe the components and functions of the cytoskeleton.
9. Describe the composition and functions of the glycocalyx.
10. Describe the structure and functions of microvilli, cilia, and flagella.
11. Distinguish between membranous and non-membranous organelles, provide examples of each.
12. Describe the structure and functions of the following organelles: nucleus, smooth endoplasmic reticulum, rough endoplasmic reticulum, ribosomes, Golgi complex, mitochondria, centrioles, peroxisomes, lysosomes.
13. Contrast the differences between organelles and inclusions, provide some examples of inclusions.
14. Define the following terms: cytoplasm, cytosol, extra cellular fluid.
15. Describe G₁, S and G₂ of the typical “cell cycle”.
16. Describe the following stages of mitosis: prophase, metaphase, anaphase, telophase, and the process of cytokinesis.
17. Define diffusion
18. Define osmosis. Explain why osmosis is considered a specific type of diffusion.
19. Define the words, isotonic, hypertonic, and hypotonic,
20. Define filtration

21. Define facilitated diffusion. Define active transport. Explain the difference between symport and antiport membrane carriers.
22. Define bulk transport, endocytosis, and exocytosis.
23. Define the following terms: (a) phagocytosis and (b) pinocytosis. Explain the steps involved in (a) phagocytosis and (b) pinocytosis

Tissues

1. List the 4 basic tissue types and state their basic functions in the human body.
2. Name and state the derivatives of the 3 embryonic tissues
3. Define: squamous, cuboidal, columnar, simple, stratified and keratinized with respect to epithelial tissue.
4. Describe the following 3 types of cellular junctions and a tissue that utilizes them: tight junctions, desmosomes, and gap junctions.
5. List common characteristics shared by all types of epithelial tissues,
6. State the 3 fundamental characteristics of connective tissue.
7. Describe and illustrate the structural arrangement of a generalized connective tissue including the terms: ground substance, fibers, matrix, and cells.
8. Explain the difference between collagen, elastin and reticular fibers.
9. Explain the differences in function of the following cells found in connective tissues: fibroblasts, fixed macrophages, other leukocytes, mast cells and adipocytes.
10. Describe the structural arrangement and the functions of the areolar connective tissue underlying all epithelial surfaces.
11. Explain the difference between dense irregular and dense regular connective tissue.
12. Explain the functions of the following types of dense irregular connective tissue: investing fascia, deep fascia and organ capsules.
13. Explain the functions of the following types of dense, regular connective tissue: ligaments, tendons, tendon sheaths, bursae and aponeuroses.
14. List the 3 types of cartilage and where they are found
15. Explain why cartilage heals slowly
16. Compare bone matrix to other connective tissue matrices.
17. Describe the structure and function of adipose tissue
18. List and describe the three muscle types of the body.
19. State the major characteristics of nervous tissue.
20. Explain the function of the following types of membranes: mucous, serous and synovial.
21. Explain the difference between endocrine and exocrine glands.

Integumentary system

1. State the different organs that belong to integumentary system.
2. Describe the major functions of integumentary system in reference to its role in protection, insulation, Vitamin D synthesis, thermoregulation and excretion.
3. Describe the structures and features of the epidermis, dermis and hypodermis as they relate their functions. Including
 - a. Location and Type of cells and Connective tissue
 - b. Layers present in thick vs thin skin
4. Describe the location and functions of sensory organs in the hair, skin and nails
5. Describe the role of the exocrine glands in the skin with respect to protection and thermoregulation.
6. Describe the consequences of high UV radiation exposure in reference to melanin production and Dna structure
7. In a small paragraph, relate the different stages of burning and their consequences.

Skeletal System

1. List and explain the six primary functions of the skeletal system.
2. List the major components of the axial and appendicular skeleton.
3. State the specific functions each of the axial and appendicular divisions.
4. Classify bones of the human skeletal system based on their shape. Give two examples of each group.
5. Describe the microscopic structure of bone.
6. Discuss the role of hormones and bone cells in bone remodeling.
7. Cite the regions of the vertebral column and list the number vertebrae in each region of the adult vertebral column.
8. List the bones that form the cranium and the sutures that join them.
9. Explain the importance of fontanel in the fetal skeleton.
10. Distinguish between endochondrial and intramembranous bone development.

Articulations

1. Explain how joints can be classified according to the type of tissue that binds the bones together.
2. Describe the general structure of a synovial joint and the function of synovial fluid.

3. List six types of freely movable (synovial) joints and describe the actions possible at each of these joints and locate and cite an example of each type that you have mentioned.
4. Describe the location, structure and function of bursae and tendon sheaths.
5. Distinguish between the three types of fibrous joints and cite an example and location for each of the three types you have mentioned.
6. Distinguish between the three types of cartilaginous joints, cite an example of each of the three types and indicate the location of the joint you have mentioned.
7. Clearly indicate the difference between the origin and insertion point of a muscle on a bone.
8. Define the term “articulation” and identify the factors that determine the degree of movement at a joint.
9. Clearly distinguish between the three following terms that are used to classify joints based upon the degree of movement they permit: a. synarthroses, b. amphiarthroses; and c. diarthroses.

Muscle System-

1. Explain the characteristics of muscle tissue.
2. Diagram, label and explain the components of a muscle fiber.
3. Diagram, label and explain the components of a sarcomere and how they relate to muscle contraction, as well as being able to explain the sliding filament theory.
4. Diagram, label and explain all the structures located at the neuromuscular junction and their role as it relates to muscle contraction.
5. Explain the differences and give examples of large motor units vs. small motor units.
6. Explain the events of excitation-contraction coupling and the stages of muscle contraction in detail.
7. Diagram, give examples and explain what is meant by the length tension relationship.
8. Diagram, label and explain all of the components of a muscle twitch.
9. List various ways muscle contraction strength can be increased.
10. Explain and demonstrate the differences between Isometric and Isotonic contractions.
11. Explain and give examples of when and how the various energy systems are used (immediate, short-term and long-term)
12. List the factors responsible for muscles fatigue.
13. Compare and contrast the structure and function of slow twitch and fast twitch muscle fibers.
14. List the main structural and functional differences between cardiac, smooth and skeletal muscle.
15. Identify assigned muscles and be familiar with their origin, insertion and action.
16. Explain criteria used for naming muscles.

17. Give examples and explain the relationship between muscles, antagonists, synergists, and fixators.

Nervous System

1. List three major functions of nervous system.
2. Name the two subdivisions of nervous system. List the anatomical structures that are found in these two divisions.
3. Distinguish between
4. afferent/sensory and efferent/motor pathway.
5. Somatic nervous system and autonomic nervous system.
6. List 2/3 things.
7. Draw a generalized neuron and label structures specific/unique/exclusive for it
8. List four types of neuroglia in CNS and two types of neuroglia in PNS. Provide one function of each type.
9. Give two roles that myelin sheath plays in conduction of electrical signal through an axon.
10. Describe in a paragraph the mechanism of nerve fiber regeneration.
11. Explain difference in CNS vs PNS
12. Distinguish chemical gradient and electrical gradient
13. Define resting membrane potential and indicate chemical concentration gradients for sodium and potassium ions.
14. Define depolarization. Describe the role of Sodium ions in depolarizing a neuron.
15. Define repolarization. Describe role of potassium ions in repolarization, hyperpolarization and maintenance of resting membrane potential.
16. Describe the role of ligand and voltage gated channels in generating action potential.
17. Draw a graph of an action potential and indicate absolute and relative refractory period. Explain functional difference between the two.
18. Define a chemical synapse. Draw a labeled diagram of synapse. Describe role of calcium ions in release of neurotransmitter from the synaptic knob.
19. Differentiate between excitatory and inhibitory synapses. Give one example each of excitatory and inhibitory neurotransmitter. What structure within the synapse determines whether it will be excitatory or inhibitory synapse?
20. Define EPSP's and IPSP's
21. List three different types of neuronal circuits and give one example of each.
22. Differentiate between temporal and spatial summation.

Central Nervous System (CNS)

1. Distinguish between grey and white matter.
2. Describe the regions and cross-sectional anatomy of the spinal cord.
3. Differentiate between ascending and descending spinal pathways.
4. Define reflex and the general components of a typical reflex arc.
5. Differentiate between flexor and crossed-extensor reflexes.
6. Describe the embryonic development of the CNS and relate this to adult brain anatomy.
7. Describe the meninges of the brain.
8. Describe the ventricular system of the brain.
9. Discuss the production, circulation, and function of the cerebrospinal fluid.
10. Explain the origin significance of the blood-brain barrier system.
11. Describe the major anatomical features and functions of each adult brain region.
12. List the 12 cranial nerves by name and number.
13. State the functions of each cranial nerve.

Peripheral Nervous Systems (PNS)

1. Describe the gross anatomy of a spinal nerve.
2. Describe the formation and structure of the myelin sheath and relate its importance to a peripheral nerve.
3. List the five major nerve plexuses and describe the general anatomy of each.
4. Describe the neural pathways involved in a simple reflex.
5. Define receptor and sense organ.
6. List the four kinds of information obtained from sensory receptors.
7. Outline three ways of classifying receptors.
8. Describe the seven types of somesthetic receptors.
9. Explain how taste and smell receptors are stimulated, and describe their neural pathways.
10. Describe the gross and microscopic anatomy of the ear and the functions of each part.
11. Explain how the ear converts vibrations to nerve signals.
12. Explain how the vestibular apparatus enables the brain to interpret the body's positions and movements.
13. Describe the anatomy of the eye and its accessory structures, and the function of each.
14. Describe the structure of the retina and its receptor cells.
15. Explain how an image is projected on the retina and how this image is converted into nerve impulses.
16. Differentiate between the function of the cells involved in day and night vision.

17. Differentiate between a nucleus, a ganglia, a nerve and a tract.

Autonomic Nervous System (ANS)

1. Explain how the autonomic and somatic nervous systems differ in form and function.
2. Explain how the two divisions of the ANS differ in general function.
3. Distinguish between preganglionic and postganglionic fibers of the autonomic nervous system.
4. Name the neurotransmitters used at different synapses of the ANS.
5. Describe the different classes of receptors in the ANS and how they relate to autonomic responses.
6. Explain how the ANS controls many target organs through dual innervations, and how control is exerted in the absence of dual innervations.
7. Compare and contrast the locations of sympathetic and parasympathetic neuron cell bodies, dendrites and axons.
8. Compare and contrast the specific anatomical and physiological roles of the sympathetic and parasympathetic nervous systems.

TO: SPRING 2020 Curriculum Committee

FROM: Mary E. Dawson, Ph.D. Professor and Chair, Department of Biological Sciences

DATE: March 3, 2020

RE: Change in Prerequisite for BIO 1100 – Human Anatomy and Physiology I

The Department of Biological Sciences is proposing a change in prerequisite for BIO 1100 – Human Anatomy and Physiology I

FROM:

Prerequisite(s): Passed, exempt, or completed developmental course work for the CUNY Assessment Tests in Reading, Writing, and ACCUPLACER CUNY Assessment Test in Math; **or** BIO 1300

TO:

Prerequisite(s): **CUNY English and Math Proficient,**

Rationale for Change:

The inclusion of BIO 1300 as an alternate route to enrolling in BIO 1100 is misleading for students, as they believe they **must** enroll in BIO 1300 in order to enroll in BIO 1100. Removal of reference to BIO 1300 addresses this concern. Updated to English and Math proficient to address the new CUNY Proficiency Index.