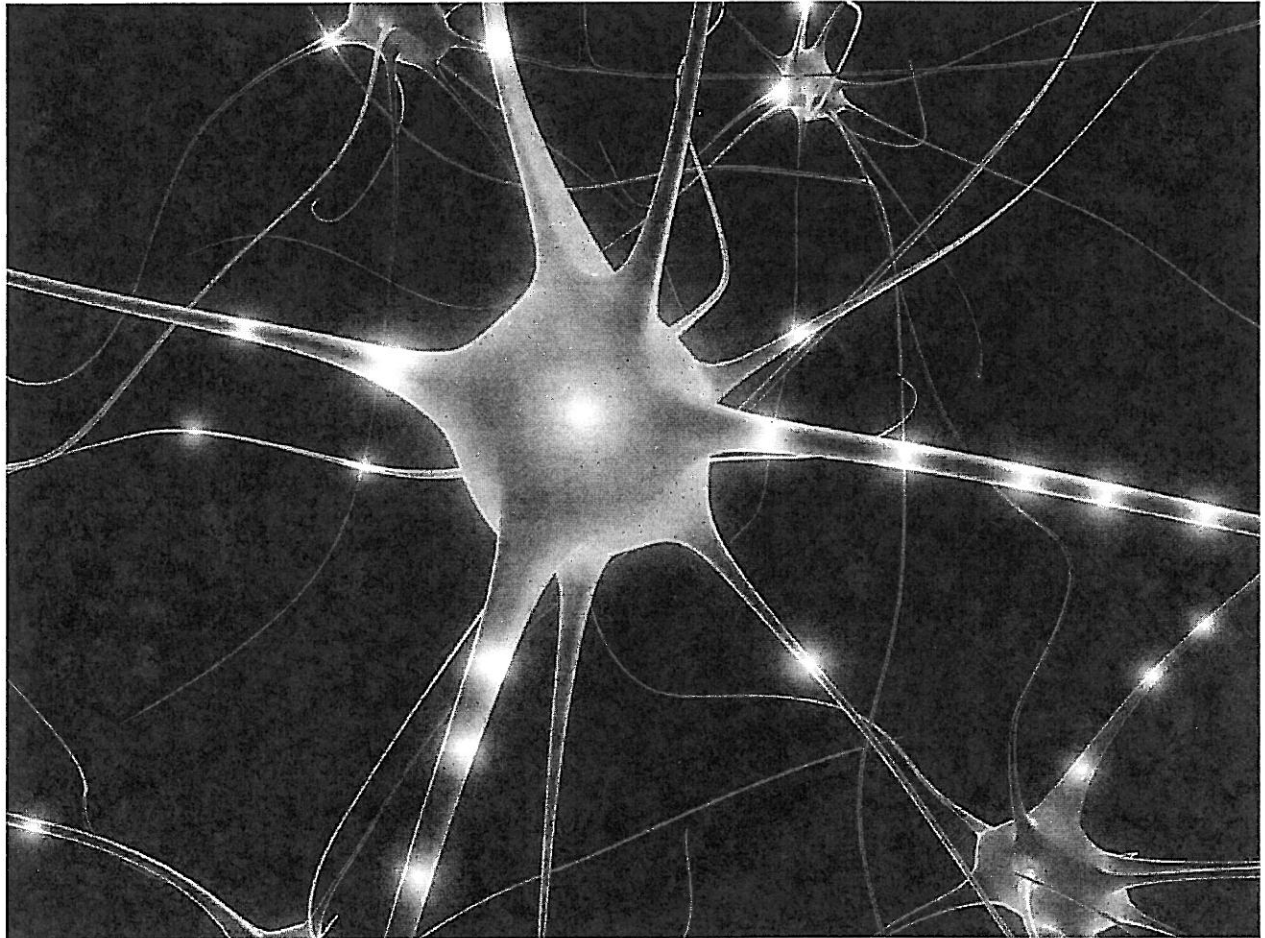
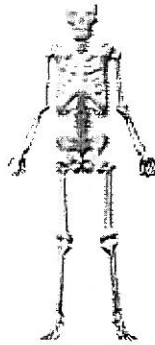
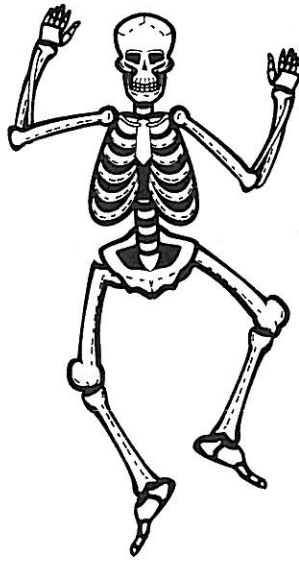


# 2011

Three Rivers Community  
College

ANATOMY AND  
PHYSIOLOGY I





**HUMAN ANATOMY & PHYSIOLOGY I  
THREE RIVERS COMMUNITY COLLEGE  
NORWICH, CONNECTICUT 06360  
Lecture: A.M. D 212 Lab A-219  
P.M. D 102**

Ms. Jean Skiba, Instructor of Anatomy & Physiology

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Office Hours:

Monday	By Appointment
Tuesday	12:00 - 1:00
Wednesday	By Appointment
Thursday	By Appointment
Friday	11:00 - 12:00
Saturday	By Appointment

If you have a visible or hidden disability which may require classroom and/or test-taking modifications, please see me as soon as possible. If you have not registered with Chris Scarborough, learning specialist at (860) 823-2985 or a counselor in the Student Services Development Center, please do so early in the semester.

Course: Human Anatomy and Physiology I /BIO 21 1  
 Credits: 4 hrs. credit ( 3 hours of lectures and 3 hours of lab each week)  
 Texts: ***Fundamentals of Anatomy and Physiology***, Frederic H. Martini, 9th edition, Prentice Hall Publisher.  
***Pictorial Anatomy of the Cat***, by Stephen Gilbert, University of Washington Press, 2000.

Other Required Materials: Dissecting kit, non-latex gloves, lab coat\* & safety goggles.

\*Landau #3178 (full length lab coat)

#### Description of the Course:

- A) Catalogue Description: A comprehensive study of the gross anatomical structure and physiology of the human body pertaining to cells, tissues, membranes and the following systems: Integumentary, Skeletal (Articular), Muscular and Nervous. Prerequisite: English 101 and successful completion of Bio 121 and Chemistry 11 1 or Chemistry 121 with a "C" grade or higher. This is a two-semester course, in order to receive knowledge of all of the body's systems the student is obligated to complete both semesters of Human Anatomy & Physiology. (Bio 21 1 – 212)
- B) General Course Objectives:
- 1) To aid the student in developing an understanding of the life processes.
  - 2) To aid the student in developing an understanding of the normal structures and functions of the human body.
  - 3) To provide a useful body of knowledge for studying biology, nursing and other allied health students.

#### Class Attendance Policy:

Attendance of all class activities in lecture and laboratory is required. Absences are counted from the first meeting of class. More than four consecutive or more than six accumulative absences could result in student receiving a "F" grade in this course. An explanation of the cause of all absences should be given to your instructor.

#### Academic and Classroom Misconduct:

The instructor has primary responsibility for control over classroom and/or laboratory behavior and maintenance of academic integrity, and can request the temporary removal or exclusion from the classroom or laboratory of any student engaged in conduct that violated the general rules and regulations of the institution. Or any student engaged in conduct deemed hazardous in the laboratory. Extended or permanent exclusion from lecture or laboratory activities or further disciplinary action can only be effected through appropriate procedures of the institution.

Plagiarism, cheating on quizzes or tests, or any form of academic dishonesty is strictly prohibited. Students guilty of academic dishonesty directly or indirectly will receive a zero for the exercise or quiz or test and may receive a "F" grade for the course in addition to other possible disciplinary sanctions with may be imposed through the regular institutional procedures. Any student that believes that he or she has been erroneously accused may appeal the case through the appropriated institutional procedure if their grade was affected.

### Procedure for Dropping the Course: College's Withdrawal Policy

Any student who finds it necessary to discontinue this course MUST complete a withdrawal form in the Registrar's Office at the time of the withdrawal. If you cannot withdraw in person, you may call the Registrar's Office and provide them with the appropriate information. Verbal withdrawals are not acceptable. Students may withdraw from the course at any time during the first 14<sup>th</sup> week (deadline date is at the end of this paragraph\*). Students who do not withdraw, but stop attending class will be assigned an "F" grade for the course. Once you withdraw from class you are no longer eligible to take any remaining quizzes or Tests.

\* December 9<sup>th</sup>

#### Tests:

There will be nine scheduled quizzes (additional pop quizzes may also be given), all quizzes are given during the first ten minutes of class. (No make-ups for quizzes). Three unit tests, three lab tests and a comprehensive final exam will also be given. Unit tests are scheduled in advance and will be reviewed before the final exam is given.

#### Grade Determination:

$\frac{1}{2}$  of the semester's average,  $\frac{1}{4}$  of the lab grade,  $\frac{1}{4}$  of the score on the comprehensive final exam will determine the final course grade.

The best seven quiz scores will be added together and divided by seven to determine the quiz average. The quiz average and the three unit test scores will be added together and divided by four to determine the semester's average. The lab grade will be determined by averaging the three lab test scores (points for lab reports may also be used to determine the final lab grade). The comprehensive final exam has total possible point of 100.

Grade Scale: There will be NO grading on the normal distribution curve.

100.00 – 94.50	= A
94.49 – 90.00	= A-
89.99 – 87.50	= B+
87.49 – 84.50	= B
84.49 – 79.50	= B-
79.49 – 77.50	= C+
77.49 – 74.50	= C
74.49 – 69.50	= C-
69.49 – 63.50	= D+
63.49 – 59.50	= D
59.49 – 00.00	= F

#### Exemption Policy:

The instructor will determine who is to be exempted from taking the final exam, not the student. Exemption is an earned privilege not an inherited right. Any student that is exempted from taking the final exam will be notified in writing. Students being considered for exemption MUST meet all of the following requirements: (No exceptions for any reason!)



- 1) Good classroom conduct.
- 2) Only 1 absence from lecture or laboratory (excused or non-excused)
- 3) No more than two tardies during course of semester in lecture or laboratory.
- 4) All unit tests and lab tests must be taken when scheduled (no make-ups).
- 5) No test score, (lecture or laboratory), lower than 88.
- 6) The average of the best seven quizzes cannot be lower than 90.
- 7) Must have an overall semester's average of 95 or higher. (No rounding off).
- 8) Must have a semester's lab grade of 95 or higher. (No rounding off).
- 9) Intangibles.

#### Make-ups:

Any assignment missed can be obtained from the instructor. Lab work may be made up during free time within a week of the missed assignment if the lab is available. Quizzes, scheduled or pop, cannot be made up for any reason. Unit tests can only be made up by special arrangement with the instructor. Makeup tests will be granted on an individual basis only following a conference with the instructor; where the reason(s) for missing the test must be determined mitigating circumstances beyond the control of the student such as, illness, death in the family, or change in condition of employment. All make-up tests will be scheduled during the week of the final exams. If two unit tests are missed during the semester and/or if the final exam is missed the student will receive a "F" grade if he or she is failing other parts of the course or an "I" if the student is passing all other parts of the course.

#### Revisions to the Syllabus:

Students are responsible for learning all of the objectives and all of the items in the course outline whether they are discussed in lecture and/or laboratory or not. The instructor reserves the right to revise the objectives, topical outline, or academic schedule contained in this syllabus without notice. However, if the revisions affects scheduled unit test a **48 hour notice** will be given for the new test date.

#### Cellular phones and beepers:

Cellular phones and beepers are only allowed in class or lab if they are turned off or in silent mode. Under no circumstance are phones to be answered in class. When there are extenuating circumstances that require that a student be available by phone or beeper, that student must speak to the instructor prior to class, so that together they can arrive at an agreement.

## **Course: Objectives: Human Anatomy and Physiology I**

1. The student will develop “critical thinking skill” and will be able to draw sound scientific conclusions through the analysis of scientific data.
2. The student will demonstrate knowledge of the organization of the body on the cellular, tissue and organ-system levels.
3. The student will demonstrate knowledge of body positions and planes of reference.
4. The student will be able to identify the principle elements that make up the body, give their chemical symbols, and summarize the biological role of each.
5. The student will demonstrate knowledge of the atomic structure and its relationship to the interaction of atoms to form molecules.
6. The student will demonstrate knowledge of ionic, covalent and hydrogen bonding and give examples of each.
7. The student will be able to describe the types of inorganic compounds found in the body and explain their biological role.
8. The student will be able to define pH and be able to identify any given pH as acid, alkaline or neutral; describe how pH changes are minimized by buffers.
9. The student will be able to discuss the major classes of organic molecules found in the human body and explain their biological role.
10. The student will be able to demonstrate knowledge of the cell, its organelles and their functions
11. The student will demonstrate knowledge of the various mechanisms of passive and active transport relative to the plasma membrane.
12. The student will demonstrate knowledge of somatic cell division (mitosis) and reproductive cell division (meiosis).
13. The student will be able to summarize the chemical make-up of enzymes and describe enzymatic action, as well as give the principle properties of enzymes.
14. The student will be able to define metabolism and give examples of various forms of metabolic processes.
15. The student will be able to demonstrate knowledge of chemical energy and the cellular respiratory process.
16. The student will demonstrate knowledge of protein synthesis.
17. The student will demonstrate knowledge of the types of tissues, membranes, and their functions.
18. The student will demonstrate knowledge of the organization of the integumentary system and its various functions.
19. The student will demonstrate knowledge of the relationship of the integumentary system to homeostasis.
20. The student will demonstrate knowledge of the development of bone tissue.
21. The student will demonstrate knowledge of bone tissue structurally and functionally.
22. The student will be able to identify the bones of the body and their prominent markings.
23. The student will demonstrate knowledge of the articulations of the body and explain their structural differences and their functions.
24. The student will demonstrate knowledge of the different types of muscle tissues; give their anatomical location and primary functions.

25. The student will demonstrate knowledge of the neuroelectrical chemical factors of muscle contraction.
26. The student will demonstrate knowledge of the mechanisms for supplying energy in muscle contraction.
27. The student will demonstrate knowledge of the types of muscle contraction.
28. The student will be able to name, give the attachments and action of the major groups of skeletal muscles.
29. The student will be able to explain the general function of the nervous system.
30. The student will be able to list the divisions of the nervous system and the composition of each division.
31. The student will be able to describe the general structure and function of a neuron.
32. The student will be able to explain how neurons are classified.
33. The student will be able to name the different types of neurological cells and describe their functions.
34. The student will be able to explain how an injured nerve fiber may regenerate.
35. The student will be able to explain the events that lead to the conduction of a nerve impulse.
36. The student will be able to explain the electrochemical changes associated with impulse transmission.
37. The student will be able to explain the electrochemical changes associated with synaptic transmission.
38. The student will be able to name the parts of a reflex arc and describe the function of each part.
39. The student will be able to name the different types of reflex arcs.
40. The student will be able to describe the coverings of the brain and spinal cord.
41. The student will be able to describe the vascular/cerebrospinal fluid system of the central nervous system.
42. The student will be able to describe and explain the structure, organization and function of the spinal cord.
43. The student will be able to describe and explain the structure, organization and function of the brain.
44. The student will be able to give the location and function of the spinal nerves.
45. The student will be able to give the location and function of the cranial nerves.
46. The student will be able to describe the structure, organization and function of the autonomic nervous system.
47. The student will be able to describe and explain the structure and function of the specialized sensory receptors.
48. The student will be able to give the location of the olfactory organs and explain their primary functions.
49. The student will be able to describe the structure and function of the tongue.
50. The student will be able to describe the structure and function of the ear.
51. The student will be able to describe the structure and function of the eye.

## Course Outline: Human Anatomy and Physiology I

### UNIT I

#### 1. Introduction

##### A) Characteristics of Life

- 1 ) Organization
- 2) Irritability
- 3) Adaptability
- 4) Movement
- 5) Growth
- 6) Metabolism
- 7) Reproduction

##### B) Anatomy and Physiology Defined

- 1 ) Subdivisions of anatomy and physiology

##### C) Terms of Location and Anatomical Position

- 2) Superior/Inferior
- 3) Anterior/Posterior
- 4) Ventra~Dorsal
- 5) Cranial/Caudal
- 6) Proximal/Distal
- 7) Internal/External
- 8) Peripheral/Deep
- 9) Medial
- 10) Lateral
- 11 ) Central
- 12) Parietal
- 13) Visceral

##### D) Fundamental Planes

- 1) Coronal or Frontal
- 2) Transverse or Horizontal
- 3) Sagittal
- 4) Medial
- 5) Lateral

##### E) Cavities

- 1) Coelom
- 2) Thoracic
  - 1) Pericardial
  - 2) Pleural
  - 3) Abdominal
  - 4) Pelvic
  - 5) Orbital
  - 6) Nasal
  - 7) Buccal

## F) Organization of the body

- 1) Cells
- 2) Tissues
- 3) Organs
- 4) Systems
  - a) integumentary
  - b) skeletal
  - c) muscular
  - d) nervous
  - e) endocrine
  - f) circulatory
  - g) respiratory
  - h) digestive
  - i) excretory
  - j) reproductive

## 2. Chemistry of Life

- A) matter and elements
- B) how elements differ
- C) structure of matter
- D) electron arrangement
- E) electron arrangement vs. reactivity
- F) chemical bonding
  - 1) ionic bonding
  - 2) covalent bonding
    - a) polar
    - b) non-polar
  - 3) Hydrogen bonding
- G) Elements of biological importance
- H) Inorganic compounds
- I) Organic compounds

## 3. The cell

- A) The cell theory
- B) The anatomy and physiology of the cell
  - 1) Cytoplasmic membrane
  - 2) Cytoplasm
  - 3) Cytoplasmic organelles
    - a) endoplasmic reticulum
    - b) golgi bodies
    - c) ribosomes
    - d) centrioles
    - e) lysosomes
    - f) vacuoles
    - g) mitochondria

## 4) Nucleus

- a) membrane
- b) nucleoplasm
- c) chromatin
- d) nucleolus

## 5) Appendages

- a) flagella
- b) cilia

## C) The movement of materials across the cell membrane

## 1) Diffusion

- a) osmosis
- b) dialysis
- c) facilitated diffusion

## 2) Active transport

## 3) Endocytosis

- a) pinocytosis
- b) phagocytosis

## D) The cell's cycle of growth (somatic cells)

## 1) Growth phase I

## 2) Synthesis phase

## 3) Growth phase 2

## 4) Reproduction of somatic cells

## a) Mitosis -nuclear division

- 1) prophase
- 2) metaphase
- 3) anaphase
- 4) telophase

## b) Cytokinesis - cytoplasmic division

## E) Division of reproductive cells

## 1) Meiosis

## a) reduction division

- 1) prophase I
- 2) metaphase I
- 3) anaphase I
- 4) telophase I

## b) equational division

- 1) prophase 2
- 2) metaphase 2
- 3) anaphase 2
- 4) telophase 2

## F) Cellular Metabolism

## 1) Anabolism

## 2) Catabolism

## 3) Enzymes



- a) composition
  - b) action
- 4) Cellular respiration
  - a) glycolysis
  - b) the kreb's cycle
  - c) The electron transport system/cytochrome system
- 5) Protein synthesis
  - a) transcription
  - b) translation

## UNIT II

### 1. Specialization of Cells (Tissues)

#### A) Structure and Function of the tissues

- 1) Epithelial
- 2) Connective
- 3) Muscular
- 4) Nervous

#### B) Membranes

- 1) Serous
- 2) Mucous
- 3) Cutaneous
- 4) Synovial

### 2. The Integumentary System

#### A) The skin and its tissues

- 1) Structure
- 2) Function

#### B) Appendages and Glands of the skin

#### C) Pigmentation

### 3. The Skeletal System

#### A) Types of bones cells and their functions

- 1) Osteoblasts
- 2) Osteoclasts
- 3) Osteocytes

#### B) The Bony Matrix

#### C) Types of Bone Tissue

- 1) Compact
- 2) Spongy

#### D) Membranes of Bone Tissue

- 1) Periosteum
- 2) Endosteum

#### E) Classification of Bones

- 1) Long
- 2) Short

- 3) Flat
- 4) Irregular
- 5) Sesamoid
- F) Formation and Growth of Bones
  - 1) Membranous Ossification
  - 2) Endochondrial Ossification
  - 3) Factors affecting bone growth and development
    - a) vitamins and minerals
    - b) hormones
    - c) physical exercise
    - 4) Anatomy and physiology of fractures
- G) Divisions of the Skeletal System and their Bones
  - 1) Axial: 80 bones
  - 2) Appendicular: 126 bones
    - a) pectoral girdle
    - b) pelvic girdle
  - 3) Descriptive Terms
    - a) processes: process, condyle, tubercle, tuberosity, trochanter, crest, spine, head
    - b) cavities and depressions: groove, sinus, atrum, cornal, meatus, foramen, fissure fovea, fossa
- H) Arthrology: joints of articulation
  - 1) Synarthroses (immovable joints)
    - a) synchondroses
    - b) sutures
  - 2) Amphiarthroses (slightly movable joints)
    - a) joints between the vertebrae
    - b) joints between the pubis and sacroiliac
  - 3) Synovial-Diathrososes (free moving joints)
    - a) ball and socket
    - b) hinge
    - c) pivot
    - d) condyloid
    - e) gliding
    - f) saddle
  - 4) Movements permitted by Diarthroses (synovial joints)
    - a) angular movements: flexion, extension, abduction, adduction, elevation, depression
    - b) circumduction
    - c) rotation
    - d) Special movements:
      - 1) supination
      - 2) pronation
      - 3) inversion
      - 4) eversion
      - 5) protraction

6) retraction

5) Practical Terms Related to the Skeletal System

- a) sprain
- b) dislocation
- c) bursitis
- d) arthritis
- e) osteomyelitis
- f) kyphosis
- g) lordosis
- h) scoliosis

4. The Muscular System

A) Types, location and function of muscle tissue

- 1) smooth muscle
- 2) cardiac muscle
- 3) striated or skeletal muscle

B) Contraction of muscle tissue

1) Conditions of contraction

- a) stimuli
- b) response to stimuli
- c) chemical changes

2) Types of contraction

3) The physiology of skeletal muscle contraction

C) Skeletal muscles

1) Naming

- a) directions of fibers
- b) location
- c) size
- d) number of origins
- e) shape
- f) origin and insertion (attachments)
- g) action

2) Grouping

- a) prime mover - antagonist
- b) prime mover - synergist

D) Skeletal Muscles and Their Bony Levers

1) The principle action of skeletal muscles

- a) flexor
- b) extensor
- c) abductor
- d) adductor
- e) levator
- f) depressor
- g) supinator
- h) pronator

- i) sphincter
- j) tensor
- k) rotator

### UNIT III

#### 1. The Nervous System

A) The function of the Nervous System

B) The organs of the Nervous System

- 1) Brain
- 2) Spinal cord
- 3) Membranes
- 4) Nerve cords
- 5) Ganglion
- 6) Nerve nucleus

C) The Cells and Tissues of the Nervous System

1) Supportive tissues and their function

- a) neuroglia cells
  - 1) astrocytes
  - 2) oligodendrocytes
  - 3) microglia cells
  - 4) ependyma

2) The Neuron

- a) anatomy
  - 1) nerve cell body
  - 2) nissl bodies (chromatophilic substances)
  - 3) dendrites
  - 4) axons
  - 5) axoplasm
  - 6) axolemma
  - 7) neurolemmocytes (Schwann cells)
- b) function of neurons
- c) types of neurons
  - 1) unipolar
  - 2) bipolar
  - 3) multipolar
  - 4) sensory
  - 5) association - connection-interneuron
  - 6) motor

3) Nerve Impulse transmission

4) The Synapse and Impulse Transmission

5) Nerve Regeneration

6) The Function (behavior) Unit of the Nervous System

- a) The reflex arc

- 1) composition
  - 2) types
- 2. The Divisions of the Nervous system
  - A) The Central Nervous System
    - 1) Membranes
    - 2) The spinal cord
      - a) structure
      - b) functions
      - c) pathways
        - 1) ascending tracts
          - a) fasciculus gracilis
          - b) fasciculus cutaneus
          - c) spinothalamic (lateral and anterior)
        - 2) descending tracts
          - a) corticospinal
          - b) reticulospinal
          - c) rubrospinal tracts
      - d) spinal cord injuries
        - 1) spinal shock
        - 2) paralysis
          - a) flaccid paralysis
          - b) spastic paralysis

## 2. The Brain

- A) Structural make-up
  - 1) lobes
  - 2) organization
    - a) cerebrum
    - b) ventricles
    - c) thalamus
    - d) hypothalamus
    - e) limbic system
    - f) pineal gland
    - g) pons
    - h) medulla oblongata
    - i) cerebellum
  - 3) functions
- B) The Peripheral Nervous System
  - 1) The cranial nerves
    - a) location
    - b) function
  - 2) The spinal nerves
    - a) location
    - b) function
- C) The Autonomic Nervous System
  - 1) Sympathetic division

- 2) Parasympathetic division
- 3) Autonomic transmitters
- D) Clinical terms related to the Nervous System

### 3. Somatic and Special Senses

#### A) Receptors

##### 1) Types

##### a) mechanical

- 1) free-nerve (dendritic) ending
- 2) meissner's corpuscles
- 3) merkel's disks
- 4) pacinian corpuscles
- 5) hair cells
- 6) baroreceptors
- 7) proprioceptors
- 8) root hair plexuses
- 9) muscle spindles
- 10) golgi tendon organs
- 11) krause end bulbs
- 12) ruffini's corpuscles

##### b) photoreceptors

- 1) rods
- 2) cones

##### c) chemoreceptors

- 1) olfactory cells
- 2) taste buds (gustatory hairs)
- 3) aortic bodies
- 4) carotid bodies

##### d) thermoreceptors

##### e) nociceptors

##### 2) Functions

#### B) The Sense of smell

- 1) Olfactory cells and their function

#### C) The Sense of Taste

- 1) Taste Buds and their function

#### D) The Ear

- 1) structural makeup
- 2) physiology of hearing
- 3) equilibrium
  - a) static
  - b) dynamic

#### E) The Eye

- 1) structural makeup
- 2) physiology of sight
- 3) common disorders



**Proposed  
Academic Schedule  
Human Anatomy and Physiology I**

**Fall 2011**

**SI Mentors:**

**Mr. John Meinking**

**Ms. Maggie Jackson**

<b>Week–Date(s)</b>	<b>Lesson(s)</b>
1     8/29 – 9/2	Handout Syllabus – Lab Safety, Orientation/The Scientific Method & Critical Thinking/The Characteristics of Life/The Science of Anatomy & Physiology – The Body as a Whole - Required reading – Chapter 1 - Required reading – Chapter 2 Lab: Anatomical Terminology
2     9/16 – 9/12	<b>Quiz 1</b> /Chemistry of Life cont'd - Required reading – Ch. 2 LECTURE: The Anatomy of a Cell- Required reading – Ch. 3 Wed. – Pre-Test Lab: Principles of Diffusion and Osmosis
3     9/13 – 9/19	<b>Quiz 2</b> / The Cell cont'd / Cell membrane functions - Required reading – Chapter 3 The Cells Cycle of Growth and Mitosis – Required Reading – Chapter 3
4     9/20 – 9/26	<b>Quiz 3</b> / Mitosis and Meiosis - Required reading – pgs in Chapter 28 Cellular Metabolism-Cellular Respiration- Required reading – pgs in Chapter 25 DNA, RNA and Protein Synthesis – Chapter 3 LAB: Histology  <b>Last time to retake pre-test</b>
5     9/27 – 10-3	<b>Unit Test 1</b> – (Wednesday 9/28) Histology LAB: Histology

6	10/4 – 10/10	Tissues and Membranes / The Integumentary System – Required reading – Chapter 5 LAB: Lab Practical I / Bones
7	10/11 – 10/17	<b>Quiz 4</b> /The Integumentary System cont'd / The Skelton System Required reading – Chapter 6, 7, 8 Lab: Skeletal Anatomy
8	10/18 – 10/24	<b>Quiz 5</b> - The Skelton System and Articulations - Required reading – Chapter 6, 7, 8, 9 LAB: Anatomy of the Skeleton
9	10/25 – 10/31	Articulation cont'd / The Muscular System – Required reading - Chapters 10, 11 LAB: Lab Practical II
10	11/1 – 11/7	<b>Quiz 6</b> / The Muscular System – Required reading – Chapter 10 & 11 LAB: Skinning / Cat Muscle I.D.
11	11/8 – 11/14	The Muscular System continued LAB: Cat Muscle I.D.
12	11/15 – 11/21	<b>Unit Test 2</b> – (Wednesday 11/16) Lecture – The Nervous System – Required reading – Chapter 12, 13, 14, 15, 16 LAB: Cat Muscle I.D.
13	11/22-11/23	<b>Quiz 7</b> / The Nervous System – Required reading - Chapters 12, 13, 14, 15, 16 LAB: Open Lab Study
14	11/28 – 12/2	<b>Quiz 8</b> / The Nervous System – Required reading - Chapters 13, 14, 15, 16 LAB: Lab Practical III
15	12/5 – 12/9	<b>Quiz 9</b> / The Nervous System – Required reading – Chapter 12, 13, 14, 15, 16 Special Senses - Required reading – Chapter 17 LAB: CNS / Anatomy of the Eye

16 12/12 – 12/16      **Unit Test 3** (Wednesday 12/14)  
Special Senses  
LAB: Ear Anatomy / Senses  
LAB PRACTICAL IV (Oral Testing on Brains, Eye and Ear)

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17 12/18      **Final Exam**

## Lecture Topics Begin at this point (Part II)

### II. Basic Biological Organization of the Human Body

Upon completion of a study of basic organization of the human body, the student should be able to correctly answer questions concerning the following:

- A. Be able to list and describe the characteristics of living material.
- B. Be able to describe the various levels of organization from atoms through organism level.
- C. Be able to list the various body systems.
- D. At the cellular level of biological organization, be able to describe the following:
  1. Distinguish between unicellular versus multicellular life forms. In reference to multicellular, understand what is meant by cell differentiation.
  2. Associated with cellular structures, be able to define and discuss the following in relation to respiration and the mitochondrion.

metabolism	pyruvic acid	substrate level phosphorylation
ATP-ADP	acetyl co-enzyme A	oxydative phosphorylation
glucose	Kreb's cycle	aerobic respiration
glycolysis	mitochondrial structure	anaerobic respiration
glycogenesis	outer/inner membrane	
glycogenolysis	cristae	
gluconeogenesis	matrix	

E. Discuss the organization of the potential dorsal and ventral cavities.

1. Distinguish between cranial and vertebral cavity.
  - a. State the contents of each.
  - b. Define meninges and state their function.
2. Distinguish between the divisions of the ventral cavity.
  - a. List the major contents of the thoracic cavity.
  - b. Pertaining to the thoracic cavity, define

mediastinum	diaphragm	pericardial cavity
visceral pleura	pleural fluid	pericardial fluid
parietal pleura	pericardium	pleural cavity

- c. List the major contents of the abdominal and pelvic cavity.
- d. Pertaining to the above cavities, define:

visceral and parietal peritoneum	peritoneal fluid
peritoneal cavity	diaphragm

### III. Tissues:

Upon completion of a study of tissues, the student should be able to correctly answer questions concerning the following:

- A. Define tissues and list the four main tissue types.
- B. Describe epithelial tissue.
  1. List functions of epithelium, structural specialization's of epithelial cells, and how they maintain their integrity

2. Classify epithelial tissue by cellular shape, layers, and associated structures.
3. Give an example of the location of the following epithelial types:

simple and stratified squamous	simple and stratified columnar
simple and stratified cuboidal	ciliated pseudostratified columnar
transitional germinal epithelium	neuraepithelium

4. Briefly organize glandular epithelium into endocrine versus exocrine, simple versus compound and modes of secretion.

C. Be able to discuss connective tissue

1. List the functions of the tissue.
2. Contrast connective tissue to epithelium using the terms extracellular protein fibers, ground substance, and matrix.
3. Distinguish between types of intercellular material by defining:

connective tissue proper	reticular fibers
fluid connective tissue	elastic fibers
supporting connective tissue	collagenous fibers
dense vs loose connective tissue	chondroitin sulfate
regular vs irregular connective tissue	

4. Define and state the function of the following connective tissue cells:

mesenchyme	osteocyte	hemocytoblast
adipocyte	osteoblast	mast cell
plasma cell	erythrocyte	chondrocyte
osteoclast	leukocyte	fibroblast
macrophage	platelet	melanocyte

5. Describe the structure and locations of the following types of connective tissue.

loose	adipose	elastic cartilage
dense	reticular	fibrocartilage
regular	elastic	fibrous
irregular	collagenous	bone
areolar	hyalin cartilage	blood

6. Describe the microstructure of cartilage by defining or labeling a diagram the following: perichondrium, matrix, lacuna, chondrocytes.
7. Describe the microstructure of bone by defining or labeling a diagram the following: matrix, lacuna, Haversian canal, osteocytes, lamella, canaliculi, osteon.
8. Compare the differences and similarities of providing nutrients to chondrocytes of cartilage versus osteocytes of bone.

D. Be able to describe muscle tissue.

1. Describe the functions of and the characteristics of muscle tissue.
2. Describe the basic structural characteristics and location of skeletal, smooth, and cardiac muscle.

- E. Briefly describe nervous tissue. (p. 134-135 of Martini only)
1. Briefly describe the characteristics of the tissue.
  2. Briefly define: neuron, cell body, axon, dendrite, and neuroglia.

#### IV. Skin:

Upon completion of a study of the integumentary system, the student should be able to correctly answer questions concerning the following:

- A. Define an organ, based upon tissue types functioning together, by using skin as an example.
- B. List the functions of skin.
- C. Describe or label on a diagram, the following skin structures:

epidermis	keratinocytes	sweat glands
stratum corneum	keratin	nerve receptors
stratum granulosum	dermis	pilomotor (arrector pili)
stratum basale	Hair (follicles, root, shaft)	muscle
melanocytes	sebaceous glands	ceruminous glands
		mammary glands

#### V. Organization and Communication Between Fluid Compartments:

Upon completion of a study of fluid compartments, the student should be able to correctly answer questions concerning the following:

- A. Be able to discuss the organization of the body into fluid compartments.
  1. Define: total body water, intracellular fluid, extracellular fluid, plasma and interstitial fluid.
  2. State the normal quantity of fluid in each of the above.
  3. Discuss the effect of age, sex, and quantity of adipose tissue on percentage of body weight made up of fluid.
  4. Discuss the relative distribution of different types of electrolytes and protein between the fluid compartments.
  5. List the normal routes of intake and output of fluids.
  6. List miscellaneous extracellular fluid compartments.
  7. State the route of communication between intracellular and interstitial fluids and between interstitial and plasma fluid compartments.
- B. Discuss transport of materials through the cell membrane.
  1. Describe the molecular construction of the cell membrane.
    - a. Define phospholipid bilayer
    - b. Organize membrane proteins into the following and be able to define each:

integral vs peripheral protein	enzymes
fibrous vs globular protein	receptors
anchors	carrier (transport) proteins
recognition proteins	channel proteins (leak vs gated)

2. Define permeability and its various degrees.
3. Discuss the following methods of moving chemicals through the cell membranes and factors influencing each:



diffusion active transport filtration	osmosis pinocytosis endocytosis	passive transport phagocytosis exocytosis
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4. Relating to osmosis, define isotonic, hypertonic, hypotonic, crenation, plasmolysis, hemolysis, normal saline, 5% dextrose, lactate Ringer's solution.
  5. Define transmembrane potential and state the cause of a resting membrane potential by relating diffusion, leak channels, and active transport of  $\text{Na}^+$  and  $\text{K}^+$  and explaining the Na-K pump.
- C. Discuss communication between plasma and interstitial fluid via capillaries.
1. Describe the general structure of a capillary.
  2. Define the following and relate them to inward and outward movements fluids through capillary walls:

capillary pressure tissue pressure effective hydrostatic pressure plasma colloid osmotic pressure	tissue colloid osmotic pressure effective osmotic pressure filtration pressure absorption pressure
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- D. Discuss the role of the lymphatic system for body fluid regulation.
- \*1. Describe the basic anatomy of the lymphatic system.
  - \*2. Describe routes of lymphatic drainage for various areas of the body.
  - \*3. Discuss the composition of, formation of, purpose of, and movement of lymph.
  - \*4. List structures not drained by lymphatics.
  - \*5. List various causes of edema.

**\*will not be covered in class**

## VI. Skeletal System:

Upon completion of a study of the skeletal system, the student should be able to correctly answer questions concerning the following:

- A. List the major functions of the skeletal system.
- \*B. Describe the microscopic construction of bone tissue (review objective III-C-7, p 10).
- C. Organize the skeleton into axial and appendicular portions.
- D. Organize bones into long, short, flat and irregular.
- E. Diagram and discuss the structure of long bones using the following terms:

epiphysis diaphysis articular cartilage periosteum metaphysis endosteum	epiphyseal plate medullar cavity red and yellow marrow spongy and compact bone trabeculae
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- F. Differentiate between intramembranous and endochondral ossification.
- G. Define and state the cause of the vertebral column curvatures.
- H. Organize skeleton articulations (joints).
  1. Define articulation and classify them into synarthrosic, amphiarthrotic, or diarthrosic according to degree of movement permitted.

2. Classify joints according to structure into sutures, synchondrosis, syndesmosis, symphysis, and synovial.
3. Diagram and discuss the basic structure of a synovial joint.

\*I. Define the following joint movements:

flexion	circumduction	protraction
extension	inversion eversion	retraction
abduction	supination	dorsiflexion
adduction	pronation	plantarflexion
rotation		

\*J. Define: ligament, tendon, tendon sheath, and bursae

**\*will not be covered in class**

## VII Nervous System:

Upon completion of a study of the nervous system, the student will be able to correctly answer questions concerning the following subject matter:

A. Describe the overall construction, organization, and terminology associated with nervous tissue.

1. List the specialized characteristics of nervous tissue.
2. Describe the organization of neurons.

a. Describe the following parts of the neuron:

cell body, axon, dendrites,	teledendria, myelin sheath,	node of Ranvier, Schwann cells
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\*b. Differentiate between the following types of neurons:

myelinated non-myelinated unipolar	bipolar multipolar alpha, beta, and gamma	motor sensory internuncial
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3. Define neuroglia (glial cells).
4. Describe the structure of a nerve.
  - a. Be able to define epineurium, perineurium, endoneurium, and fasciculi as parts of a nerve.
  - \*b. Distinguish between motor, sensory, and mixed nerves.

\*5. Define the following nervous system terminology:

central nervous system	somatic	ganglia sensory
peripheral nervous system	visceral	(afferent)
receptor	effector	motor (efferent)

\*6. Distinguish between gray and white matter by defining:

cortex, nuclei, horns,	associational, projectional, ascending and descending	nerve tracts, commissural,
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- B. Discuss the processes involved in nerve impulse generation and conduction using such terms as:

ion channels (discuss types) sodium-potassium pump transmembrane potentials resting membrane potential	depolarization repolarization graded potential threshold potentials	action potentials hyper-hypopolarization refractory periods (absolute, relative)
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- C. Diagram and describe the synapse.

1. Be able to define synapse.
2. Relate the following to synapses:

bouton synaptic cleft pre-postsynaptic membrane synaptic vesicles	neurotransmitter spacial summation EPSP IPSP	calcium adrenergic cholinergic temporal summation
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3. Be able to list and discuss chemicals used as neurotransmitters.
  5. Compare and contrast adrenergic and cholinergic synapses and receptors involved
- D. Diagram and discuss the anatomy of the brain.
1. Define and list the main structures of the telencephalon, diencephalon, mesencephalon, rhombencephalon, brain stem, and diagram the connection of each.
  2. Diagram and describe the cerebrum using the following terms:

cerebral hemishpere cerebral cortex longitudinal fissure central sulcus lateral fissure transverse fissure	frontal lobe parietal lobe occipital lobe temporal lobe	convolutions sulcus fissure primary motor area pre-motor area	somesthetic area corpus callosum optic chiasma basal nucleus lymbic system
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- \*3. Describe the location of and list the functions of the following lower brain structures: thalamus, hypothalamus, midbrain, pons, medulla, cerebellum.
- E. Diagram and discuss the parts of and the function of the spinal cord.
1. Given a diagram of a cross-section view of the spinal cord, be able to divide the gray matter into anterior and posterior horns.
  2. State the purposes of the following spinal nerve tracts: spinocerebellar, funiculus gracilis, funiculus cuneatus, rubrospinal, spinothalamic, corticospinal, pyramidal, and extrapyramidal.
  3. State the level at which the spinal cord terminates.
  4. Define cauda equina.
  5. Divide the spinal cord into cervical, thoracic, lumbar, and sacral segments.
- F. Describe the anatomy and function of the meninges by defining dura mater, venous sinus, epidural space, subdural space, arachnoid mater, subarachnoid space, and pia mater.

**\*will not be covered in class**

- G. State the origin and trace the path of circulation of cerebro-spinal fluid using the following terms:

choroid plexus	aqueduct of Sylvius
lateral ventricles	4th ventricle
foramen of Monroe	foramen of Luschka and Magendie
3rd ventricle	arachnoid villi

- H. Discuss the organization of the peripheral nervous system.

- \*1. State the name, number, and general function of the cranial nerves.
  - \*2. Describe spinal nerves.
    - a. State the total number and number of cervical, thoracic, lumbar, and sacral, and coccygeal.
    - b. Describe the origin of spinal nerves by defining dorsal and ventral roots, dorsal root ganglia, anterior and posterior rami.
  - \*3. Define, state the location of, and the spinal nerves involved in the make-up of the cervical, brachial, lumbar, and sacral plexus.
  - \*4. State the general location and function of the following peripheral nerves: axillary, musculocutaneous, radial, median, ulnar, femoral, obturator, sciatic, pudendal, and phrenic nerves.
  - \*5. Organize receptors into types: exteroceptors, proprioceptors, and interoceptors. Briefly state the functions of the following exteroceptors: free dendritic endings, Merkel discs, Meissner's, Ruffini's, and Pacinian corpuscles
- I. Describe the reflex arc as the basic function of the nervous system.
- 1. Using the spinal cord, correctly locate sensory, internuncial, and anterior horn cells and describe the path of impulse conduction for the myotactic (knee jerk), and withdrawal reflex.
  - 2. Trace the pathway sensory nerve impulses would take as they ascend up the spinal cord to the brain using the dorsal column and spinalthalamic tracts.
  - 3. Trace the pathway motor nerve impulses would take as they descend down the spinal cord from the brain using the corticospinal tracts.
- J. Define the purpose of and describe the make-up of the autonomic nervous system.
- 1. Contrast autonomic and somatic reflexes.
  - 2. Discuss the difference between the parasympathetic and sympathetic divisions using such terms as:

craniosacral	post-ganglionic fibers	mesenteric ganglia
thoracolumbar	sympathetic chain ganglia	adrenergic fibers
pre-ganglionic fibers	*celiac, superior and inferior	cholinergic fibers

- 3. Be able to describe the effect of sympathetic or parasympathetic stimulation on any major visceral organ.

**\*will not be covered in class**

### VIII. Myology (study of muscle)

Upon completion of a study of muscle tissue, the student should be able to correctly answer questions concerning the following:

- A. List and define properties of muscle tissue.
- B. Contrast skeletal, smooth, and cardiac muscle tissue according to cellular structure, location, arrangement, innervation, and physiological properties.
  1. Describe cellular structure of the three muscle types using the following terms:

muscle fiber	myofibrils	I, A, H, and Z bands
sarcolemma	multinucleated	intercalated discs
sarcoplasm	striations	tight junctions

2. Describe location of the muscle types.
3. Contrast innervation of muscle tissue types and define motor end plate.
4. Define motor unit.
5. Contrast the basic physiological differences between muscle tissue types according to speed of contraction, latent period, fatigue, refractory periods all or none principle, tonus, tetany, isometric and isotonic contraction.
- C. Describe the overall anatomy of a skeletal muscle.
  1. Describe the gross structure of a skeletal muscle by defining origin, insertion, and belly.
  2. Describe muscle attachments such as tendons and aponeuroses.
  3. Describe the fascia arrangement using the terms: epimysium, fasciculus, perimysium, and endomysium.
- D. Describe the ultra-micro structure of skeletal muscle fibers using the following terms:

motor end plate	sarcoplasm	T-tubules	cross bridges
sarcolemma	calcium	triad	Z-bands
myofibrils	sarcoplasmic reticulum	myofilaments	sarcomere
synaptic cleft	longitudinal tubules	actin	troponin
synaptic vesicles	cisternae	myosin	tropomyosin

- E. Describe the contractile mechanism for skeletal muscle.
  1. Discuss stimulation of the muscle fiber by describing the conduction across the motor end plate, depolarization of the sarcolemma and conduction into the myofibrils by T-tubules.
  2. Describe release of calcium ions and the calcium pump associated with the sarcoplasmic reticulum.
  3. Describe the ratchet theory of contraction using the relationships of calcium, actin complex, myosin, troponin, tropomyosin, ATP, ADP, creatine phosphate, and creatine.
  4. Discuss ATP replacement by defining aerobic, anaerobic respiration, lactic acid, and oxygen debt.
  5. List causes of skeletal muscle fatigue.
  6. List the effects of exercise on skeletal muscle.
- F. Discuss how muscles work as groups using such terms as prime mover, synergistic muscles, and antagonistic muscles.
- \*G. Identify the location of major muscles and muscle groups of the body.

(Correlation with lab work)

**\*will not be covered in class**

## **SPECIFIC OBJECTIVES FOR THE LABORATORY PORTION OF THE COURSE**

Laboratory content is divided into the following learning units.

### **I. Introduction to the Human Body Lab**

Upon completion of the following laboratory studies, the student should be able to correctly answer questions concerning the following:

- A. Discuss the derivation of medical terminology.
- B. Define and correctly use anatomical directions, planes, and regions when describing the human body.
- C. Organize the body into its potential body cavities and list major organs found in each.
- D. Locate exterior features and landmarks of the human body.

### **II. Cell Structure and Mitosis Lab**

Upon completion of a lab study of microscopic usage, cell structure, and mitosis, the student should correctly complete a lab report.

- A. Identify the major parts of a microscope and use the instrument effectively in study.
- B. Be able to prepare a wet-mount slide for study under a microscope.
- C. Identify major cellular structures with a light microscope using a variety of live and prepared specimens.
- D. Identify cells in various stages of mitosis.

### **III Identification of Tissues Lab**

The following tissue types are to be correctly identified by the student on a lab practical exam:

- A. Epithelial tissue:
  1. simple squamous
  2. stratified squamous
  3. simple cuboidal
  4. stratified cuboidal
  5. simple columnar
  6. stratified columnar
  7. ciliated pseudostratified columnar
  8. transitional
- B. Connective tissue:
  1. areolar
  2. adipose
  3. reticular
  4. hyalin cartilage
  5. elastic cartilage
  6. fibrocartilage
  7. elastic
  8. collagenous
  9. bone
  10. blood cells (erythrocytes, leukocytes, platelets)
- C. Muscle tissue: (smooth, skeletal, versus cardiac)
- D. Nervous tissue: (neurons versus glial cells)

### **IV. Principles of Diffusion and Osmosis Lab**

Upon completion of experimental procedures and terminology associated with diffusion through a liquid and colloidal solution, osmotic pressure, and tonicity, the student should correctly complete a laboratory report of their data and conclusions.



## V. Anatomy and Physiology of the Ear Lab

Upon completion of a study of the ear, the student should be able to correctly answer questions concerning the following:

- A. Describe the anatomy of the ear by locating and stating the functions of the following:

temporal bone mastoid process outer, middle, inner ear cerumenous glands auricle tympanic membrane ear ossicles malleus -incus	stapes scala vestibula eustachian tube stapediusbasilar membrane tensor tympani semicircular canals cochlea scala tympani oval window round window vestibular membrane	cochlear duct (scala media) tectoral membrane organ of Corti vestibular-cochlear nerve endolymph perilymph
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\*B. Define middle ear (bone) and nerve deafness.

**\*will not be covered in class**

## VI. Anatomy and Physiology of the Eye Lab

Upon completion of a study of the eye and its associated structures, the student should be able to correctly answer questions concerning the following:

- A. List the five special senses.  
B. Briefly describe the orbits.  
1. List the openings into the orbit and their purpose.  
2. List the contents of the orbit.  
C. Describe the construction of the anterior coverings of the orbit.  
1. State the purpose of the eyelids.  
2. Define medial and lateral angles, palpebral fissure, conjunctiva, conjunctival sac, tarsal plates, and their associated glands.  
3. Locate, state the nerve supply, and the function of the levator palpebral superioris and orbicularis oculi muscle.  
D. Describe the lacrimal apparatus.  
E. Locate, state the nerve supply, and the function of the muscles that move the eyeball.  
F. Describe the anatomy of the eye by locating and stating the functions of the following:

sclera	ciliary body	optic disc
cornea	suspensory ligaments	anterior and posterior cavity
choroid	retina	anterior and posterior chamber
iris	rods and cones	aqueous humor
pupil	macula	vitreous humor
lens	fovea centralis	optic nerve

\*G. Define the following

ptosis	astigmatism
glaucoma	conjunctivitis
myopia	accommodation
hypermetropia	refraction

H. Successfully complete the following optional exercises:

near point of accommodation

two-point discrimination

visual acuity  
color blindness  
Rinne and Weber hearing test  
localization

location of tastebuds  
examination of retina  
examination of tympanic membrane  
olfactory nerve testing

**\*will not be covered in class**

## VII Anatomy of the Skeleton Lab

Upon completion of a study of the skeleton, the student should be able to correctly identify the following on a timed laboratory practical examination.

- A. Be familiar with the following terms as they apply to skeletal parts.
- |         |            |        |         |
|---------|------------|--------|---------|
| condyle | trochanter | fossa  | spine   |
| crest   | tubercle   | sinus  | foramen |
| head    | tuberosity | meatus |         |
- B. Identify any bone as a member of the axial or appendicular skeleton.
- C. Given a human skull, accurately identify the following bones and their details:
1. frontal bone
    - a. frontal sinus
    - b. supraoptic foramen
  2. parietal bone
  3. temporal bone
    - a. mastoid process
    - b. external auditory meatus
    - c. zygomatic process
    - d. zygomatic arch
    - e. mandibular fossa
    - f. styloid process
    - g. carotid canal
    - h. jugular foramen
  4. occipital bone
    - a. foramen magnum
    - b. occipital condyles
    - c. occiput (external occipital protuberance)
  5. sphenoid
    - a. sella turcica
    - b. optic foramen
    - c. sphenoid sinus
    - c. foramen ovali
    - d. foramen rotundum
  6. ethmoid
    - a. cribriform plate
    - b. concha
    - c. crista galli
    - d. ethmoid sinus (air cells)
    - e. perpendicular plate
  7. maxillary bone (maxilla)
    - a. alveolar process
    - b. maxillary sinus
    - c. infraorbital foramen
  8. zygomatic
    - a. temporal process
    - b. zygomatic arch
  9. lacrimal
  10. palatine
  11. nasal
  12. vomer
  13. mandible
    - a. body
    - b. condyloid (condylar) process
    - c. alveolar process
    - d. coronoid process
    - e. ramus
    - f. angle
    - g. body
    - h. mental foramen
    - i. mandibular foramen
  14. hyoid

15. other structures
  - a. orbits (superior and inferior orbital fissures)
  - b. sagittal suture
  - c. coronal suture
  - d. lambdoidal suture
  - e. squamosal suture
- D. If given a vertebra, identify its basic parts:
 

spinous process	odontoid process (dens) (axis only)
transverse process	demifacet (thoracic only)
superior and inferior articular process/facets	transverse foramen (cervical only)
pedicle	intervertebral foramen
vertebral foramen	lamina
body	
- E. Identify the intervertebral disc and define its parts; annulus fibrosus and nucleus pulposus (p. 269-270). Discuss disc problems (p. 276)
- F. List the types and number of vertebrae, according to their locations. If given an individual vertebrae, be able to identify if it is a cervical, thoracic, lumbar, or sacral.
- G. Identify the first two cervical vertebrae as the atlas and the axis and state how each allows head movement.
- H. If given a sternum, differentiate between its manubrium, body, xiphoid process, sternal (jugular) notch, and sternal angle
- I. State the number of pairs of and the difference between true, false, and floating ribs and identify the following parts: body or shaft, head, neck, tubercle, angle, costal groove, costal cartilages, and intercostal spaces.
- J. Identify the following bones of the pectoral girdle and their details:
  1. clavicle
    - a. sternal end
    - b. acromial end
  2. scapula
 

a. supraspinous fossa	e. acromion process	i. body
b. infraspinous fossa	f. spine	
c. subscapular fossa	g. coracoid process	
d. glenoid fossa	h. superior and inferior angle	
- K. Identify the following bones of the upper extremities and their details:
  1. humerus
 

a. head	f. capitulum	k. anatomical/surgical neck
b. greater tubercle	g. trochlear	
c. lesser tubercle	h. olecranon fossa	
d. medial epicondyles	i. coronoid fossa	
e. lateral epicondyles	j. bicipital (intertubercular) groove	
  2. ulna
 

a. olecranon process	c. coronoid process	e. styloid process
b. semilunar (trochlear) notch	d. radial notch	
  3. radius
 

a. styloid process	b. ulnar notch	c. head
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  4. carpals: scaphoid, lunate, triquetrum, pisiform, trapezium, trapezoid, capitate, hamate (Also define carpal tunnel and carpal tunnel syndrome)
  5. metacarpals: I - V
  6. phalanges: proximal, middle, distal
- L. Identify the pair of coxal (innominant), that as hip bones, form the pelvic girdle. Identify the areas of the coxal bone that are the ilium, ischium, and pubis. Also identify the following features:

1. iliac crest
  2. pubic symphysis
  3. anterior superior iliac spine
  4. greater sciatic notch
  5. ischial tuberosity
  6. acetabulum
  7. obturator foramen
  8. greater or false pelvis
  9. lesser or true pelvis
  10. pelvic brim
  11. posterior superior iliac spine
  12. ischial spine
  13. pelvic inlet
- M. Identify the following bones of the lower extremities and their details:
1. femur
    - a. head
    - b. neck
    - c. greater & lesser trochanter
    - d. shaft
    - e. medial & lateral condyles
    - f. medial & lateral epicondyle
  2. patella
  3. tibia
    - a. medial and lateral condyles
    - b. medial malleolus
    - c. tibial tuberosity
  4. fibula
    - a. head
    - b. lateral malleolus
  5. tarsals: calcaneus, talus, navicular, cuboid, cuneiforms (first, second, third)
  6. metatarsals: I - V
  7. phalanges: proximal, middle, distal

### VIII. Dissection of Major Skeletal Muscles of the Cat

Upon completion of dissection, the students should be able to correctly identify the following muscles on a dissected cat, a diagram of human musculature, and/or upon themselves on a laboratory practical exam.

#### A. Superficial Thoracic Muscles:

1. pectoralis major
2. pectoralis minor

#### B. Abdominal wall muscles:

1. external abdominal oblique
2. internal abdominal oblique
3. linea alba (a line of connective tissue on midline where the aponeuroses of the above muscles fuse together)
4. transversus abdominis
5. rectus abdominis

#### C. Deep Thoracic muscles:

1. serratus ventralis (anterior)
2. scalenus ("the scalenes")
3. external intercostals
4. internal intercostals

#### D. Superficial back muscles:

1. clavotrapezium
2. clavobrachialis
3. acromiotrapezius
4. spinotrapezius
5. latissimus dorsi

#### E. Deep back muscles:

1. multifidus spinae
2. longissimus dorsi
3. spinalis dorsi

#### F. Muscles of the neck:

1. sternomastoid
2. cleidomastoid
3. sternohyoid
4. sternothyroid
5. cricothyroid
6. digastric
7. mylohyoid
8. thyrohyoid

#### G. Deep muscles of the neck and back:

1. rhomboideus minor (cervicis)
3. splenius

2. rhomboideus major (thoracis)
- H. Muscles of the head:
  1. masseter
  2. temporalis
- I. Shoulder muscles:
  1. supraspinatus\*
  2. infraspinatus\*
  3. teres major\*
  4. subscapularis\*
  5. acromiodeltoid
  6. spinodeltoid
  7. teres minor
- \*"rotator cuff" muscles
- J. Muscles of the upper arm (brachium)
  1. biceps brachii
  2. triceps brachii
  3. brachialis
- K. Superficial muscles of the medial side of the thigh:
  1. sartorius
  2. gracilis
- L. Superficial muscles of the lateral side of the thigh:
  1. biceps femoris☒
  2. tensor fascia latae
- M. Deep muscles of the medial side of the thigh:
  1. pectineus
  2. adductor longus
  3. adductor femoris
  4. psoas major
  5. semimembranosus☒
  6. semitendinosus☒
- ☒"hamstring" muscles
- N. Deep muscles of the lateral side of the thigh
  1. vastus medialis●
  2. rectus femoris●
  3. vastus lateralis●
  4. vastus intermedius●
  5. semimembranosus (deep surface)
  6. semitendinosus (deep surface)
- "quadriceps (quads) femoris" group
- O. Muscles of the calf
  1. tibialis anterior (cranialis)
  2. gastrocnemius
  3. soleus
- P. Muscles of the hip
  1. gluteus maximus♦
  2. gluteus medius
- ♦Note the position of the sciatic nerve deep to the belly of this muscle

## TOPICAL OUTLINE - BIO 211 - HUMAN ANATOMY & PHYSIOLOGY I

- I. Review of chemical organization of Life
  - A. Matter and energy
    1. Elements of life
    2. Atoms, ions, and molecules
    3. Chemical bonding
  - B. Chemical makeup of life
    1. Water, solutions, and measurement
    2. Biological organic compounds
  - C. Chemical reactions
    1. Types of metabolic reactions
    2. ATP
    3. Role of enzymes and nucleic acids

## II. Review of cellular structure and organization

- A. Cell theory
- B. Cellular structure and function
  - 1. Organelles and inclusions
  - 2. Respiration
  - 3. Movement
  - 4. Mitosis

## III. Organization of the Human Body

- A. Structural interrelationships
- B. Homeostasis and feedback regulation
- C. Respiration
- D. Body cavities
  - 1. Dorsal cavity
    - a. subdivisions
    - b. contents
    - c. meninges
  - 2. Ventral cavity
    - a. subdivisions
    - b. contents
    - c. pleura and peritoneum
- E. Anatomical directions, planes, and regions

## IV. Tissues

- A. Definition and types of tissues
- B. Organization of epithelium
- C. Organization of connective
- D. Muscle and nervous

## V. Skin as an example of an organ

- A. Functions of skin
- B. Epidermal and dermal structures

## VI. Fluid compartment organization

- A. Fluid compartments
  - 1. Definitions and quantities
  - 2. Chemical compositions
  - 3. Intake and output
- B. Cell membrane physiology
  - 1. Molecular structure
  - 2. Transport across cell membranes
  - 3. Membrane electrical potentials
- C. Capillary dynamics
  - 1. Structure
  - 2. Pressures
- D. Lymphatic system

## VII. Skeletal system

- A. Organization and general structure

- B. Ossification
- C. Vertebral column curvatures
- D. Joint organization and movements
- E. Anatomy of the skeleton

#### VIII. Nervous system

- A. Overall construction, organization and terminology
  - 1. Neurons
  - 2. Nerves
- B. Nerve impulses
- C. Synapses
- D. Central nervous system
  - 1. Brain
  - 2. Spinal cord
  - 3. Meninges
  - 4. Cerebrospinal fluid
- E. Peripheral nervous system
  - 1. Cranial nerves
  - 2. Spinal nerves and nerve plexus
  - 3. Major peripheral nerves
  - 4. Sense receptors
  - 5. Reflex arcs
  - 6. Autonomic nervous system
  - 7. Eye and ear and other special senses

#### IX. Muscular system

- A. Organization, structure, and characteristics of muscle tissue
- B. Anatomy of a typical skeletal muscle
- C. Microstructure of skeletal muscle fibers
- D. Physiology of contraction
- E. Location of major skeletal muscles

