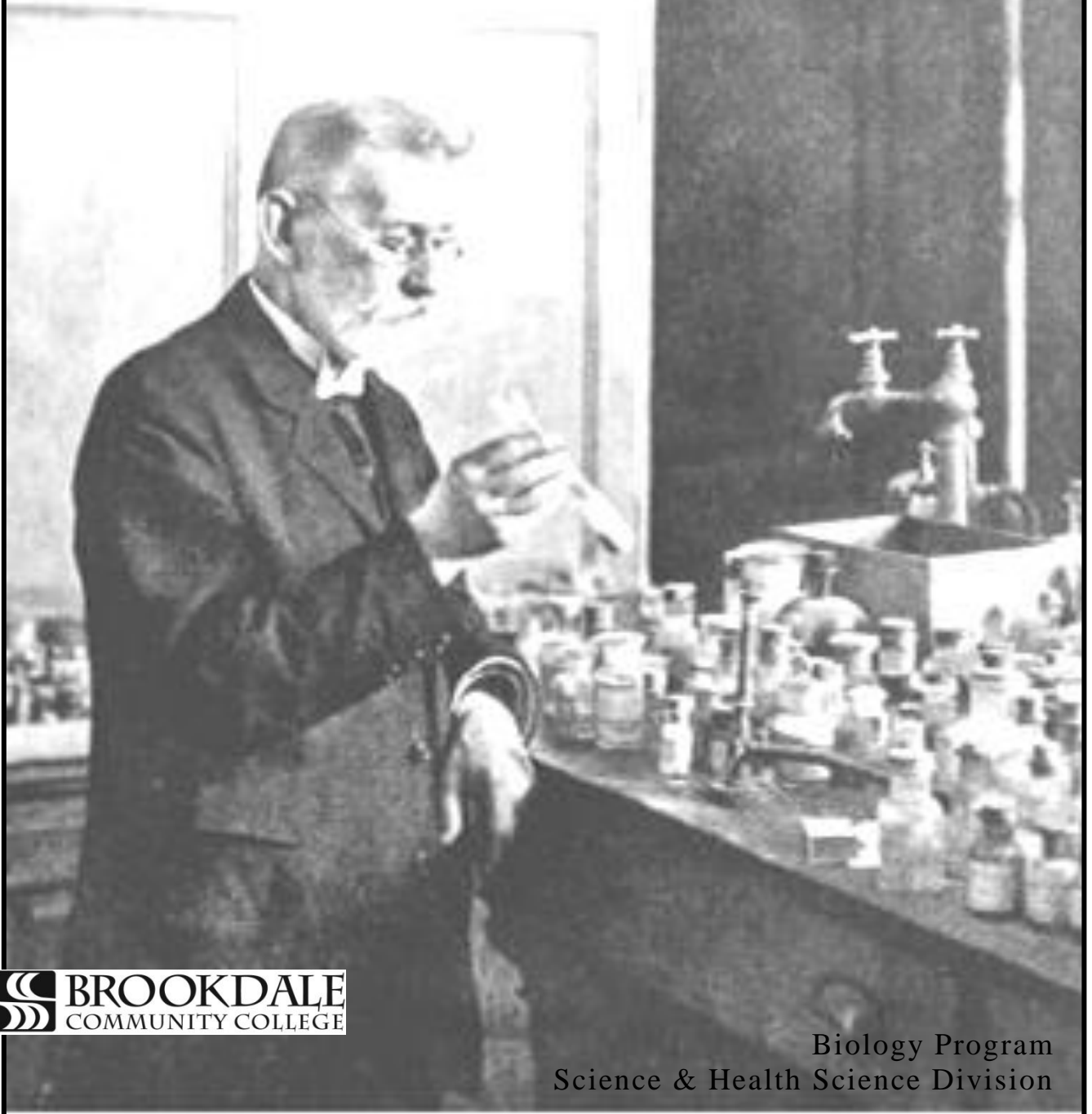


BROOKDALE COMMUNITY COLLEGE

Biology 111 Syllabus  
Anatomy & Physiology  
Fall 2011



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**CODE:** BIOL 111

**TITLE:** Anatomy and Physiology I

**DIVISION:** Science & Health Science

**DEPARTMENT:** Biology

**COURSE DESCRIPTION:** This course is designed to satisfy the requirements of health sciences programs, the needs of the pre-professional student and those who desire a deeper understanding of the human body. Through classroom and laboratory experiences, the student will be able to identify and describe the anatomy, and demonstrate an understanding of the physiology of the human body at the molecular, cellular, tissue and organ system levels. Covered in this course are the integumentary, skeletal, muscular, nervous and digestive systems of the human body.

**PREREQUISITES:** HS Biology or a grade of “C” or higher in BIOL 105, HS Chemistry or a grade of “C” or higher in CHEM 100 or CHEM 136, and a grade of “C” or higher in MATH 021 or MATH 025 or passing score in algebra on Basic Skills Test, and READ 095 or passing score in reading on Basic Skills Test, ENGL 095 or passing score in writing on Basic Skills Test

**PREREQUISITES OR COREQUISITES:**

**COREQUISITES:**

**CREDITS:** 4

**LECTURE HOURS:** 3

**LAB/STUDIO HOURS:** 2

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**REQUIRED MATERIALS:**

Textbook: Principles of Anatomy and Physiology  
By Gerard J. Tortora and Bryan Derrickson  
12<sup>th</sup> edition, 2009  
John Wiley & Sons, Inc.

Laboratory Manual: Biology 111 Laboratory Manual

**ADDITIONAL TIME REQUIREMENTS:**

Additional weekly lab time is required. (See instructor)

**COURSE LEARNING OUTCOMES:**

The student will be able to:

- Examine the gross and microscopic anatomy of the human skeletal, muscular, nervous and digestive systems and understand the relationships between the various structures.
- Demonstrate comprehension of the physiology of the integumentary, skeletal, muscular, nervous and digestive systems.
- Employ the deductive reasoning logic utilized in the scientific method to comprehend basic concepts in anatomy and physiology:
  - Homeostatic regulation and responses to homeostatic imbalances
  - Complementarity of form and function at the chemical, cellular, tissue, and system levels (Mathematical/Scientific Reasoning/Informational Literacy)

**GRADING STANDARD:**

**A student must have an average of 65% or better for the classroom component and an average of 65% or better for the laboratory component of the course in order to earn a passing grade for the course.**

Upon completion of the course, grades will be assigned as follows:

<b>A</b>	<b>=</b>	<b>92 – 100%</b>
<b>A-</b>	<b>=</b>	<b>89 - 91%</b>
<b>B+</b>	<b>=</b>	<b>86- 88%</b>
<b>B</b>	<b>=</b>	<b>82 - 85%</b>
<b>B-</b>	<b>=</b>	<b>79 - 81%</b>
<b>C+</b>	<b>=</b>	<b>76 – 78%</b>
<b>C</b>	<b>=</b>	<b>70 - 75%</b>
<b>D</b>	<b>=</b>	<b>65 - 69%</b>
<b>F</b>	<b>=</b>	<b>below 65%</b>

**Unit examination results will be reported as the grade assigned by the faculty calculated to the first decimal place. These grades will be weighed according to course grading policy. In calculating the course grade, 0.5 will round up to the next numerical grade and 0.4 will round down to the next lower numerical grade.**

A grade of C or better is required in all pre-requisite courses. Career studies courses must have a grade of C or better to count toward the Mathematics / Science Program – Biology Option.

Students are permitted to withdraw from the course without penalty until approximately 80% of the semester is complete. Please see term schedule for the exact deadline.

At the end of the semester, application for an Incomplete may be made if a student with proper documentation needs to complete no more than one lecture exam and/or one laboratory practical. The granting of an Incomplete is at the discretion of the instructor.

**COURSE CONTENT:**

Unit One:	Introduction to the Human Body
Unit Two:	Chemistry of Life
Unit Three:	Cell Structure and Function
Unit Four:	Tissues
Unit Five:	Integumentary System
Unit Six:	Bones and Skeletal System
Unit Seven:	Joints and Bony Attachments
Unit Eight:	Muscles and Muscle Tissue
Unit Nine:	The Nervous System
Unit Ten:	The Digestive System

**DEPARTMENT POLICIES:**

**Attendance** during class and laboratory sessions is strongly recommended for optimum performance in biology courses.

**Lecture exams** will be given in class or in the Testing Center, depending on instructor preference.

**Laboratory practicals** will be given during laboratory sessions, in accordance with schedules provided by the learning assistants. Exams and practicals must be taken at the times designated by the instructor or learning assistant. A student who misses a lecture exam or laboratory practical must provide prior notification and proper documentation in order to take the exam or laboratory practical. The acceptance of said prior notification and proper documentation will be determined by the instructor.

**Documentation** must be provided within one week of the student's return to the classroom for a make-up exam or laboratory practical to be scheduled. A student who is unable to provide proper documentation for a missed exam or laboratory practical will be given a grade of zero for that exercise. Students may not re-take exams or laboratory practicals on which they perform poorly.

Requirements for the completion of laboratory are listed in the laboratory responsibility sheets for individual courses. Requirements for course completion are listed in individual instructor syllabi.

**COLLEGE POLICIES:**

For information regarding:

- ◆ Brookdale's Academic Integrity Code
- ◆ Student Conduct Code
- ◆ Student Grade Appeal Process

Please refer to the **STUDENT HANDBOOK AND BCC CATALOG.**

**NOTIFICATION FOR STUDENTS WITH DISABILITIES:**

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Disabilities Services Office at 732-224-2730 or 732-842-4211 (TTY), provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

**ADDITIONAL SUPPORT/LABS:**

***Course Website:***

***Biology Department information and BIOL 111 resources are available on the Brookdale website:***

***<http://www.brookdalecc.edu/pages/802.asp>***

# **BIOL 111 Anatomy & Physiology I #1 of 10 Units 4 credits**

Name of Unit: **INTRODUCTION TO THE HUMAN BODY**  
Chapter 1

Unit Objectives: To discuss the structural organization and characteristics of living organisms. To understand the importance of homeostasis, and to define anatomical terminology used to study the human body.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Define the sciences of anatomy, and physiology, and discuss relationships of these fields of study. Provide examples of different scientific disciplines and subdivisions of anatomy and physiology.	page 2
2. Understand and define different levels of structural organization in the human body. Describe and provide examples of the principle of complementarity of structure and function.	pages 3-5 figure 1.1
3. List the major organs and primary functions of organ systems of the human body to include: integumentary system, muscular system, nervous system, skeletal system, endocrine system, urinary system, cardiovascular system, respiratory system, lymphatic/immune system, digestive system, and reproductive systems.	pages 4-7 table 1.2
4. Provide examples of common properties of living organisms and survival requirements necessary to maintain life.	pages 5-8

# **BIOL 111 Anatomy & Physiology I #1 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
5. Understand and describe homeostatic feedback mechanisms (negative and positive). Provide examples of feedback mechanisms that regulate body temperature, blood glucose concentration, endocrine control, blood pressure, heart rate, blood clotting and childbirth. Discuss the significance of homeostatic imbalances as related to disease and provide examples of diagnostic procedures designed to monitor homeostasis.	pages 9-12 figure 1.2, 1.3, 1.4
6. Define and describe anatomical position, and understand regional terms of the human body.	pages 12-13 figure 1.5
7. Define and provide examples of directional terms used to describe the position of body structures relative to one another.	pages 12, 14-15 Exhibit 1.1
8. Define body planes of section to include: sagittal (mid and para), frontal (coronal), transverse/cross-section, and oblique planes of section.	page 16 figure 1.7, 1.8
9. Define and identify dorsal and ventral body cavities and their subdivisions. Provide examples of organs located in each cavity.	pages 17-19 figure 1.9, 1.10, 1.11
10. Describe the structure, and provide examples of serous membranes (serosa) of the ventral body cavity. Compare and contrast parietal and visceral serosa and provide examples of their functions.	pages 18-19

**BIOL 111 Anatomy & Physiology I #1 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion
	2. Textbook Readings:
11. Describe and identify the nine regions	pages 19-21
and four quadrants of the	figure 1.12
abdominopelvic cavity.	
	3. Successfully apply anatomical terminology to
	study in the laboratory.
	4. Complete Self-Quiz questions,
	pages 26-27

# **BIOL 111 Anatomy & Physiology I #2 of 10 Units 4 credits**

Name of Unit: **CHEMISTRY OF LIFE**  
Chapter 2

Unit Objectives: To describe the structure of an atom and understand how atoms form molecules by chemical bonding. To compare and contrast the composition, reactions, and functions of major types of inorganic and organic compounds.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Define matter. Define and provide examples of different forms of energy.	pages 28, 36
2. Identify common elements present in living cells and provide examples of important functions of these elements.	table 2.1
3. Describe the subatomic composition of an atom to include a comparison of the location, charge, and mass of each of the following subatomic particles: protons, neutrons, and electrons.	page 30 figures 2.1, 2.2
4. Become familiar with the periodic table of the elements, and be able to determine atomic number, atomic weight/mass number, and the number of each subatomic particle in one atom of a given element.	page 30 Appendix B figure 2.2
5. Define isotope. Provide examples of radioactive isotopes and understand their importance in medical imaging technologies and research.	pages 30-31

## **BIOL 111 Anatomy & Physiology I #2 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Reading:
6. Define ion. Provide examples of cations and anions.	pages 32-33 figure 2.4, table 2.2
7. Define mixture and describe solutions, colloids and suspensions.	pages 40-41
8. Define and differentiate the terms: electron shell, electron orbital, valence shell, and valence electron.	pages 32, 33 figure 2.2
9. Utilize the periodic table to determine the number of electrons in the valence shell of biologically significant atoms.	pages 32, 33, Appendix B figure 2.2
10. Compare and contrast the formation and properties of the following types of chemical bonds: covalent (polar and nonpolar), ionic, and hydrogen bonds. Provide examples of biological molecules which are formed by covalent and ionic bonds. Provide examples of hydrogen bond interactions between molecules.	pages 33-36 figures 2.4–2.7 table 2.2
11. Describe water as a polar molecule, and provide examples of important properties which make water essential for living cells.	pages 35-36, 39-40 figures 2.6-2.7, 2.10
12. Describe chemical properties of salts. Define an electrolyte.	pages 41, 33-34 figure 2.11
13. Define and provide examples of acids and bases. Define pH and describe how it is measured. Cite examples of buffers in the human body. Describe how the carbonic acid-bicarbonate buffering systems help to maintain blood pH homeostasis.	pages 41-43 figure 2.12 table 2.4

## **BIOL 111 Anatomy & Physiology I #2 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings
14. Describe and cite examples of different types of chemical reactions to include: synthesis/anabolic, decomposition/catabolic, exchange/displacement, and exergonic/endergonic reactions reactions. List factors that can affect the rate of a chemical reaction.	pages 36-38 figures 2.8, 2.9
15. Identify common functional groups present in biological macromolecules and understand the properties of these reactive groups.	pages 43-44 table 2.5
16. Distinguish between dehydration synthesis and hydrolysis reactions required for the formation and degradation of macromolecules.	page 40
17. Identify, compare and contrast the monomers and important structural and functional properties of the major classes of biological macromolecules (carbohydrates, lipids, proteins, nucleic acids). Cite examples of each type of macromolecule.	pages 44-56 figures 2.14-2.25
18. Cite examples of and understand important structural and functional properties of different types of carbohydrates including: monosaccharides, disaccharides, oligosaccharides, and polysaccharides.	pages 44-46 figures 2.14-2.16 table 2.6
19. Describe major structural classes of the following types of lipids and their functions: triglycerides, phospholipids, steroids, eicosanoids, and fat-soluble vitamins.	pages 46-50 figures 2.17-2.19 table 2.7

# **BIOL 111 Anatomy & Physiology I #2 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings
20. Describe the generalized structure of an amino acid. Characterize amino acids as to whether they are essential or non-essential and whether they are hydrophobic, hydrophilic (positively or negatively charged) or sulfur containing depending on the R group present.	page 50 figure 2.20
21. Describe and define different levels of protein structure to include primary, secondary, tertiary, and quaternary structure. Cite examples of structural and functional differences of fibrous proteins compared to globular proteins.	pages 50-52 figures 2.21, 2.22 table 2.8
22. Describe biochemical characteristics of protein enzymes and understand how enzymes function as catalysts to accelerate biochemical reactions in a cell. Define active site, substrate, activation energy, cofactor, and coenzymes.	pages 53-54 figure 2.23
23. Describe the biochemical structure of a nucleotide, the monomer of nucleic acids, including the chemical bonds that join together each component of a nucleotide.	pages 54-56 figure 2.24
24. Compare and contrast the structures and functions of different types of nucleic acids to include deoxyribonucleic acid (DNA), ribonucleic acid (RNA), and adenosine triphosphate (ATP).	pages 54-57 figures 2.24, 2.25
25. Understand the importance of ATP as a chemical energy source and discuss the role of phosphorylation reactions in cell metabolism.	pages 56-57
	3. Complete Self-Quiz questions, page 58-59

# **BIOL 111 Anatomy & Physiology I #3 of 10 Units 4 credits**

Name of Unit: **CELL STRUCTURE AND FUNCTION**  
Chapter 3

Unit Objectives: To identify and describe the structures and functions of a typical human cell. To study the phases of the cell cycle and examine the processes of DNA replication and protein synthesis.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Discuss the cell as the basic unit of structure and function in living organisms.	page 61
2. Name and describe the three main parts of a cell: plasma membrane, cytoplasm (with organelles), and nucleus.	page 62 figure 3.1
3. List and describe the four main structural components of the plasma membrane: <ul style="list-style-type: none"><li>• phospholipids</li><li>• proteins</li><li>• cholesterol</li><li>• carbohydrates</li></ul> Describe the “fluid mosaic model”.	pages 63-65 figures 3.2, 3.3
4. Describe the following transport processes: <ul style="list-style-type: none"><li>• Passive<ul style="list-style-type: none"><li>○ Simple diffusion</li><li>○ Osmosis</li><li>○ Facilitated diffusion</li></ul></li><li>• Active<ul style="list-style-type: none"><li>○ Active transport (pumps)</li><li>○ Vesicular transport<ul style="list-style-type: none"><li>▪ Endocytosis</li><li>▪ Exocytosis</li></ul></li></ul></li></ul>	pages 66-76 figures 3.4-3.14 table 3.1
5. List and describe the different types of membrane specializations: microvilli, junctions (tight, gap, desmosomes), cilia.	pages 76-80, 110-112 figures 3.15, 3.17, 4.1

## **BIOL 111 Anatomy & Physiology I #3 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
6. List and describe the cytoplasmic organelles: <ul style="list-style-type: none"> <li>• Cytoskeleton</li> <li>• Centrosome, centrioles</li> <li>• Cilia, flagella</li> <li>• Ribosomes</li> <li>• Endoplasmic reticulum (smooth, rough)</li> <li>• Golgi complex</li> <li>• Lysosomes, peroxisomes</li> <li>• Mitochondria</li> <li>• Vesicles and cytoplasmic inclusions</li> </ul>	pages 76-87 figures 3.15-3.23 table 3.2
7. Describe the structure and function of the nucleus. Include nuclear envelope, nuclear pores, nucleoli and chromatin in the discussion.	pages 87-88 figures 3.24, 3.25
8. Describe the phases and subphases of the cell cycle: <ul style="list-style-type: none"> <li>• Interphase (G<sub>1</sub>, S, G<sub>2</sub>)</li> <li>• Mitotic phase (mitosis and cytokinesis)</li> </ul>	pages 93 - 96 figure 3.30-3.32 table 3.3
9. Briefly describe DNA replication and the role of complementarity in the replication process.	pages 93, 94 figure 3.31
10. Describe the structure of a chromosome. Include chromatids, kinetochore, and centromere in the discussion.	page 87 figures 3.25, 3.32
11. Describe cell cycle control systems and the relevancy of uncontrolled growth in cancer cells.	pages 96-97, 101-102 figure 3.30
12. Briefly describe the process of protein synthesis. Include transcription, translation, triplet, codon, anticodon, mRNA, tRNA and ribosomes in the discussion	pages 88-92 figures 3.26-3.29
	3. Complete Self-Quiz questions, pages 106-107

# **BIOL 111 Anatomy & Physiology I #4 of 10 Units 4 credits**

Name of Unit: **TISSUES**  
Chapter 4

Unit Objectives: To discuss the cellular patterns that define the tissue types found in the human body, and to describe the major functions of each tissue type.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Briefly describe differentiation, specialization, meiosis, gamete formation, fertilization, zygote formation, conceptus, morula, blastocyst, implantation, and trophoblast formation.	pages 97-100; 1132-1142 figures 29.1-29.6
2. Name the three embryonic germ layers and describe their relationship to adult tissues and organs: ectoderm, mesoderm and endoderm.	pages 110, 1140 figure 29.7 table 29.1
3. Name and briefly state the locations and characteristics of the four main tissue types found in the human body: <ul style="list-style-type: none"><li>• Epithelial tissue</li><li>• Connective tissue</li><li>• Muscular tissue</li><li>• Nervous tissue</li></ul>	page 110
4. Describe the general features of all epithelial tissue. Include these terms in the discussion: cellularity, avascular, innervated, polarity, apical surface, basal surface, basement membrane, membrane specializations, regeneration.	pages 110-113 figures 4.1, 4.2
5. State the three functions of epithelial tissue: <ul style="list-style-type: none"><li>• Barrier that promotes/limits material exchange</li><li>• Secretion</li><li>• Protection</li></ul>	page 112

# **BIOL 111 Anatomy & Physiology I #4 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
6. Classify epithelia using the terms: <ul style="list-style-type: none"><li>• Simple and stratified</li><li>• Squamous, cuboidal, columnar</li></ul>	pages 113-114 figure 4.3
7. Discuss the specialized attachment of epithelial tissue to connective tissue. Summarize the formation of basement membrane and the formation of the basal lamina (glycoproteins and network of fine proteins) from the epithelium, and the reticular lamina (bundles of coarse protein fibers) produced by the connective tissue.	page 112 figure 4.2
8. Give examples of the basic types of epithelial tissue and state locations and functions for each: <ul style="list-style-type: none"><li>• Simple squamous</li><li>• Simple cuboidal</li><li>• Simple columnar</li><li>• Pseudostratified</li><li>• Stratified squamous</li><li>• Stratified cuboidal</li><li>• Stratified columnar</li></ul>	pages 114-120 table 4.1a - i
9. Compare endocrine and exocrine glands. Classify exocrine glands using the terms: <ul style="list-style-type: none"><li>• Unicellular and multicellular</li><li>• Simple and compound</li><li>• Tubular and acinar</li><li>• Merocrine and holocrine</li></ul>	pages 120-123 figures 4.4, 4.5 table 4.2
10. Discuss the common embryonic origin of connective tissues and the role of mesenchymal cells.	pages 123, 125-127 table 4.3
11. Name the five main types of connective tissue: loose connective tissue, dense connective tissue, cartilage, bone, blood.	page 127

# **BIOL 111 Anatomy & Physiology I #4 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
12. Describe the general features of all connective tissue. Include these terms in the discussion: ground substance, fibers, matrix, connective tissue cells (fibroblasts, chondroblasts, osteoblasts, hemoblasts).	pages 123-125 figure 4.6
13. State the functions of connective tissue: <ul style="list-style-type: none"><li>• Support and binding</li><li>• Protection</li><li>• Energy storage and insulation</li><li>• Compartmentalization</li><li>• Transport system</li></ul>	page 123
14. Describe the specialized proteins found in the ground substance of connective tissue. Include proteoglycans, glycosaminoglycans and adhesion proteins in the discussion.	pages 124-125 figure 4.6
15. Describe the three types of fibers found in connective tissue: collagen fibers, elastic fibers and reticular fibers.	page 125 figure 4.6
16. Describe the structures, locations and functions of loose connective tissue and dense connective tissue: <ul style="list-style-type: none"><li>• Loose connective tissue<ul style="list-style-type: none"><li>○ Areolar connective tissue</li><li>○ Adipose connective tissue</li><li>○ Reticular connective tissue</li></ul></li><li>• Dense connective tissue<ul style="list-style-type: none"><li>○ Dense regular connective tissue</li><li>○ Dense irregular connective tissue</li><li>○ Elastic connective tissue</li></ul></li></ul>	pages 127-130 table 4.4a - f
17. Describe the general features of cartilage. Include these terms in the discussion: fibers, ground substance, resilience, chondrocytes, perichondrium, interstitial and appositional growth.	pages 131-134 table 4.4 g - i

# **BIOL 111 Anatomy & Physiology I #4 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion
	2. Textbook Readings:
18. Describe the structures, locations and functions of the three types of cartilage:	pages 131-134 table 4.4 g - i
<ul style="list-style-type: none"><li>• Hyaline cartilage</li><li>• Fibrocartilage</li><li>• Elastic cartilage</li></ul>	
19. Briefly describe the general features of bone. Include compact bone, spongy bone, osteocyte and skeletal system in the discussion (Note: bone is covered in detail in Chapter 6).	page 134 table 4.4 j
20. Briefly describe the general features of blood. Include plasma, formed elements, transport function, liquid connective tissue and circulatory system in the discussion (Note: blood is covered in detail in Chapter 19 – A&PII).	page 135 table 4.4 k
21. Define epithelial membrane and describe the locations and functions of the three epithelial membranes found in the body:	pages 135-137 figure 4.7 a - c
<ul style="list-style-type: none"><li>• Mucous membrane</li><li>• Serous membrane</li><li>• Cutaneous membrane</li></ul>	
22. Describe the general features of synovial membranes.	page 137 figure 4.7 d
23. Provide an overview of muscular tissue and nervous tissue (Note: muscular tissue is covered in detail in Chapter 10; nervous tissue is covered in detail in Chapter 12).	pages 137-140 tables 4.5, 4.6
	3. Complete Self-Quiz questions, pages 144-145

**BIOL 111 Anatomy & Physiology I #5 of 10 Units 4 credits**

Name of Unit: **INTEGUMENTARY SYSTEM**  
Chapter 5

Unit Objectives: To discuss the structure of the integumentary system and describe the vital role that it plays in maintaining human physiology.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Briefly describe general features of the integumentary system. Include these terms in the discussion: skin, epidermis, dermis, hypodermis, subcutaneous tissue, cutaneous membrane, hair, glands and nails.	pages 147-149, 155 figure 5.1
2. Describe the layers of the epidermis and the cells found in each layer. Layers: <ul style="list-style-type: none"><li>• Stratum basale</li><li>• Stratum spinosum</li><li>• Stratum granulosum</li><li>• Stratum lucidum</li><li>• Stratum corneum</li></ul> Cells: <ul style="list-style-type: none"><li>• Keratinocytes</li><li>• Melanocytes</li><li>• Langerhans' cells</li><li>• Merkel cells</li></ul>	pages 149-152 figures 5.1-5.3 table 5.1
3. Compare the composition of the two layers of the dermis: <ul style="list-style-type: none"><li>• Papillary layer</li><li>• Reticular layer</li></ul>	pages 152-153 figure 5.1 table 5.2
4. Describe the pigments of the skin and explain the basis for different skin colors.	pages 153-154

**BIOL 111 Anatomy & Physiology I #5 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
5. Discuss the structure, distribution and function of hair. Include cuticle, cortex, medulla, shaft, root, hair follicle, arrector pili muscle, hair root plexus, terminal hair and vellus in the discussion.	pages 155-157 figure 5.4
6. Discuss the structure, distribution and function of skin glands. Include the following terms in the discussion: <ul style="list-style-type: none"><li>• Sebaceous and sudoriferous glands</li><li>• Sebum and sweat</li><li>• Merocrine and holocrine glands</li><li>• Eccrine and apocrine glands</li><li>• Temperature regulation and lubrication</li><li>• Ceruminous glands</li></ul>	pages 120-123, 157-159 figures 4.5, 5.1 table 5.3
7. Provide a brief description of nails.	pages 159-160 figure 5.5
8. List and describe the functions of the integumentary system: <ul style="list-style-type: none"><li>• temperature regulation</li><li>• blood reservoir</li><li>• protection</li><li>• cutaneous sensation</li><li>• excretion</li><li>• metabolic functions</li></ul>	pages 160-162
9. Briefly describe skin cancers, burns, and pressure ulcers.	pages 168-170 figures 5.8-5.10
	3. Complete Self-Quiz questions, pages 172-173

**BIOL 111 Anatomy & Physiology I #6 of 10 Units 4 credits**

Name of Unit: **BONES AND SKELETAL SYSTEM**  
Chapters 6-8

Unit Objectives: To explain the structure and function of the skeletal system and to explore the embryogenesis and histology of bone tissue. To further discuss bone injuries and repair.

Methods of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. List and briefly discuss the functions of the skeletal system: support, protection, movement, mineral storage, blood cell formation, and triglyceride storage.	page 176
2. Differentiate between long, short, flat, irregular, and sesamoid bones with examples of each.	pages 199-201 figure 7.2
3. Describe the chemical composition of bone and list the components. Compare the relative abundance of the organic and inorganic components.	pages 176-177
4. Describe the gross anatomy of a long bone by defining the terms: diaphysis, epiphysis, epiphyseal plate and articular cartilages. Describe the membranes covering and lining bone tissue: periosteum and endosteum.	page 176 figure 6.1
5. Discuss the role of osteogenic cells, osteoblasts, osteocytes and osteoclasts.	page 178 figure 6.2

**BIOL 111 Anatomy & Physiology I #6 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion
	2. Textbook Readings:
6. Describe the histology and location of compact bone tissue and the basic unit of structure known as the osteon. Define the following terms: circumferential, interstitial, concentric lamellae, central canals, perforating canals, lacunae, and canaliculi.	page 179 figure 6.3
7. Describe the histology of spongy bone tissue and its location in flat, short, irregular and long bones. Give specific examples of bones containing red bone marrow.	pages 181-182 figures 6.5, 6.6
8. Describe the steps of intramembranous and endochondral ossification.	page 182 figures 6.5, 6.6
9. Describe the growth of bone during infancy, childhood and adolescence.	page 185
10. Define bone remodeling, including the cells needed for bone resorption and bone deposition.	pages 186-187
11. List the factors that affect bone growth and remodeling, including the role of specific hormones.	page 187
12. Explain how the blood calcium level is regulated by PTH, calcitonin and calcitriol, and how bone serves as the body's calcium reservoir.	page 190
13. Compare the various types of common fractures: simple, compound, comminuted, greenstick, impacted, Pott's, and Colles'.	pages 187-188 figure 6.8

**BIOL 111 Anatomy & Physiology I #6 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion
	2. Textbook Readings:
14. Assess the following repair processes of fractures: hematoma formation, fibrocartilaginous callus formation, bony callus formation, and remodeling.	pages 189-190 figure 6.9
15. Discuss the homeostatic imbalances of bone: osteoporosis, rickets and osteomalacia.	page 193
	3. Complete Self-Quiz questions, pages 195-197
	4. Bones laboratories, Chapters 7-8

**BIOL 111 Anatomy & Physiology I #7 of 10 Units 4 credits**

Name of Unit: **JOINTS AND BONY ATTACHMENTS**  
Chapter 9

Unit Objectives: To explain the joining of bones and how this, in part, determines their range of motion.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Describe the structural classifications of joints: <ul style="list-style-type: none"><li>• Fibrous</li><li>• Cartilaginous</li><li>• Synovial</li></ul> Describe the functional classifications of joints: <ul style="list-style-type: none"><li>• Synarthroses</li><li>• Amphiarthroses</li><li>• Diarthroses</li></ul>	page 265 table 9.2
2. Discuss the major characteristics of the three types of fibrous joints: <ul style="list-style-type: none"><li>• Sutures</li><li>• Syndesmoses</li><li>• Gomphoses</li></ul>	pages 265-266 figure 9.1
3. Discuss the major characteristics of the two types of cartilaginous joints: <ul style="list-style-type: none"><li>• Synchrondroses</li><li>• Symphyses</li></ul>	page 267 figure 9.2
4. Describe the structure of synovial joints, including the joint cavity, articular cartilage, articular capsule (fibrous and synovial membranes), synovial fluid, and ligaments. Describe structures related to synovial joints: bursae and tendon sheath.	pages 267-270 figure 9.3

**BIOL 111 Anatomy & Physiology I #7 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
5. List and describe the angular movements of joints: <ul style="list-style-type: none"><li>• Flexion, extension</li><li>• Abduction, adduction, circumduction</li><li>• Rotation</li></ul> Describe special movements that occur at certain joints: <ul style="list-style-type: none"><li>• Elevation, depression</li><li>• Protraction, retraction</li><li>• Inversion, eversion</li><li>• Supination, pronation</li><li>• Opposition</li></ul>	pages 270-275 figures 9.5-9.9 table 9.1
6. Describe the six subtypes of synovial joints based on their articulating surfaces: <ul style="list-style-type: none"><li>• Planar joints</li><li>• Hinge joints</li><li>• Pivot joints</li><li>• Condylloid joints</li><li>• Saddle joints</li><li>• Ball-and-socket</li></ul>	pages 276-278 figure 9.10 table 9.2
7. Discuss the common joint injuries, including sprains, cartilage injuries, bursitis, and dislocations. Describe the common types of arthritis.	pages 269, 270, 282, 296
	3. Complete Self-Quiz questions, pages 298-299

**BIOL 111 Anatomy & Physiology I #8 of 10 Units 4 credits**

Name of Unit: **MUSCLES AND MUSCLE TISSUE**  
 Chapters 10-11

Unit Objectives: To describe the structural organization of muscle tissue and explain how muscle contraction occurs.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Describe in overview the three types of muscle tissue:	page 302
<ul style="list-style-type: none"> <li>• Skeletal</li> <li>• Cardiac</li> <li>• Smooth.</li> </ul>	
2. List the four major functions of muscle tissue: production of movement, maintaining posture, stabilizing joints, and generating heat.	page 302
3. Discuss the properties of muscle tissue: excitability, contractility, extensibility, and elasticity.	pages 302-303
4. Describe the gross anatomy of a skeletal muscle including connective tissue wrappings and attachments, and blood and nerve supply.	page 303 figure 10.1
5. Describe the microscopic structure of the skeletal muscle fiber by defining the following: sarcolemma, T tubules, sarcoplasm, sarcoplasmic reticulum, terminal cisterns, filaments and sarcomeres (Z disc, A band, I band, H zone).	pages 305-309 figures 10.2, 10.3 table 10.1

**BIOL 111 Anatomy & Physiology I #8 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
6. Describe the structure and function of the contractile proteins (actin and myosin) and regulatory proteins (troponin and tropomyosin) and the location of each protein within the myofibril.	page 310 figure 10.6 table 10.2
7. Explain the sliding filament mechanism of muscle contraction and the changes in the bands and sarcomere during muscle contraction.	figure 10.6
8. Outline the steps of the contraction cycle: ATP hydrolysis, cross bridge attachment, power stroke, and cross bridge detachment.	pages 312-314 figures 10.7, 10.8
9. Describe the structures at the neuromuscular junction and the sequence of events leading to muscle contraction. Understand the roles of acetylcholine and $Ca^{+2}$ .	page 315 figures 10.10, 10.11
10. Define muscle twitch and describe the events during the latent period, contraction period, and relaxation period. Compare it to a wave summation, incomplete tetanus, and complete tetanus.	pages 321-322 figures 10.14, 10.15
11. Compare and contrast the three muscle types found in the body.	pages 327-329 tables 10.3, 10.4
	3. Complete Self-Quiz questions, pages 334-336
	4. Muscles laboratories, Chapter 11

**BIOL 111 Anatomy & Physiology I #9 of 10 Units 4 credits**

Name of Unit: **THE NERVOUS SYSTEM**  
Chapters 12, 13, 14, 15, 16

Unit Objectives: To understand how irritable tissues generate, conduct and transmit impulses; to describe the structure and function of the major divisions of the nervous system in effecting control and coordination of the human body.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Describe the structures and main functions of the nervous system.	pages 416-417 figure 12.1
2. Describe the structure of a motor neuron and relate each structure to its physiological role.	pages 417-419 figure 12.2
3. Classify neurons both structurally and functionally.	pages 419-421 figures 12.3, 12.4
4. Identify and describe the structure and function of neuroglia of the nervous system.	pages 421-423 figures 12.6, 12.7
5. Explain the importance of the myelin sheath and describe its formation.	page 423 figures 12.7, 12.8
6. Describe the organization of the nervous system. Differentiate between central and peripheral nervous systems; sensory and motor divisions; autonomic and somatic divisions; sympathetic and parasympathetic divisions.	pages 425-526 figures 12.1, 12.10

**BIOL 111 Anatomy & Physiology I #9 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
7. Describe the resting membrane potential, give values in nerve and body cells and explain the establishment and maintenance of resting potentials in terms of ion channels and membrane permeability.	pages 428, 430-432 figures 12.13, 12.14
8. Differentiate between graded potentials and action potentials; hyperpolarizing and depolarizing graded potentials; mechanically-gated and ligand-gated channels.	pages 427, 432-434 figures 12.11, 12.15, 12.16
9. Describe the events of an action potential to include threshold, depolarization and repolarization.	pages 434-436 figure 12.19, 12.21
10. Define absolute and relative refractory periods; explain the all-or-none principle.	page 436
11. Explain continuous vs. saltatory conduction and factors that influence conduction velocity.	pages 438-440 figure 12.22
12. Describe the structure of electrical and chemical synapses.	page 441 figure 12.23
13. Describe the events involved in nerve impulse transmission and termination.	pages 441-445 figure 12.23
14. Define temporal and spatial summation; EPSP and IPSP.	pages 445-447 figures 12.25, 12.26
15. Identify the major neurotransmitters, whether they are found centrally or peripherally and whether they are excitatory or inhibitory.	pages 448-451 figure 12.27

# **BIOL 111 Anatomy & Physiology I #9 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
16. Define diverging, converging, reverberating and parallel after-discharge circuits.	pages 451-452 figure 12.28
17. Explain regeneration of nervous tissue in the peripheral nervous system.	pages 452-454
18. Describe the gross anatomy of the spinal cord; distinguish between gray and white matter on cross section.	pages 461-467 figures 13.1-13.3
19. Describe the structure of a peripheral nerve.	pages 468-469 figure 13.5
20. Identify the spinal nerves and their branches.	page 469 figures 13.2, 13.6
21. Identify the major nerve plexuses, the specific ventral rami involved and the area of the body innervated.	pages 470-479 figures 13.7, 13.8, 13.10, 13.11
22. Identify the components of a reflex arc.	pages 482-483 figure 13.14
23. Describe specific spinal reflexes: <ul style="list-style-type: none"><li>• stretch reflex</li><li>• flexor reflex</li><li>• crossed extensor reflex.</li></ul>	pages 483-484, 486-488 figures 13.15, 13.17, 13.18
24. Describe the embryonic development of the brain and spinal cord.	pages 496, 537-539 figures 14.27, 14.28

**BIOL 111 Anatomy & Physiology I #9 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
25. Identify the adult brain structures and adult neural canal regions that arise from each of the secondary brain vesicles.	page 496 figure 14.1 table 14.1
26. Describe how meninges, cerebrospinal fluid and the blood-brain barrier protect the brain and spinal cord.	pages 496-500 figures 14.2, 14.3
27. Describe the formation, circulation and reabsorption of cerebrospinal fluid.	pages 500-502 figure 14.4
28. Name the parts of the brain stem and give specific examples of functions from each of these parts, including the reticular formation.	pages 503-507 figures 14.5-14.7
29. Identify the structures of the cerebellum and describe its role in coordinating motor activity.	pages 507-510 figure 14.8
30. Identify the major regions of the diencephalon and using examples from each characterize the functions.	pages 510-513 figures 14.9, 14.10
31. List the major lobes and fissures of the cerebrum.	pages 513-516 figure 14.11
32. Describe the cerebral white matter and differentiate between association, commissural and projection fibers.	pages 516-517 figure 14.12
33. Identify the basal ganglia and their function.	page 517 figure 14.13

**BIOL 111 Anatomy & Physiology I #9 of 10 Units 4 credits**

Learning Objectives	Recommended Learning Experiences
The student will be able to:	1. Class Discussion
	2. Textbook Readings:
34. Describe the limbic system structures and function.	pages 517-518 figure 14.14
35. Describe the functional areas of the cerebral cortex: <ul style="list-style-type: none"> <li>• sensory areas</li> <li>• motor areas</li> <li>• association areas</li> </ul>	pages 518-521 figure 14.15
36. Identify the twelve cranial nerves, the function of each and which adult brain structure each communicates with.	pages 522-532 figures 14.17-14.26 table 14.4
37. Compare the architecture and basic functions of the somatic and autonomic nervous systems including effector organs.	pages 547-548 figure 15.1 table 15.1
38. Describe the sympathetic and parasympathetic divisions in terms of origin, ganglia, fiber length and neurotransmitters involved.	pages 549-557 figures 15.2-15.6 table 15.3
39. Detail the location and effect of binding of cholinergic and adrenergic receptors.	pages 558-560 figure 15.7 table 15.2
40. Cite in detail the effects of the parasympathetic and sympathetic divisions on various organs of the body.	pages 544-547 table 14.5
	3. Complete Self-Quiz questions, pages 456-467, 491-493, 542-544, 567-568
	4. Nervous System laboratories

**BIOL 111 Anatomy & Physiology I #10 of 10 Units 4 credits**

Name of Unit: **The Digestive System**  
Chapters 24, 25

Unit Objectives: To understand the structure and function of the human digestive system in preparing food for absorption; to describe initial metabolic processes of the body to utilize nutrient material.

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
1. Explain the overall function of the digestive system by comparing catabolic and anabolic reactions in the body.	pages 921, 978 figure 25.1
2. Define the major processes of mechanical digestion, chemical digestion and absorption.	page 923 figure 24.1
3. Describe the basic structure of the alimentary canal in terms of the major layers found in all regions.	page 924-925 figure 24.2
4. Identify the structures of and allied to the oral cavity in terms of mechanical and chemical digestion.	pages 928-933 figures 24.5, 24.6, 24.8 table 24.1
5. Identify the structures of and allied to the pharynx and esophagus noting the roles played in mechanical digestion.	pages 934-936 figure 24.9 table 24.2
6. Describe the processes of chewing (mastication) and swallowing (deglutition).	pages 932-936 figure 24.10 table 24.2

**BIOL 111 Anatomy & Physiology I #10 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
7. Identify the macroscopic and microscopic anatomy of the stomach.	pages 937-939 figures 24.11, 24.12
8. Explain the mechanical and chemical digestive processes of the stomach being sure to include enzyme activity and the role of zymogens.	pages 939-941 figure 24.11 table 24.3
9. List examples of substances that are absorbed in the stomach.	table 24.3
10. Identify the macroscopic and microscopic anatomy of the duodenum, jejunum and ileum being sure to note the structural relationships to accessory organs of digestion.	pages 949-953 figures 24.14, 24.17-24.19
11. Describe the duodenum in terms of material received from the stomach, liver and pancreas.	Class discussion figure 24.14
12. Explain the chemical digestive processes of the small intestine specifying the sources and action of the enzymes and other secretions involved.	pages 954-955 table 24.4
13. Identify the macroscopic and microscopic anatomy of the large intestine.	pages 959-961 figures 24.22, 24.23
14. Explain the importance of the large intestine in terms of storage function, reabsorption of water and electrolytes and bacterial action.	page 963 table 24.6
15. Describe mass (bulk) movements and the controls of defecation.	page 963 figure 24.22

**BIOL 111 Anatomy & Physiology I #10 of 10 Units 4 credits**

<b>Learning Objectives</b>	<b>Recommended Learning Experiences</b>
The student will be able to:	1. Class Discussion 2. Textbook Readings:
16. Summarize the digestive processes acting on the major food groups, (the four macromolecular groups), vitamins, electrolytes and water.	table 24.4
17. Discuss principles governing absorption in general being sure to include the roles played by active and passive transport mechanisms.	pages 956-958, 963 figure 24.20
18. Explain the liver's role as an "interface" organ in terms of detoxification and in the metabolism of energy containing nutrients in the body.	page 949 figure 25.14
19. Discuss neural controls of digestion and food intake.	pages 925-926, 965
20. Describe the humoral controls of digestive processes.	pages 965-967 table 24.8
	3. Complete Self-Quiz questions, pages 973-975
	4. Digestive System Laboratories Chapter 24