

BROOKDALE COMMUNITY COLLEGE

Biology 111 Syllabus Anatomy & Physiology I



CODE: BIOL 111 :

TITLE: Anatomy and Physiology I

Institute: STEM

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 satisfactory completion of the College's foundational studies requirement in algebra, READ 095 or satisfactory completion of the College's foundational studies requirement in reading, and ENGL 095 or satisfactory completion of the College's foundational studies requirement in writing.

PREREQUISITES OR COREQUISITES:

COREQUISITES:

CREDITS: 4

LECTURE HOURS: 3

LAB/STUDIO HOURS: 2

REQUIRED MATERIALS:

Textbook: Human Anatomy & Physiology
Elaine Marieb and Katja Hoehn
11th edition, 2019
Pearson Education, 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

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:

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

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:

BIOL 111 course and laboratory resources are available in CANVAS, Brookdale's Learning Management System, which is available via Brookdale's website: www.brookdalecc.edu

Independent Study Laboratory ("Open Lab") – MAS 056 – is available to students enrolled in this biology course. Students use this lab to complete laboratory exercises, review lab materials, and to get help with course material from Instructional Assistants that staff the lab.

Biology Department course and program information available on the Biology Department website:

<https://www.brookdalecc.edu/stem-institute/biology/>

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

Learning Objectives	
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The student will be able to:

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.
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.
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.
4. Provide examples of common properties of living organisms and survival requirements necessary to maintain life.

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

Learning Objectives	
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The student will be able to:

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.
6. Define and describe anatomical position, and understand regional terms of the human body.
7. Define and provide examples of directional terms used to describe the position of body structures relative to one another.
8. Define body planes of section to include: sagittal (mid and para), frontal (coronal), transverse/cross-section, and oblique planes of section.
9. Define and identify dorsal and ventral body cavities and their subdivisions. Provide examples of organs located in each cavity.
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.

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

Learning Objectives	
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The student will be able to:

11. Describe and identify the nine regions and four quadrants of the abdominopelvic cavity.

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

Learning Objectives	
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The student will be able to:

1. Describe water as a polar molecule, and provide examples of important properties which make water essential for living cells.
2. Describe chemical properties of salts. Define electrolyte.
3. 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.
4. Describe and cite examples of different types of chemical reactions to include: synthesis/anabolic, decomposition/catabolic, exchange/displacement, and exergonic/endergonic reactions. List factors that can affect the rate of a chemical reaction.
5. Identify common functional groups present in biological macromolecules and understand the properties of these reactive groups.

Learning Objectives	
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The student will be able to:

6. Distinguish between dehydration synthesis and hydrolysis reactions required for the formation and degradation of macromolecules.
7. Cite examples of and understand important structural and functional properties of different types of carbohydrates including: monosaccharides, disaccharides, oligosaccharides, and polysaccharides.
8. Describe major structural classes of the following types of lipids and their functions: triglycerides, phospholipids, steroids, eicosanoids, and fat-soluble vitamins.
9. 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.
10. 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.
11. 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.
12. Describe the biochemical structure of a nucleotide, the monomer of nucleic acids, including the chemical bonds that join together each component of a nucleotide.

13. 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).
14. Understand the importance of ATP as a chemical energy source and discuss the role of phosphorylation reactions in cell metabolism.

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

Learning Objectives	
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The student will be able to:

1. Discuss the cell as the basic unit of structure and function in living organisms.
2. Name and describe the three main parts of a cell: plasma membrane, cytoplasm (with organelles), and nucleus.
3. List and describe the four main structural components of the plasma membrane:
 - phospholipids
 - proteins
 - cholesterol
 - carbohydratesDescribe the “fluid mosaic model”.
4. Describe the following transport processes:
 - Passive
 - Simple diffusion
 - Osmosis
 - Facilitated diffusion
 - Active
 - Active transport (pumps)
 - Vesicular (bulk) transport
 - Endocytosis (3 forms)
 - Exocytosis
5. List and describe the different types of membrane specializations: microvilli, junctions (tight, gap, desmosomes), cilia.

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

Learning Objectives	
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The student will be able to:

6. List and describe the cytoplasmic organelles:
 - Cytoskeleton
 - Centrosome, centrioles
 - Cilia, flagella
 - Ribosomes
 - Endoplasmic reticulum (smooth, rough)
 - Golgi complex
 - Lysosomes, peroxisomes
 - Mitochondria
 - Vesicles and cytoplasmic inclusions
7. Describe the structure and function of the nucleus. Include nuclear envelope, nuclear pores, nucleoli and chromatin in the discussion.
8. Describe the phases and subphases of the cell cycle:
 - Interphase (G_1 , S, G_2)
 - Mitotic phase (mitosis and cytokinesis)
9. Briefly describe DNA replication and the role of complementarity in the replication process.
10. Describe the structure of a chromosome. Include chromatids, kinetochore, and centromere in the discussion.
11. Describe cell cycle control systems and the relevancy of uncontrolled growth in cancer cells.
12. Briefly describe the process of protein synthesis. Include transcription, translation, triplet, codon, anticodon, mRNA, tRNA and ribosomes in the discussion

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

Learning Objectives	
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The student will be able to:

1. Name the three embryonic germ layers and describe their relationship to adult tissues and organs: ectoderm, mesoderm and endoderm.
2. Name and briefly state the locations and characteristics of the four main tissue types found in the human body:
 - Epithelial tissue
 - Connective tissue
 - Muscular tissue
 - Nervous tissue
3. 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.
4. State the three functions of epithelial tissue:
 - Barrier that promotes/limits material exchange
 - Secretion
 - Protection
5. Classify epithelia using the terms:
 - Simple and stratified
 - Squamous, cuboidal, columnar

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

Learning Objectives	
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The student will be able to:

6. 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.
7. Give examples of the basic types of epithelial tissue and state locations and functions for each:
 - Simple squamous
 - Simple cuboidal
 - Simple columnar
 - Pseudostratified
 - Stratified squamous
 - Stratified cuboidal
 - Stratified columnar
8. Compare endocrine and exocrine glands. Classify exocrine glands using the terms:
 - Unicellular and multicellular
 - Simple and compound
 - Tubular and acinar
 - Merocrine, apocrine and holocrine
9. Discuss the common embryonic origin of connective tissues and the role of mesenchymal cells.
10. State the functions of connective tissue:
 - Support and binding
 - Protection
 - Energy storage and insulation
 - Compartmentalization
 - Transport system

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

Learning Objectives	
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The student will be able to:

11. Describe the general features of all connective tissue. Include these terms in the discussion: extracellular matrix, ground substance, fibers, connective tissue cells (fibroblasts, chondroblasts, osteoblasts, hemoblasts).
12. Describe the specialized proteins found in the ground substance of connective tissue. Include proteoglycans, glycosaminoglycans and adhesion proteins in the discussion.
13. Describe the three types of fibers found in connective tissue: collagen fibers, elastic fibers and reticular fibers.
14. Name the five main types of mature connective tissue: loose connective tissue, dense connective tissue, cartilage, bone, and blood.
15. Describe the structures, locations and functions of loose connective tissue and dense connective tissue:
 - Loose connective tissue
 - Areolar connective tissue
 - Adipose connective tissue
 - Reticular connective tissue
 - Dense connective tissue
 - Dense regular connective tissue
 - Dense irregular connective tissue
 - Elastic connective tissue
16. Describe the general features of cartilage. Include these terms in the discussion: fibers, ground substance, resilience, chondrocytes, perichondrium, interstitial and appositional growth.

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

Learning Objectives	
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The student will be able to:

17. Describe the structures, locations and functions of the three types of cartilage:
 - Hyaline cartilage
 - Fibrocartilage
 - Elastic cartilage

18. 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).

19. 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).

20. Define epithelial membrane and describe the locations and functions of the three epithelial membranes found in the body:
 - Mucous membrane
 - Serous membrane
 - Cutaneous membrane

21. Provide an overview of muscular tissue and nervous tissue (Note: muscular tissue is covered in detail in Chapter 9; nervous tissue is covered in detail in Chapter 11).

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

Learning Objectives	
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The student will be able to:

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.
2. Describe the layers of the epidermis and the cells found in each layer.
Layers:
 - Stratum basale
 - Stratum spinosum
 - Stratum granulosum
 - Stratum lucidum
 - Stratum corneumCells:
 - Keratinocytes
 - Melanocytes
 - Langerhans' cells
 - Merkel cells
3. Compare the composition of the two layers of the dermis:
 - Papillary layer
 - Reticular layer
4. Describe the pigments of the skin and explain the basis for different skin colors.

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

Learning Objectives	
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The student will be able to:

5. Discuss the structure, distribution and function of hair. Include cuticle, cortex, medulla, shaft, root, hair follicle, hair matrix, arrector pili muscle, hair root plexus, terminal hair and vellus in the discussion.
6. Discuss the structure, distribution and function of skin glands. Include the following terms in the discussion:
 - Sebaceous and sudoriferous glands
 - Sebum and sweat
 - Eccrine and apocrine glands
 - Temperature regulation and lubrication
 - Ceruminous glands
7. Provide a brief description of nails.
8. List and describe the functions of the integumentary system:
 - temperature regulation
 - blood reservoir
 - protection
 - cutaneous sensation
 - excretion
 - synthesis of vitamin D
9. Briefly describe skin cancers, burns, and pressure ulcers.

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

Learning Objectives	
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The student will be able to:

1. List and briefly discuss the functions of the skeletal system: support, protection, movement, mineral storage, blood cell formation, and triglyceride storage.
2. Differentiate between long, short, flat, irregular, and sesamoid bones with examples of each.
3. 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.
4. Describe the chemical composition of bone and list the components. Compare the relative abundance of the organic and inorganic components.
5. Discuss the role of osteogenic cells, osteoblasts, osteocytes and osteoclasts.

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

Learning Objectives	
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The student will be able to:

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.
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.
8. Describe the steps of intramembranous and endochondral ossification.
9. Describe the growth of bone during infancy, childhood and adolescence.
10. Define bone remodeling, including the cells needed for bone resorption and bone deposition.
11. List the factors that affect bone growth and remodeling, including the role of specific hormones.
12. Explain how the blood calcium level is regulated by PTH, calcitonin and calcitriol, and how bone serves as the body's calcium reservoir.
13. Compare the various types of common fractures: simple, compound, complete, incomplete, comminuted, greenstick,

depressed, spiral, epiphyseal.

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

Learning Objectives	
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The student will be able to:

14. Assess the following repair processes of fractures: hematoma formation, fibrocartilaginous callus formation, bony callus formation, and remodeling.
15. Discuss the homeostatic imbalances of bone: osteoporosis, rickets and osteomalacia.

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

Name of Unit: **JOINTS AND BONY ATTACHMENTS**
Chapter 8

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

Learning Objectives	
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The student will be able to:

1. Describe the structural classifications of joints:
 - Fibrous
 - Cartilaginous
 - SynovialDescribe the functional classifications of joints:
 - Synarthroses
 - Amphiarthroses
 - Diarthroses
2. Discuss the major characteristics of the three types of fibrous joints:
 - Sutures
 - Syndesmoses
 - Gomphoses
3. Discuss the major characteristics of the two types of cartilaginous joints:
 - Synchondroses
 - Symphyses
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.

Learning Objectives	
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The student will be able to:

5. List and describe the angular movements of joints:

- Flexion, extension
- Abduction, adduction, circumduction
- Rotation

Describe special movements that occur at certain joints:

- Elevation, depression
- Protraction, retraction
- Inversion, eversion
- Supination, pronation
- Opposition

6. Describe the six subtypes of synovial joints based on their articulating surfaces:

- Planar joints
- Hinge joints
- Pivot joints
- Condylloid joints
- Saddle joints
- Ball-and-socket

7. Discuss the common joint injuries, including sprains, cartilage injuries, bursitis, and dislocations.

Describe the common types of arthritis.

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

Name of Unit: **MUSCLES AND MUSCLE TISSUE**
Chapters 9-10

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

Method of Evaluation: Unit Examination, Quizzes, Laboratory Performance

Learning Objectives	
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The student will be able to:

1. Describe in overview the three types of muscle tissue:
 - Skeletal
 - Cardiac
 - Smooth.
2. List the four major functions of muscle tissue: production of movement, maintaining posture, stabilizing joints, and generating heat.
3. Discuss the properties of muscle tissue: excitability, contractility, extensibility, and elasticity.
4. Describe the gross anatomy of a skeletal muscle including connective tissue wrappings and attachments, and blood and nerve supply.
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).

Learning Objectives	
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The student will be able to:

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.
7. Explain the sliding filament mechanism of muscle contraction and the changes in the bands and sarcomere during muscle contraction.
8. Outline the steps of the contraction cycle: ATP hydrolysis, cross bridge attachment, power stroke, and cross bridge detachment.
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} .
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.
11. Define isometric contractions and isotonic contractions (including eccentric and concentric).
12. Describe the mechanisms used by skeletal muscles to regenerate ATP: direct phosphorylation, glycolysis & lactic acid formation, and aerobic cellular respiration.
13. Describe the three kinds of skeletal muscle fibers and their structural and functional differences.

14. Describe the basic histological and functional differences between skeletal muscle fibers and smooth muscle fibers.

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

Name of Unit: **THE NERVOUS SYSTEM**
Chapters 11, 12, 13, 14

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

Learning Objectives	
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The student will be able to:

1. 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.
2. Describe the structures and main functions of the nervous system.
3. Describe the structure of a motor neuron and relate each structure to its physiological role.
4. Classify neurons both structurally and functionally.
5. Identify and describe the structure and function of neuroglia of the nervous system.
6. Explain the importance of the myelin sheath and describe its formation.

Learning Objectives	
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The student will be able to:

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.
8. Differentiate between graded potentials and action potentials; hyperpolarizing and depolarizing graded potentials; mechanically-gated and ligand-gated channels.
9. Describe the events of an action potential to include threshold, depolarization, hyperpolarization, and repolarization.
10. Define absolute and relative refractory periods; explain the all-or-none principle.
11. Explain continuous vs. saltatory conduction (propagation) and factors that influence conduction velocity.
12. Describe the structure of electrical and chemical synapses.
13. Describe the events involved in nerve impulse transmission and termination.
14. Define temporal and spatial summation; EPSP and IPSP.
15. Identify the major neurotransmitters, whether they are found centrally or peripherally and whether they are excitatory or inhibitory.

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

Learning Objectives	
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The student will be able to:

16. Explain regeneration of nervous tissue in the peripheral nervous system.
17. Describe the gross anatomy of the spinal cord; distinguish between gray and white matter on cross section. Identify and describe the functions of major spinal cord tracts.
18. Describe the structure of a nerve.
19. Identify the spinal nerves and their branches.
20. Identify the major nerve plexuses, the specific ventral rami involved and the area of the body innervated.
21. Identify the components of a reflex arc (i.e. the organization of spinal cord gray matter).
22. Describe specific spinal reflexes:
 - stretch reflex
 - flexor reflex
 - crossed extensor reflex.
23. Describe the embryonic development of the brain and spinal cord.
24. Describe the main types of sensory receptors.

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

Learning Objectives	
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The student will be able to:

25. Identify the adult brain structures and adult neural canal regions that arise from each of the secondary brain vesicles.
26. Describe how meninges, cerebrospinal fluid and the blood-brain barrier protect the brain and spinal cord.
27. Describe the formation, circulation and reabsorption of cerebrospinal fluid.
28. Name the parts of the brain stem and give specific examples of functions from each of these parts, including the reticular formation.
29. Identify the structures of the cerebellum and describe its role in coordinating motor activity.
30. Identify the major regions of the diencephalon and using examples from each characterize the functions.
31. List the major lobes and fissures of the cerebrum / cerebral hemispheres.
32. Describe the cerebral white matter and differentiate between association, commissural and projection tracts.
33. Identify the basal nuclei and their function.

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

Learning Objectives	
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The student will be able to:

34. Describe the structures and function of the limbic system and reticular formation.

35. Describe the functional areas of the cerebral cortex:

- sensory areas
- motor areas
- association areas

36. Identify the twelve cranial nerves, the function of each and which adult brain structure each communicates with.

37. Compare the architecture and basic functions of the somatic and autonomic nervous systems including effector organs.

38. Describe the sympathetic and parasympathetic divisions in terms of function, site of origin in CNS, ganglia, presynaptic vs. postsynaptic fiber (axon) length and neurotransmitters used.

39. Detail the location and effect of binding of cholinergic and adrenergic receptors.

40. Cite in detail the effects of the parasympathetic and sympathetic divisions on various organs of the body.

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

Name of Unit: **The Digestive System**
Chapters 23, 24

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

Learning Objectives	
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The student will be able to:

1. Explain the overall function of the digestive system by comparing catabolic and anabolic reactions in the body.
2. Define the major processes of mechanical digestion, chemical digestion and absorption.
3. Describe the basic structures of the alimentary canal, and its major layers found in all regions.
4. Identify the structures of and allied to the oral cavity in terms of mechanical and chemical digestion.
5. Identify the structures of and allied to the pharynx and esophagus noting the roles played in mechanical digestion.
6. Describe the processes of chewing (mastication) and swallowing (deglutition).

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

Learning Objectives	
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The student will be able to:

7. Identify the macroscopic and microscopic anatomy of the stomach.
8. Explain the mechanical and chemical digestive processes of the stomach being sure to include gastric juice release.
9. List examples of substances that are absorbed in the stomach.
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.
11. Explain the liver's role as an "interface" organ in terms of detoxification and in the metabolism of energy containing nutrients in the body, and its role in bile production.
12. Describe the duodenum in terms of material received from the stomach, liver and pancreas.
13. Explain the chemical digestive processes of the small intestine specifying the sources and action of the enzymes and other secretions involved.
14. Identify the macroscopic and microscopic anatomy of the large intestine.
15. Explain the importance of the large intestine in terms of storage function, absorption of water and electrolytes and bacterial action.

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

Learning Objectives	
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The student will be able to:

16. Describe haustral contractions, mass (bulk) movements and the controls of defecation.

17. Summarize the digestive processes acting on the major food groups, (the four macromolecular groups), vitamins, electrolytes and water.

18. Discuss principles governing absorption in general being sure to include the roles played by active and passive transport mechanisms.

19. Discuss neural controls of digestion and food intake.

20. Describe the major hormones that control digestion.