MARION TECHNICAL COLLEGE
ANATOMY AND PHYSIOLOGY I CBE INFORMATION

COURSE NUMBER & NAME:	Sci1200 Anatomy and Physiology I
TERM/YEAR:	Spring 2025
DEPARTMENT NAME:	Mathematics and Natural Sciences
TAG/OTM/OT36/CT2/CTAG[1] COURSE #:	TMNS (OT36 Natural Sciences)
CREDIT HOURS:	4 (3- lecture, 1-lab)
COURSE REQUIREMENT(s):	Prerequisites: Sci1050 or placement

COURSE DESCRIPTION

This is the first of a two-semester sequence. This course has a laboratory component, which focuses on the structures & functions of cells and tissues, then the integumentary, skeletal, muscular & nervous systems using models, cadavers, and BioPac physiology equipment. The lecture component emphasizes the major organic molecules in the body, cells & tissues, and the physiology of the above systems. This is an OTM (Ohio Transfer Module) course.

COURSE MATERIALS FOR CLASS

TEXTBOOK:	HUMAN ANATOMY & PHYSIOLOGY
AUTHOR(s):	MARIEB, ELAINE N.; HOEHN, KATJA N.
PUBLISHER:	PEARSON
YEAR/EDITION:	11th Edition (10th and 9th editions ok) ISBN13: 9780134580999
LAB MANUAL:	EXPLORING AP IN THE LAB 3RD ED CUSTOM 2ND EDITION FOR MARION TECH AP1
AUTHOR(s):	AMERMAN
PUBLISHER:	MORTON
EDITION:	Custom Edition
ISBN13:	9781640434349

FREE MATERIALS FOR STUDY

Free Anatomy Textbook: https://openstax.org/details/books/anatomy-and-physiology-2e

Crash Course Anatomy and Physiology: https://www.youtube.com/playlist?list=PL8dPuuaLjXtOAKed_MxxWBNaPno5h3Zs8

Histology Information: https://histologyguide.com/

Community College of Allegheny County A&P Online Resources: https://libguides.ccac.edu/a-and-p/home

[1] Approved TAG and OT36 courses carry the guarantee that the courses and their credits will transfer and apply toward the major at any of Ohio's public institutions of higher education, provided they were taken when the courses were equivalent. Additional Ohio transfer information may be obtained at https://www.ohiohighered.org/

Credit By Exam Details

The exam will comprise of two parts:
Part 1: Lecture Exam. 100 Multiple Choice Questions. Time: 3 hours
Part 2: Lab Practical. 60 Fill-in-the-blank Questions utilizing images, models, histology. Time: 1 hour 30 minutes.

Please note that a lot of lecture and lab material overlaps. Some “lab” material may be covered on the “lecture” exam and vice versa.

The parts can be taken separately, or back to back on the same day.

A 70% is needed (combined) to pass the exam.

Lecture Topics Covered

1. Introduction to the Human Body and Terminology
2. Chemistry and Macromolecules
3. Cells (organelles, cell cycle, energy and metabolism)
4. Histology
5. Integumentary system
6. Skeletal System
7. Bone and Skeletal Tissue
8. Skeletal System (Bone and features)
9. Joints
10. Muscles and Muscular Tissue (including physiology)
11. Muscular System
12. Nervous System and Tissues
13. Central Nervous System
14. Peripheral Nervous System and The Autonomic Nervous System

Lab Topics

- Anatomical, Directional, Planes, Regional Terms
- Body Cavities
- Chemistry (pH and solubilities)
- Microscopes
- Osmosis
- Cell Models (organelles)
- Mitosis (microscopy and models)
- Epithelial tissue types
- Connective tissue types
- Muscular tissue types
- Nervous tissue
- Integumentary system (models, histology, thick vs thin skin)
- Skeletal System (bones and bone features, male vs female skeleton differences)
- Bone histology
- Joints (classifications, movements, names)
- Muscles (name and movements)
- Electromyography
- Nervous tissue (neuron model, histology)
- Nervous physiology (action potential)
- Brain (models, dissection, histology)
- Spinal cord (models, histology)
- Cranial nerve (functions)
- Reflexes (reflex arc)

Lecture Learning Objectives by Chapter

1: Introduction to Anatomy and Physiology

1. Distinguish between anatomy and physiology and identify several branches of each.
2. Describe the structure of the body, from simplest to most complex, in terms of the levels of organization.
3. Define homeostasis and explain its importance to normal human functioning.
4. Describe anatomical position.
5. Use appropriate anatomical terminology to identify key body structures, body regions, body cavities, and directions in the body.
6. Identify examples of body plane and sections.
7. Identify the major components of each body system

2: Chemistry of Life

1. Describe the fundamental composition of mater
2. Distinguish between ionic bonds, covalent bonds (polar and non-polar), hydrogen bonds
3. Identify the properties of water that make it essential to life
4. Identify the four macromolecules essential to human functioning
5. Provide examples of three types of carbohydrates and identify the primary functions of carbohydrates in the body
6. Describe the types of lipids
7. Describe the structure of proteins
8. Identify the building blocks of nucleic acids, the role of DNA, RNA, and ATP

3A: Cells

1. Describe the structure and function of the cell membrane, including its regulation of materials into the out of the cell
2. Differentiate between materials that can and can not diffuse across the lipid bilayer
3. Compare the contrast the different types of passive transport with active transport providing examples of each
4. Describe the function of cytoplasmic organelles and the cytoskeleton

3B: Mitosis

1. Describe the stages of the cell cycle in order including mitosis and cytokinesis
2. Identify the stages of mitosis
3. Explain the importance of the process of cell cycle control and checkpoints

3C/24: Energy

1. Define anabolic and catabolic reactions
2. Discuss the role of ATP in metabolism
3. Explain the process of glycolysis
4. Describe the pathway of a pyruvate molecule through the Krebs cycle
5. Explain the transport of electrons through the electron transport chain
6. Recognize how energy can be derived from fat and proteins

4: Histology

1. Identify the main tissue types and discuss their roles in the human body
2. Explain the functions and examples of each type of epithelial tissue and how their forms enable their function
3. Explain the function of various connective tissues and how their forms enable their functions
4. Describe the characteristics of muscle tissue and how these enable the function
5. Discuss the characteristic of nervous tissue and how these enable information processing and control of muscular and glandular activities

6. Identify the four types of tissue membranes and the characteristics of each that make them functional

5: Integumentary

1. Describe the integumentary system and the role it plays in homeostasis
2. Describe the layers of the skin and the functions of each layer
3. Describe the accessory structures of the skin and the structure and functions of each
4. Describe skin cancer, burns and aging

6: Skeletal Tissue

1. Describe the components functions of the skeletal system.
2. Differentiate between the four classes of bone: long, short, flat, and irregular.
3. Describe the parts of long bones.
4. Differentiate between compact and spongy bone.
5. Differentiate the functions and locations of the four types of bone cells: osteoblast, osteoclast, osteocyte, and osteogenic cells.
6. Describe the microscopic structure of bone compact and spongy bone.
7. Describe, locate, and give the function of the two types of bone marrow.
8. Discuss the process of bone formation and development
9. Differentiate between the different types of fracture
10. Describe the repair of a fracture
11. Describe the homeostatic mechanism responsible for the maintenance of bone.

7: Skeletal System

1. Differentiate between axial and appendicular skeleton
2. Identify the bones and and bones features
3. List differences between the male and female skeletons

8: Articulations

1. Discuss both the functional and structural classifications of body joints
2. Describe the characteristic features for fibrous, cartilaginous, and synovial joints and give examples of each
3. Define and identify the different body movements
4. Identify joints of the body

9: Muscle Physiology

1. Explain the organization of muscle tissue
2. Describe the function and structure of skeletal, cardiac muscle, and smooth muscle
3. Describe how muscles contract and relax
    a. Specifically explain the cross bridge cycle
4. Define the process of muscle metabolism
5. Explain how the nervous system controls muscle tension
6. Relate the different muscle fibers types to exercise and muscle performance
7. Relate smooth muscle contraction to skeletal muscle contraction

10: Muscles

1. Identify origins, insertions, and muscle interactions (agonist, antagonist etc.).
2. Describe how levers cause movement in the body
3. Cite the criteria used for naming muscles
4. Identify and explain the actions of selected muscles of head, neck, back, shoulder, chest, arms, abdomen, gluteal region, thigh, and leg utilizing models and cadaveric specimens

11: Nervous Structure and Function

1. Describe the relationship of the nervous system to maintaining homeostasis.
2. Differentiate between the anatomic and physiologic divisions of the nervous system.

3. Describe the structure of the typical neuron.
4. Describe the different types of neurons and their special endings.
5. Explain the anatomy of a nerve.
6. Explain the mechanism of action potential and factors that influence its speed.
7. Explain how a whole nerve responds to different strengths of stimuli.
8. Differentiate between excitatory synapses and inhibitory synapses.
9. Describe neurotransmitters responsible for excitation and inhibition.

12: Central Nervous System

1. Identify and explain major anatomical structures and functions of the brain.
2. Describe the ventricles and their openings.
3. Explain the formation and circulation of cerebrospinal fluid.
4. Explain the structure and arrangement of the meninges.
5. Identify and explain the major anatomical structures and functions of the spinal cord

13/14: Peripheral and autonomic nervous systems

1. Describe sensory neural pathways to and from the brain.
2. Identify the 12 pairs of cranial nerves their origins, distributions, and functions.
3. Describe the anatomy of a typical spinal nerve.
4. Identify the four major nerve plexuses, name the important nerves of each, and their distribution -- cervical, brachial, lumbar, sacral
5. Explain the anatomy of the autonomic nervous system.
6. Explain the functional difference between parasympathetic and sympathetic systems.
7. Identify adrenergic and cholinergic fibers and their receptors.
8. Describe the anatomy of a reflex arc.

Lab Learning Objectives

- Practice appropriate lab safety measures
- Describe anatomical position
- Use appropriate anatomical terminology to identify key body structures body regions, body cavities and directions.
- Identify examples of body planes and sections
- Explain pH and determine pH of a solution using strips or concentration of hydrogen ion.
- Classify solutions as acids or bases.
- Predict a molecules solubility in various solutions based on its polar/nonpolar nature.
- Correctly use a microscope to view microscopic samples
- Accurately identify the parts of a microscope and their functions.
- Describe hypertonic, hypotonic and isotonic solutions.
- Predict the result of placing a cell into a hypertonic, hypotonic, or isotonic solution.
- Identify organelles of the cell and their functions
- Identify the stages of mitosis
- Identify the different types of epithelial tissue using microscopes and slides.
- Identify the different types of connective tissues using microscopes and slides.
- Identify nervous tissue and its components using microscopes and slides.
- Identify the layers of the skin using microscopes and slides and models.
- Compare and contrast thick and thin skin.

- Identify accessory structures of the skin using microscopes and slides and models.
- Identify the bones and bone features of the skeleton.
- Differentiate between axial and appendicular skeleton
- Compare male and female pelvic bones
- Describe the parts of long bones.
- Describe the microscopic structure of compact and spongy bone and the epiphyseal plate.
- Identify joints of the body.
- Define and identify different body movements
- Classify joints by structure and function.
- Identify origins, insertions, and muscle interactions
- Identify muscles of the human body using cadaveric specimens and models
- Identify and explain the actions of the muscles of the human body.
- Explain the organization of muscle tissue
- Explain how the nervous system controls muscle tension
- Collect and analyze electromyography data from individual students
- Determine the relationship between electrical activity and contraction strength
- Describe the organization of muscle tissue
- Identify the components of the neuromuscular junction using microscopes and slides
- Describe the structure of the typical neuron
- Identify different types of neurons and their special nerve endings
- Identify neurons and glia using microscopes and slides
- Describe the structure of the typical neuron and synapse
- Explain the mechanism of an action potential
- Explain how a whole nerve responds to different strengths of stimuli.
- Differentiate between excitatory synapses and inhibitory synapses/signals.
- Identify and explain major anatomical structures and functions of the brain (model and sheep brains).
- Explain the structure and arrangement of the meninges (models).
- Identify the major anatomical structures of and function of the spinal cord (models and cadavers).
- Describe sensory neural pathways to and from the brain.
- Identify the 12 pairs of cranial nerves and their functions.
- Identify the four major nerve plexuses, name the important nerves of each, and their distribution -- cervical, brachial, lumbar, sacral
- Identify differences between parasympathetic and sympathetic nervous systems.
- Describe the anatomy of a reflex arc.
- Design an experiment to collect individual biological data of a reflex. Compare two conditions.
- Identify the components of a typical spinal nerve using models and microscopes/slides.