

A-G Sports Therapy Outline

Course description

Sports Physical Therapy teaches human anatomy and physiology within the context of sport. Students learn how the many systems of the body interact with one another and adapt to the demands placed on the body by sport. Students will participate in multiple laboratory activities in class. In addition, students will spend time outside the classroom learning the prevention, recognition, evaluation and treatment of athletic injuries.

Goals and/or Major student outcomes

- Understand the anatomy and physiology of the human body.
- Gain knowledge of sports medicine careers and develop motivation to pursue a career in sports medicine.
- Through an understanding of the systems of the body, be able to identify and evaluate injuries to them.
- Through multiple class activities, be able to understand and apply the steps of the scientific method.

Course Outline

1. Introduction to sports medicine 1 week
 - a) History of sports medicine
 - b) Disciplines involved in sports medicine
 - c) Legal and ethical issues including HIPAA

2. Emergency procedures 3 weeks
 - a) American Heart Association 1st Aid and CPR
 - i) **LAB: CPR and 1st aid certification (to include splinting, crutch/cane fitting)**
 - b) Bloodborne pathogens
 - i) HIV/AIDS
 - ii) Hepatitis
 - iii) Universal Precautions
(1) LAB: universal precautions
 - c) Evaluation procedures
 - i) HOPS
 - ii) SOAP notes

3. The Human Body 3 weeks
 - a) Anatomic terms including planes, directional terms and cavities
 - i) **LAB: Basic Terms**
 - b) Body organization and systems
 - c) Homeostasis and vital signs
 - i) How body maintains homeostasis in heat, cold and altitude
(1) Injuries due to cold stress, heat stress and altitude

- ii) **LAB: Assessing vital signs (temperature, pulse, blood pressure and respiration)**
4. Cell structure and function 1 week
 - a) Definition of a cell
 - b) Anatomy of a typical cell
 - i) Structure and function of organelles
 - ii) **LAB: Cells and their functions**

 5. Tissues 3 weeks
 - a) Function, characteristics and morphology of
 - i) Epithelial tissue
 - ii) Connective tissue
 - iii) Muscular tissue
 - iv) Nervous tissue
 - v) **LAB: Tissue Identification**
 - b) Tissue response to injury
 - i) Response to trauma
 - ii) The injury cycle
 - iii) Healing and regeneration
 - iv) Effects of modalities on injury cycle
 - v) Pharmacology as it relates to injury cycle
 - c) **Case Study of specific tissue injury, to include written summary of history, diagnosis, treatment and outcome and oral presentation of findings. Case study to be started in this unit and presented throughout the year.**

 6. Integumentary System 1 week
 - a) Anatomy of the integumentary system
 - b) Functions of the integumentary system
 - c) Disorders of the integumentary system (cause, recognition and treatment/management)
 - i) Cancer
 - ii) Dermatophytes
 - iii) Psoriasis
 - iv) Human papilloma virus
 - v) Type 1 herpes simplex
 - vi) Tinea pedis

 7. Skeletal System 5 weeks
 - a) Functions of the skeletal system
 - b) Bone growth and formation
 - c) Histology of bone
 - d) Anatomy of a typical long bone
 - e) Classification of bone based on shape
 - f) Divisions of skeleton
 - i) identification of bones in the axial and appendicular skeleton
 - ii) **LAB: bone identification**
 - g) Joints
 - i) Classification and mechanics of joints
 - h) Injuries to the skeletal system
 - i) Fractures

- (1) How bones heal
- ii) sprains
 - (1) mechanism and classification of sprains and ligament injuries
- iii) arthritis
- iv) skeletal and joint injuries in sport
 - (1) foot
 - (2) ankle
 - (3) knee
 - (4) hip
 - (5) hand
 - (6) elbow/forearm
 - (7) shoulder
 - (8) **LAB: joint laxity testing and management**

8. The muscular system 5 weeks

- a) Function of muscular system
- b) Types and anatomy of muscle tissue
 - i) Smooth/visceral
 - ii) Striated/skeletal
 - iii) Cardiac
 - iv) **LAB: Muscle Tissue**
- c) Physiology of muscular contraction
 - i) Sliding filament theory
 - ii) Muscle twitch
 - iii) Muscle tone
 - iv) **LAB: build a model of a sarcomere**
- d) muscle identification
 - i) muscle name
 - ii) function
 - iii) location
 - iv) origin/insertion
 - v) **LAB: superficial muscle identification**
 - vi) **LAB: gross anatomy/cadaver muscle identification**
- e) muscle injuries in sport
 - i) foot, ankle and lower leg
 - ii) knee/thigh
 - iii) hip/groin
 - iv) wrist/ hand
 - v) elbow/forearm
 - vi) shoulder
 - vii) back
 - viii) **LAB: Muscle testing and injury management**

9. Nervous system and spinal cord 2 weeks

- a) Function of the nervous system
- b) Organization of nervous system
 - i) Central/peripheral nervous system
 - ii) Afferent/efferent nerves

- iii) Somatic/autonomic nervous system
 - (1) Sympathetic/parasympathetic nervous system
 - c) the nerve and nerve impulse
 - d) Spinal cord and spinal nerves
 - i) Function and anatomy
 - (1) **LAB: Dissection of cow spinal cord**
 - ii) Injuries to
 - (1) Spinal cord injuries
 - (2) Brachial plexus injuries
 - e) **LAB: testing reaction times**
 - f) **LAB: testing reflexes**
10. Nervous system and the brain 2 weeks
- a) Anatomy and functions of the brain
 - b) Cranial nerves
 - c) **LAB: Dissection of sheep brain**
 - d) Injuries to the brain
 - i) Concussion
 - ii) Second impact syndrome
 - iii) Post-concussion syndrome
 - iv) **LAB: assessment and management of concussions**
11. The cardiovascular system 2 weeks
- a) Anatomy of the heart and circulatory system
 - b) Functions of the heart and circulatory system
 - i) Blood pressure
 - ii) Heart rate
 - (1) **LAB: Dissection of pig or sheep heart**
12. Respiratory system 2 weeks
- a) Purpose of the respiratory system
 - b) Anatomy and function of the upper respiratory system (nose, pharynx, larynx, trachea, bronchi)
 - c) Anatomy and function of the lungs
 - d) Process of ventilation
 - i) **LAB: build simple model of working lung**
 - e) Process of respiration (external, internal and cellular)
 - f) **LAB: multi-unit lab—Monitoring blood pressure, respiration and heart rate before during and after exercise**
 - g) Diseases/abnormal conditions
 - i) Recognition and treatment/management of
 - (1) Pneumothorax
 - (2) Hemothorax
 - (3) Asthma
 - (4) Pneumonia
 - (5) **LAB: listening to lung sounds**
13. Lymphatic system 1 week
- a) Function of the system and the structure and functions of the lymphatic vessels
 - b) Immune response

- c) Organs of the lymphatic system
 - i) Recognition and management of injury to the spleen

14. Nutrition and the Digestive System 4 weeks
- a) Purpose of the digestive system
 - b) Anatomy and function of the digestive system
 - i) **LAB: Digestive System**
 - c) Recognition and management of abdominal injuries in sport
 - d) Essential nutrients
 - i) Function
 - ii) RDA for essential nutrients during various stages life
 - iii) Where to obtain essential nutrients
 - iv) **PROJECT: Oral presentations on essential nutrients**
 - v) **PROJECT: Analysis of personal nutrition via food diary and use of USDA web site**
15. Presentation of case studies assigned at the beginning of the year 1 week

Labs

LAB: CPR and 1st aid certification

Objectives: Students will be able to

1. Explain the relationship between the circulatory and respiratory system
2. Identify the signs and symptoms of respiratory and cardiac distress
3. Explain ventricular fibrillation and how an Automated External Defibrillator (AED) corrects it
4. Demonstrate proper use of AED
5. Demonstrate proper CPR skills for adult, infant and child
6. Recognize situations that require 1st aid care
7. Demonstrate proper 1st aid care for various accidents and illnesses

LAB: universal precautions and the spread of disease: Students will use the “How Viruses Spread” lab activity to predict, observe and analyze how viruses travel through the population. While performing the lab, students will observe universal precautions such as wearing gloves and masks.

Objectives: Students will be able to

1. Explain the difference between blood-borne and air-borne pathogens
2. Describe how pathogens are spread through a population
3. Identify strategies to prevent the spread of a pathogen
4. Demonstrate proper use of universal precautions

LAB: Basic Terms: Students will rotate to multiple stations, each using a different strategy to demonstrate their knowledge of basic terms

Objectives: Students will

1. Identify planes of the body using anatomical models
2. Analyze photographs of various athletes and describe the position of their joints using anatomical terms.
3. Draw a person in anatomical position and label it using directional terms.
4. Compare points on a skeleton using directional terms.

LAB: Assessing vital signs: Students will learn how to monitor a patient's temperature, pulse, blood pressure and respiration. Students will also watch a video on Mt. Everest to analyze how vital signs respond to cold and altitude.

Objectives: Students will

1. Explain the importance of monitoring the vital signs of a patient
2. Explain how vital signs adjust to maintain homeostasis
3. Demonstrate the proper method for taking vital signs
4. Analyze how vital signs will adapt to changes in temperature and altitude.

LAB: Cells and their functions: Students will use various materials to make a model of a cell and label the organelles and their function. Students will also identify slides/pictures of cells and organelles.

Objectives: Students will

1. Construct a model of a cell and its organelles.
2. Explain the function of the organelles.
3. Identify various organelles on slides
4. Explain how the various parts of a cell work together

LAB: Tissue Identification: Students will view various slides to identify different tissue types.

Objectives: Students will

1. Identify slides of muscle, nerve, bone and connective tissue.
2. Describe functions of various tissue types.
3. Explain how tissues are organized into organs and organ systems.

LAB: Bone Identification: Students will rotate to various stations and identify bones and bony landmarks. In tact skeletons, disarticulated skeletons will be used. Students will also use photographs and each other to identify superficial landmarks of bones.

Objectives: Students will

1. Identify bones as part of the axial or appendicular skeleton.
2. Classify bones based on shape (long, short, irregular, flat)
3. Classify bones and parts of bones based on their structure (spongy vs. compact)
4. Identify individual bones and their landmarks
5. Classify bones as either right or left.
6. Describe how bones increase in length and diameter

LAB: Joint Laxity Testing and Management: Students will watch videos of sports injuries. They will analyze the video to predict what injury occurred as a result of the incident. They will then demonstrate on each other how they would evaluate the suspected injury.

Objectives: Students will

1. Predict what forces will cause damage to what ligaments (i.e., how a valgus force can cause damage to a ligament on the medial aspect of a joint).
2. Analyze video of sports and predict what injury occurred from a particular incident.
3. Describe the various degrees of sprains.
4. Demonstrate proper technique for evaluating joint laxity.

LAB: Muscle Tissue: Students will use microscopes to identify slides of different muscle tissue.

Objective: Students will

1. Identify cardiac, striated and smooth muscle tissue.

2. Demonstrate the use of a compound microscope.
3. Explain the similarities and differences between the different muscle types.

LAB: The Sarcomere: Students will use common items to build a working model of a sarcomere.

Objectives: Students will

1. Analyze the mechanisms of the sliding filament theory.
2. Collaborate with a partner to construct a model of a sarcomere.
3. Label and explain the parts of a sarcomere represented in their model.

LAB: Superficial Muscle Identification: Student will use pictures of athletes to identify muscles.

Objectives: Students will

1. Label specific muscles.
2. Identify the superficial contours of specific skeletal muscles.
2. List the functions of specific muscles.

LAB: Cadaver Muscle Identification: Students will visit a cadaver lab at a local chiropractic college and identify tagged muscles on the dissected cadaver.

Objectives: Students will

1. Identify tagged muscles on a cadaver.
2. Identify functions of tagged muscles.

LAB: Muscle Testing and Injury Management: Students will use the knowledge of muscles and their functions to test the integrity of specific muscles.

Objectives: Students will

1. Analyze the function of specific muscles to develop a manual test to evaluate the integrity of that muscle.
2. Demonstrate muscle test.
3. Explain their rationale for the test.

LAB: Dissection of Cow Spinal Cord: Students will use knowledge of spinal cord anatomy to identify specific structures of spinal cord.

Objectives: Students will

1. Identify and describe the components of a typical vertebra and specific differences in the cervical, thoracic and lumbar regions.
2. Identify and describe the components of a typical spinal nerve.
3. Identify and describe the major coverings (meninges) of the spinal cord
4. Identify and describe the spinal cord, dorsal and ventral rootlets, and dorsal root ganglion
5. Analyze what deficit would result when there is damage to particular regions of the spinal cord

LAB: Reaction Time: Students will use a ruler and a chart to determine each others reaction time.

Objectives: Students will

1. Predict how a subject's reaction time will vary in various situations (e.g. with practice, in low light, etc.)
2. Work in groups to test the reaction times of multiple subjects with multiple variables.
3. Analyze and explain their data, including any unexpected outcomes.

LAB: Testing Reflexes: Students will work in pairs. They will use a reflex hammer to evaluate the following reflexes: Biceps (C5), Brachioradialis (C6), Triceps (C7), Patellar tendon (L2, 3, 4), Achilles tendon (S1).

Objectives: Students will:

1. Understand the mechanism by which a reflex tests a specific neurological level.
2. Demonstrate how to test reflexes.

LAB: Dissection of Sheep Brain: Students will work in pairs to dissect a sheep's brain.

Objectives: Students will:

1. Identify specific areas of the brain including cranial nerves
2. Understand how different areas of the brain are responsible for specific functions.
3. Analyze what deficit would result when there is damage to a particular area of the brain.

LAB: Assessment and Management of Concussions: Students will work in pairs to demonstrate the assessment of an athlete with a possible concussion. The student who is the "athlete" will have a script they will use to answer the questions asked by the examiner and to replicate the signs and symptoms of a concussion.

Objectives: Students will:

1. Demonstrate the steps they would take to evaluate a concussion
2. Analyze the results of their clinical assessment to determine the degree of the concussion.
3. Explain what steps they would take to manage the "athlete".
4. Explain complications that may result from an improperly managed concussion (i.e. second impact syndrome, post-concussion syndrome).

LAB: Dissection of Sheep or Pig Heart: Students will work in pairs to dissect either a pig or sheep heart.

Objective: Students will:

1. Identify the major anatomy of the heart.
2. Explain how blood travels to, through and out of the heart.
3. Explain the significance of the valves in directing blood flow.
4. Analyze how abnormalities of the valves affect the flow of blood.

LAB: Model Lung: Students will use a water bottle, straw, and two balloons to build a simple model of the lung.

Objective: Students will:

1. Analyze the anatomy and physiology of the lung in order to develop a simple working model of the lung.
2. Explain the process of ventilation.

LAB: Multi-Unit Lab—Respiratory and Circulatory System: Students will work in small groups to observe how the circulatory and respiratory systems work together to maintain homeostasis during exercise. Students will take turns being the subject while the other members of the group take and record their vital signs (blood pressure, temperature and heart rate) at various intervals.

Objective: Students will:

1. Predict how each of the three vital signs will change with exercise and how they will recover post-exercise.
2. Demonstrate how to monitor vital signs.
3. Analyze the data from the members of their group to determine how the circulatory and respiratory systems work together to maintain homeostasis.
4. Hypothesize the reasons for any discrepancies in their data

LAB: Lung Sounds: Students will work stethoscopes in small groups to practice listening to lung sounds. In addition to listening to each others lung sounds, recorded lung sounds will be used.

Objectives: Students will:

1. Demonstrate the use of a stethoscope
2. Demonstrate the proper protocol for listening to lung sounds
3. Identify normal vs. abnormal lung sounds

LAB: Digestive system: Students will use a tagged cadaver (if available) or a model and pictures to identify tagged areas of the digestive system.

Objectives: Students will:

1. Identify the name of the tagged structure.
2. Explain the function that occurs at each tagged area (digestion, absorption, secretion, etc).
3. List the order in which the food travels through the digestive system.

ACTIVITY: Case Study: Students will choose a person that has suffered a particular injury. The students will write a case study of that injury. Students will interview the person to gain specific information regarding their injury. They will then research to gain more information on the type of injury. Students will write a case study to include the following sections: introduction, presentation of the case (history, diagnosis, treatment, outcome), and conclusion. The case study will be started in the Tissue Unit, but be worked on throughout the year. The project will culminate with an oral presentation of the case study to the class during the final week of school.

Objectives: Students will

1. Research a particular injury via personal interviews and internet.
2. Analyze data to formulate a conclusion regarding the patient's outcome and prognosis.
3. Develop writing skills by composing a written case study according to given standards.
4. Develop oral presentation skills.

PROJECT: Essential Nutrients: Students will work in pairs to create a poster on one of the essential nutrients. The students will then present their poster to the class.

Objectives: Students will:

1. Explain the role the nutrient plays the functioning of the body.
2. Identify the RDA for the nutrient.
3. Explain the health consequences of a deficiency or overdose of the nutrient.
4. Identify foods that contain the nutrient.

PROJECT: Analysis of Personal Nutrition: Students will keep a 5-day log of all food, drink and physical activity. They will then use the USDA website <http://www.mypyramidtracker.gov> to calculate their nutritional needs and compare them to their current status.

Objectives: Students will:

1. Calculate their personal nutritional needs.
2. Evaluate their current nutritional status.
3. Compare their present nutritional status to their needs.

4. Analyze the results of their comparison to develop a plan that would correct any deficiencies or excesses in their diet.