Sports Medicine Cadaver Demonstration
High School

This guide is for high school students participating in the AIMS Sports Medicine Cadaver Demonstration. Programs will be presented by an AIMS Anatomy Specialist. During this session, the most common sports injuries of the shoulder, elbow, knee and ankle will be outlined. Basic principles of injury management will also be discussed. Students will be exposed to the physiology and anatomic relationships of the musculoskeletal system that involves muscles, bones and connective tissue. Students will become more familiar with the anatomical structures by observing, studying and examining human specimens. Included in this guide, you will find additional resources such as important terminology and pre/post tests for your students.

National Science Education (NSES) Content Standards

Content Standard K-12	Unifying Concepts and Processes: systems order and organization; evidence, models and explanation; form and function
Content Standard A	Science as Inquiry
Content Standard C	Life Science: matter, energy and organization of living systems
Content Standard F	Science in Personal Health and Social Perspectives: personal and community health

Show Me Standards (Science and Health/Physical Education)

Science 1	Properties and principles of matter and energy
Science 2	Properties and principles of force and motion
Science 3	Characteristics and interactions of living organisms
Health/Physical Education 1	Structures of, functions of and relationships among human body systems
Health/Physical Education 2	Principles and practices of physical and mental health
Health/Physical Education 3	Diseases and methods for prevention, treatment and control
Health/Physical Education 4	Principles of movement and physical fitness
Health/Physical Education 5	Methods used to assess health, reduce risk factors, avoid high-risk behaviors
Health/Physical Education 6	Consumer health issues

Missouri Learning Standards

Life Sciences (9-12.LS1.A.2)	Interacting systems that provide specific functions within multicellular organisms.

Lesson Objectives:

Student will participate in the use of a cadaver as a learning tool for health science education.
Student will explore the structure and relationships of the muscles, bones, tendons and ligaments of the knee, ankle, shoulder and elbow.
Student will increase their understanding of common sports-related injuries of the above joints.
Student will increase their understanding of the principles of movement and physical fitness.
Student will increase their knowledge of basic principles of injury prevention, treatment and management.

Prerequisite Knowledge:

Students should be familiar with terms relating to the musculoskeletal system. During physical activity, the components of muscles, bones and connective tissue work in unison to move the body. Injury to the components of this system can often result in limited range of motion or pain during the incidence of sports-related injury.

- Knee
    - Bones: femur, tibia, fibula, tibial tubercle, femoral epicondyles
    - Muscles: quadriceps (rectus femoris, vastus medialis, vastus intermedius, vastus lateralis), sartorius, tensor fasciae latae, iliotibial band, tibialis anterior, peroneus longus and brevis, gastrocnemius, soleus, femur, iliac crest, tibia, fibula, calcaneus; femoral artery, vein and nerve
    - Ligaments: ACL, PCL, MCL, LCL
- Ankle/Foot
    - Bones: tibia, fibula, talus, calcaneus, cuboid, navicular, cuneiform bones, metatarsals, phalanges
    - Muscles: tibialis anterior and posterior, extensor digitorum longus, flexor digitorum longus, peroneus longus and brevis, gastrocnemius and soleus
    - Ligaments: deltoid ligament, plantar fascia
- Shoulder
    - Bones: clavicle, acromion process, coracoid process, glenoid fossa, humerus
    - Muscles: deltoid, biceps, triceps, supraspinatus, infraspinatus, teres minor, subscapularis
- Elbow
    - Bones: humerus, radius, ulna, olecranon process, humeroulnar joint, proximal radioulnar joint
    - Muscles: biceps, brachioradialis, triceps
    - Ligaments: medial collateral ligament (ulnar collateral ligament), lateral collateral ligament (radial collateral ligament)

Materials:

Review of Terminology/Vocabulary Reference Guide
Pre/Post Test

Sports Medicine Cadaver Demonstration
Terminology/Vocabulary Reference Guide

Achilles Tendon	A tendon that attaches the calf muscles to the heel bone (calcaneus)
Apophysitis	Inflammation of the apophysis, which is a prominence on any bone
Epicondylitis	Inflammation of the epicondyle or of the tissues adjoining the epicondyle of the humerus
Iliotibial Band (Tract)	A thickened lateral portion of the fascia lata. It extends as a tendinous band from the iliac crest to the knee.
Lateral Collateral Ligament (LCL)	A strong ligament which connects the femur and the tibia, stabilizing the outer aspect of the knee joint.
Medial Collateral Ligament (MCL)	One of the four important stabilizer ligaments of the knee. The ligament attaches to the femur and the tibia and runs across the inside of the knee. It prevents the knee from buckling inward.
Medial Epicondyle	A bony prominence of the inner aspect of the humerus
Non-steroidal Anti-inflammatory Drug (NSAID)	A non-steroidal drug, such as aspirin or ibuprofen, used to treat inflammation, mild to moderate pain and fever.
Osgood Schlatters' Disease	An osteochondritis of the apophysis of the tibial tubercle
Patellar Tendinitis	An inflammation of the patella tendon; often called “jumper’s knee”
Plantar Fasciitis	An inflammation of the plantar fascia, a thin layer of tough tissue supporting the arch of the foot. May cause the heel to hurt, feel hot or swell.
Posterior Cruciate Ligament (PCL)	A strong ligament of the knee that originates from the anterolateral surface of the medial condyle of the femur, passes posteriorly and inferiorly between the condyles and attaches to the posterior intercondylar area of the tibia.
R.I.C.E	An acronym for REST, ICE, COMPRESSION and ELEVATION. The four basic methods used to speed minor injury recovery.
Shoulder Dislocation	When the upper arm or humerus is out of its socket
Sprain	Tearing injury to a ligament. Can be minor, with only slight dress to the ligament or may be severe with total separation of a ligament that supports a joint.

Sports Medicine Cadaver Demonstration
Terminology/Vocabulary Reference Guide (Continued)

Strain	Tearing injury to a muscle. Usually causes some degree of bleeding within the muscle tissue.
Tennis Elbow	Inflammation at the lateral epicondyle (bony process of the humerus) of the elbow and tendon insertions
Tommy John Injury (Surgery)	Rupture of the ulnar collateral ligament, also known as the medial collateral ligament, which is the main ligament that holds the bones of the lower arm and those of the upper arm together at the elbow and prevents them from moving in an abnormal way. Surgery typically involves transplanting another ligament to replace the MCL.

Sports Medicine Cadaver Demonstration
Pre/Post Test

1. Name the four muscles of the rotator cuff:
    - _____
    - _____
    - _____
    - _____
2. Condition of the shoulder in which the shoulder joint has significant loss of its range of motion in all directions: _____. This is also known as _____.
3. The three bones that make up the knee joint are:
    - _____
    - _____
    - _____
4. Sprains occur to _____; strains occur to _____.
5. A _____ degree sprain/strain occurs when all or most of the fibers of the ligament/muscle are torn and loss of function is severe.
6. _____ occurs because of wear and tear on the joint and is the result of the wearing away of the hyaline cartilage that lines the ends of the long bones.
7. This condition is an overuse injury to the ligaments around the knee that frequently occurs in basketball players, skiers and other athletes that use the knee as a shock absorber _____. This is also known as _____.
8. Name the condition which refers to pain along the inner two-thirds of the tibial shaft, primarily caused by repetitive pulling of the tibialis posterior tendon as one pushes of the foot during running _____.
9. Shoulder dislocations occur at the _____ joint. Shoulder separations occur at the _____ joint.
10. The vast majority (95%) of shoulder dislocations occur in an _____ direction.
11. This condition is usually a repetitive injury resulting in inflammation of the ligament from the lateral epicondyle to the radius _____. It is also known as _____.
12. The most commonly sprained ligament in the ankle: _____.

Bonus: Are you interested in a career in medicine, science or healthcare?

_____

Sports Medicine Cadaver Demonstration
Pre/Post Test Answers

1. Rotator cuff
    a. Supraspinatus
    b. Infraspinatus
    c. Teres minor
    d. Subscapularis
2. Adhesive capsulitis or “frozen shoulder”
3. Femur, tibia, patella
4. Ligaments, muscles
5. Third
6. Osteoarthritis
7. Patellar tendonitis or “jumper’s knee”
8. Shin splints
9. Glenohumeral, acromioclavicular
10. Anterior
11. Lateral epicondylitis or “tennis elbow”
12. Talofibular ligament