

STRANDS AND STANDARDS

EXERCISE SCIENCE/SPORTS MEDICINE



Course Description

This full-year course is designed to teach students components of exercise science/sports medicine; including exploration of therapeutic careers, medical terminology, anatomy and physiology, first aid, injury prevention principles, the healing process, rehabilitation techniques, therapeutic modalities, sport nutrition, sport psychology, and performance enhancement philosophies.

Intended Grade Level	11-12
Units of Credit	1.0
Core Code	36.01.00.00.040
Concurrent Enrollment Core Code	36.01.00.13.040
Prerequisite	None
Skill Certification Test Number	701
Test Weight	1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Exercise Science/Sport Medicine
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1

Students will explore the fundamental aspects of Exercise Science/Sports Medicine.

Standard 1

Identify Members of the Sports Medicine team.

- Recognize the primary members of the sports medicine team to include: Coach, Athlete, Parents, Team Physician, Certified Athletic Trainer, and Allied Health professionals.
- Understand that other careers provide support to the sports medicine team.
- Compare and contrast the roles of each member of the sports medicine team.

Standard 2

Explore a variety of therapeutic careers and describe the job duties and skills, education required, job settings, and potential salary for each of the following:

- Certified Athletic Trainer (AT)
- Physical Therapist (PT)
- Physical Therapy Assistant (PTA)
- Occupational Therapist (OT)
- Occupational Therapy Assistant (OTA)
- Exercise Physiologist
- Orthopedic Surgeon
- Physician
 - DO
 - MD
- Physician Assistant (PA)
- Nurse Practitioner (NP)
- Biomechanist
- Prosthetist
- Orthotist
- Podiatrist
- Chiropractor (DC)
- Sports Psychologist
- Emergency Medicine
 - EMT
 - Paramedic
- Certified Strength & Conditioning Specialist/Personal Trainer (CSCS)
- Registered Dietician (RD)
- Massage Therapist (LMT)

Standard 3

Explain legal issues and legal terminology.

- Discuss risk management in an athletic setting.
 - Collision
 - Contact
 - Non-contact
 - Surfaces
- Define legal terminology and discuss issues, including:
 - Assumption of risk
 - Battery
 - Commission
 - Omission
 - Failure to warn
 - HIPAA
 - Informed consent
 - Liability
 - Malpractice
 - Negligence
 - Duty of care
 - Breach of duty
 - Damage/injury occurred
 - Proximal cause
 - Standard of care
 - Statute of limitations
 - Good Samaritan law
- Discuss parameters of ethical conduct and associated issues, including:
 - Americans with Disabilities Act
 - Cheating
 - Drug testing
 - Fair play and sportsmanship
 - Performance enhancing drugs
 - Scope of practice
 - Title IX (gender equity in sports)
 - Winning at all costs
- Review preventative measures to reduce potential risks of litigation.
 - Medical History & Pre-participation Physical Examination (PPE)
 - Carry liability insurance
 - Continuing education
 - Demonstrate appropriate documentation (SOAP)
 - Follow physician orders and recommendations
 - Have an emergency action plan (EAP)
 - Maintain adequate supervision
 - Maintain good rapport with the Sports Medicine Team

Performance Skill

SOAP Note

STRAND 2

Students will describe principles of sports psychology.

Standard 1

Identify the psychological implications of an injury to an athlete.

- Describe the five psychological phases an athlete experiences following an injury.
 - Denial
 - Anger
 - Bargaining
 - Depression
 - Acceptance
- Compare and contrast athletes that deny pain and loss of function or view injury as a source of relief.

Standard 2

Identify effective psychological intervention skills.

- Describe the importance of goal setting.
 - Performance goals
 - Outcome goals
 - SMART goals
- Examine different relaxation techniques and how they can help performance.
 - Focused breathing
 - Progressive muscle relaxation
 - Visual Imagery

Standard 3

Identify potential problems associated with overtraining.

- Compare and contrast staleness and burnout.
- Identify interventions to prevent or treat staleness or burnout.
 - Remove from activity
 - Time off
 - Allow athlete to have more control
 - Decrease emotional and stressful demands
 - Avoid repetition
 - Sufficient attention to complaints and small injuries
 - Supportive and caring environment

Standard 4

Discuss different sources of anxiety that athletes may deal with.

- Trauma Induced
- Stress related
- Phobias

Standard 5

Discuss depression in athletes.

- Causes
- Resources
- Guidelines

STRAND 3

Students will describe the injury and healing process.

Standard 1

Discuss the inflammatory response and the healing process.

- Compare and contrast Acute and Chronic injuries.
- Discuss the purpose of inflammation.
- Categorize the stages of acute injury healing and explain the processes involved in each.
 - Acute (Inflammation) Phase
 - Signs and symptoms of inflammation
 - Heat
 - Redness
 - Swelling
 - Pain
 - Loss of function
 - Time frame
 - Define vasodilation and explain why it occurs
 - Define hypoxia and explain its role in secondary injury
 - Subacute (Repair and Regeneration) Phase
 - Time frame
 - Explain what fibroblasts are
 - Explain what collagen is and its role in scar tissue formation
 - Remodeling (Maturation) Phase
 - Time frame
 - Define adhesions
 - Explain Wolff's Law

Standard 2

Compare and contrast injury classifications.

- Describe first degree injuries.

- Describe second degree injuries.
- Describe third degree injuries.

Standard 3

Compare and contrast common fractures.

- Compression
- Depressed
- Greenstick
- Comminuted
- Longitudinal
- Spiral
- Transverse

Standard 4

Vocabulary

- Anatomical Planes
 - Sagittal Plane/Midsagittal
 - Frontal/Coronal
 - Transverse/Horizontal
- Signs & Symptoms
 - Acute
 - Chronic
 - Constriction
 - Dilation
 - Ecchymosis
 - Edema
 - Effusion
 - Inflammation
 - Joint laxity

STRAND 4

Students will explore specific sports injuries of the head and neck and apply athletic injury prevention principles.

Standard 1

Review the anatomy of the head and neck.

- Bones
 - Frontal
 - Occipital
 - Parietal
 - Temporal
 - Mandible

- Maxillae
- Zygomatic
- Nasal
- Vertebrae
- Muscles
 - Sternocleidomastoid
 - Trapezius
- Structures
 - Brain
 - Intervertebral discs
- Nerves
 - Cervical Plexus
 - Brachial Plexus

Standard 2

Head and neck injuries

- Recognize common injuries to the head and neck to include.
 - Concussion
 - Subdural hematoma
 - Epidural hematoma
 - Cervical spine fracture
 - Brachial plexus injuries
 - Nose bleeds
- Identify the mechanism of each injury.
- Identify the signs and symptoms of each injury.
- Indicate appropriate treatment for each injury.
- Describe injury prevention strategies.
 - Modification of equipment
 - Proper fit and selection
 - Use of defective or worn out equipment

Standard 3

Describe the basic principles and specialized equipment used in the prevention of athletic injuries.

- Recognize types and functions of protective equipment.
 - Helmet, facemask, ear guards
 - Mouth guards
 - Neck collars
 - Padding
 - Sports bras
 - Compression shorts/cup
- Discuss the legal ramifications of manufacturing, buying, and issuing equipment.
 - NOCSAE warning

- Modification of equipment
- Proper fit and selection
- Use of defective or worn out equipment

Standard 4

Vocabulary

- Amnesia
- Articulation
- Innervate
- Mechanism of Injury (MOI)
- Point tenderness
- Range of Motion (ROM)-Active, Passive, Resistive
- Referred Pain

STRAND 5

Students will explore various aspects of sports nutrition.

Standard 1

Describe the basic components of nutrition and the sources of the following nutrients.

- Carbohydrates
- Proteins
- Fats
- Vitamins
- Minerals
- Water

Standard 2

Examine the importance of fluid replacement and hydration.

- Examine the importance of water and its role in the body.
- Explain the correct process of hydration during athletic activity.
 - Identify the dangers of inappropriate hydration techniques.
 - Identify the dangers of dehydration.
- Compare and contrast advantages and disadvantages of sports drinks.
 - Identify the role of sports drinks in hydration.
 - Discuss the correct chemical make-up of sports drinks.

Standard 3

Identify the components of a pre and post event meal and explain the value of each.

- Describe the recommended nutrient percentages of pre and post event meals.
- Identify foods that are easily digested.
- Identify foods that should be avoided.
- Identify when pre and post event meals should be eaten.
- Explain the process of carbohydrate loading and discuss when it is most effective.

STRAND 6

Students will explore the fundamentals of body composition and diseases and disorders related to body issues.

Standard 1

Describe basic body composition.

- Define body composition.
- Compare and contrast the most common methods for analyzing body composition.
 - Hydrostatic
 - Bod Pod
 - Calipers
 - Bio-Impedance Analysis (BIA)
 - Infrared
- Describe the parameters of safe weight loss and weight gain.

Standard 2

Recognize disorders associated with nutrition.

- Identify signs, symptoms, and effects of Anorexia Nervosa.
- Identify signs, symptoms, and effects of Bulimia Nervosa.
- Identify signs, symptoms, and effects of Bigorexia.

STRAND 7

Students will explore specific sports injuries of the lower extremities and apply athletic injury prevention principles.

Standard 1

Review the anatomy of the lower extremities.

- Bones
 - Femur
 - Tibia
 - Fibula
 - Patella
 - Talus
 - Calcaneus
 - Metatarsals
 - Phalanges
- Joints
 - Tibial Femoral
 - Patella Femoral
 - Talocrural
 - Subtalar
 - Midfoot
 - MP

- PIP/DIP
- Soft Tissues
 - Patellar Tendon
 - ACL
 - MCL
 - PCL
 - LCL
 - Lateral and Medial Meniscus
 - Anterior Talofibular ligament (ATF)
 - Deltoid ligament
- Muscles
 - Quadriceps
 - Hamstrings
 - Peroneal
 - Tibialis Anterior
 - Tibialis Posterior
 - Gastrocnemius
 - Soleus
 - Achilles Tendon

Standard 2

Lower extremity injuries

- Recognize common injuries to the lower extremity to include.
 - Cruciate/Collateral Ligament sprains
 - Meniscal injury
 - Patella-femoral injuries
 - Ankle sprains
 - Plantar Fasciitis
 - Turf toe
 - Thigh contusions
 - Quadriceps/Hamstring strains
 - Medial Tibial Stress Syndrome (MTSS)
- Identify the mechanism of each injury.
- Identify the signs and symptoms of each injury.
- Indicate appropriate treatment for each injury.
- Describe injury prevention strategies.
 - Shin Guards
 - Shoes
 - Other sport specific protection devices

Standard 3

Demonstrate theory and principles of prophylactic taping.

- Analyze the basic principles of prophylactic taping.

- Identify the necessary supplies and their purpose for prophylactic taping.
 - Athletic tape (various sizes)
 - Underwrap
 - Heel and lace pad
 - Adhesive spray
 - Shark/Scissors
- Analyze the basic principles of proper tape removal.
- Explain the terminology associated with prophylactic taping procedures.
 - Anchor
 - Stirrup
 - Horseshoe
 - Spica
 - Heel-lock
 - Checkrein/Fan

Performance Skill

Competently tape an ankle using the standard prophylactic taping method.

Optional Performance Skill

Competently tape an arch using the standard prophylactic taping method.

Standard 4

Identify principles of protective bracing.

- Discuss the differences between functional and prophylactic bracing.
- Identify the function of joint sleeves (compression).

Standard 5

Vocabulary

- General Terms
 - Atrophy
 - Bursa
 - Cartilage
 - Crepitus
 - Ligament
 - Tendon
 - Valgus
 - Varus
- Anatomical Positions and Directions
 - Superior
 - Inferior
 - Posterior
 - Medial
 - Lateral
 - Distal

- Proximal
- Superficial
- Deep
- Ventral
- Dorsal
- Prone
- Supine
- Bilateral
- Contralateral
- Unilateral
- Movements of the Foot and Ankle
 - Inversion
 - Eversion
 - Dorsiflexion
 - Plantarflexion

STRAND 8

Students will examine performance enhancement philosophies.

Standard 1

Define terms associated with performance enhancements.

- Cardiovascular endurance
- Muscular endurance
- Power
- Speed
- Strength

Standard 2

Discuss general conditioning principles.

- Adaptation
- Overload
- Specificity
- Reversibility
- Periodization

Standard 3

Examine the role the cardiovascular/respiratory systems have on fitness/athletic performance.

- Describe the anatomy of the cardiovascular/respiratory systems.
 - Heart
 - 4 chambers
 - 4 valves
 - 4 blood vessels
 - Lungs

- Oxygen exchange from alveoli to capillaries
- Identify vital signs related to the cardiovascular/respiratory system.
 - Describe and accurately measure blood pressure (systolic/diastolic).
 - Describe and accurately measure respiratory rate.
 - Describe and accurately measure pulse rate.
 - Describe lung volume.
 - Describe the importance of cardiac output, stroke volume, and heart rate during exercise.
- Examine different types of tests used to quantify cardiovascular fitness.
 - VO2max
 - Harvard step test
 - 12-minute run test
- Describe the effects exercise has on the cardiovascular/respiratory systems.
 - Immediate effects of exercise
 - Heart rate
 - Ventilation
 - Long term effects of exercise
 - Heart rate
 - Stroke volume
 - Cardiac output
- Compare and contrast aerobic/anaerobic training.
- Examine the importance of a warm up/cool down in a training program.
- Examine different cardiovascular training methods.
 - Interval
 - Fartlek
 - Circuit
 - Continuous
- Apply general conditioning principles to improve cardiovascular fitness.
 - Rate of perceived exertion (BORG scale)
 - Target heart rate

Standard 4

Examine the effects of the environment on training and performance.

- Discuss the effects of high and low altitude.
- Describe the effects of acclimatization.
- Recognize the effects of travel on the body.

Standard 5

Vocabulary

- Acclimatization
- Aerobic
- Anaerobic

STRAND 9

Students will examine strength training principles, flexibility, and ergogenic aids.

Standard 1

Examine the role strength training has on fitness/athletic performance.

- Describe and know the function of the following muscular structures.
 - Fascia
 - Fascicle
 - Fibers
 - Myofibrils
 - Sarcomere
 - Actin
 - Myosin
 - Neuromuscular junction
- Sliding filament theory
- Compare and contrast the difference between slow twitch and fast twitch muscle fibers and the type of athletic performance each influences.
- Compare and contrast different types of movements related to strength training.
 - Isometric/Isotonic/Isokinetic
 - Eccentric/Concentric
 - Closed chain/Open chain
 - Plyometrics
- Identify methods of resistance.
- Apply general conditioning principles to improve strength.
 - Speed
 - Muscular endurance
 - Power

Standard 2

Examine the importance of flexibility in fitness/athletic performance.

- Explain the general guidelines of flexibility.
 - Define ROM and how it relates to fitness/athletic performance.
 - Identify the benefits of flexibility.
 - Decrease risk of injury
 - Reduce muscle soreness
 - Improve muscular balance and postural awareness
 - Demonstrate proper timing of flexibility techniques.
 - Before activity
 - After activity
- Identify the different methods to increase flexibility and the safety/effectiveness of each.
 - Static Stretching

Performance Skill

Demonstrate the proper techniques of static stretching for ALL major muscle groups.

- Ballistic stretching
- Dynamic stretching
- Proprioceptive Neuromuscular Facilitation Stretching
 - Contract/Relax
 - Hold/Relax

Standard 3

Compare and contrast the physiological and psychological effects of ergogenic aids.

- Define ergogenic aid.
- Recognize the effects and possible dangers of common ergogenic aids.
 - Stimulants
 - Narcotics
 - Anabolic steroids
 - Beta blockers
 - Diuretics
 - Human growth hormone
 - Blood doping products
 - Erythropoietin
 - Anesthetics
 - Corticosteroids
 - Creatine
- Discuss the dangers of energy drinks and their effects on the body.

STRAND 10

Students will explore specific sports injuries of the upper extremities and apply athletic injury prevention principles.

Standard 1

Review the anatomy of the upper extremity.

- Bones
 - Scapula
 - Clavicle
 - Humerus
 - Radius
 - Ulna
 - Carpals
 - Metacarpals
 - Phalanges
- Joints
 - Shoulder
 - Sternoclavicular

- Acromioclavicular
- Glenohumeral
- Scapulothoracic
- Elbow
- Wrist
- Metacarpal-phalangeal
- Interphalangeal
- Soft tissues
 - Sub-acromial bursa
 - AC ligament
 - Glenoid labrum
- Muscles
 - Deltoid
 - SITS (Subscapularis, Infraspinatus, Supraspinatus, Teres minor)
 - Biceps brachii
 - Triceps brachii

Standard 2

Recognize common injuries to the upper extremity.

- Upper extremity injuries
 - Clavicle fracture
 - Impingement syndrome
 - Rotator cuff injuries
 - Glenohumeral dislocation
 - AC joint separation
 - Epicondylitis
 - Lateral (Tennis elbow)
 - Medial (Little leaguer's elbow)
 - Interphalangeal dislocation
- Identify the mechanism of each injury.
- Identify the signs and symptoms of each injury.
- Indicate the appropriate treatment for each injury.
- Describe injury prevention strategies.

Performance Skill

Competently tape a thumb using the standard prophylactic taping method.

Optional Performance Skill

Competently tape a wrist using the standard prophylactic taping method.

Standard 3

Vocabulary

- Movements

- Flexion
- Extension
- Hyperextension
- Abduction
- Adduction
- Pronation
- Supination
- Protraction
- Retraction
- Elevation
- Depression
- Rotation
- Circumduction
- External rotation
- Internal rotation
- Lateral flexion
- Movements of the Wrist & Thumb
 - Radial deviation
 - Ulnar deviation
 - Opposition

STRAND 11

Students will be able to recognize common injuries and administer injury management.

Standard 1

Explain an injury assessment (HIPS).

- Identify proper PPE/BSI precautions.
- Identify the components included in obtaining an accurate history.
- Identify the components of an inspection.
- Describe the process of palpation.
- Describe the purposes of special tests.
 - Range of Motion
 - Passive
 - Active
 - Resistive
 - Stress Tests (structural integrity)
 - Neurological
 - Functional
- Discuss the decisions that can be made from a HIPS evaluation.
- Explain a HIPS assessment.

Standard 2

Identify soft tissue injuries and skin conditions.

- Differentiate signs, symptoms, and treatment for:
 - Avulsions
 - Abrasions
 - Bites
 - Blisters
 - Contusions
 - Lacerations
 - Stings
- Differentiate signs, symptoms, and treatment for:
 - Ring worm
 - Jock itch
 - Athlete's foot
 - Impetigo
 - MRSA
 - Warts
 - Eczema

Standard 3

Recognize abdominal injuries, bleeding, and shock.

- Discuss external bleeding.
- Demonstrate proper procedures to control bleeding.
 - Apply direct pressure with sterile gauze pad.
 - Apply a pressure dressing.
 - Check circulation.
- Identify signs, symptoms, and treatment of internal bleeding.
- Identify signs, symptoms, and treatment of abdominal injuries.
 - Ruptured spleen
 - Appendicitis
 - Hernia
- Describe shock and the treatment for shock.

Standard 4

Discuss immobilization techniques.

- Identify fracture signs and symptoms.
- Explain the steps to immobilization.
 - Splint in the position found.
 - Immobilize the joint above and the joint below.
 - Check circulation distal to the injury.
- Explain head/neck immobilization.
 - Maintain in-line stabilization
 - Monitor ABC's

Performance Skill

Demonstrate crutch fitting to any size individual.

Standard 5

Recognize and provide treatment for environmental conditions.

- Compare and contrast the causes, signs, symptoms, and treatment of heat illnesses.
 - Heat cramps
 - Heat exhaustion
 - Heat stroke
- Compare and contrast the causes, signs, symptoms, and treatment of cold exposure.
 - Hypothermia
 - Frostbite

Standard 6

Describe the treatment for medical conditions.

- Seizures
- Fainting
- Diabetes
- Anaphylactic shock
- Asthma
- Exertional sickling
- Sudden cardiac arrest

Standard 7

Vocabulary

- General Vocabulary Terms
 - Cyanosis
 - Diagnosis
 - Incision
 - Palpation
 - Prognosis
 - Reduction
 - Shock
- Injuries
 - Bursitis
 - Dislocation
 - Fracture
 - Hematoma
 - Separation
 - Sprain
 - Strain
 - Subluxation

STRAND 12

Students will explain therapeutic modalities and rehabilitation techniques.

Standard 1

Explore therapeutic modalities.

- Identify the purpose of therapeutic modalities.
- Explain how to properly select the use of therapeutic modalities.
- Identify the Gate Control Theory as a principle of pain management and describe the physiological process of the theory.

Standard 2

Describe the physiological effects, indications, contraindications, and application of the following:

- Cryotherapy
 - Ice Packs

Performance Skill

Prepare an ice bag/pack

- Ice massage
- Ice immersion
- Cold whirlpool
- Chemical coolant
- Describe the R.I.C.E. method for acute injuries

Performance Skill

Apply a compression wrap to an ankle.

Performance Skill

Apply a compression wrap to a knee.

- Thermotherapy
 - Heat packs
 - Ultrasound
 - Hot whirlpool
- Electrotherapy
- Massage

Standard 3

Discuss the components and goals of a rehabilitation program.

- Identify the general guidelines of a rehabilitation program.
 - Individualize each program
 - Be as aggressive as possible without causing harm
 - Use a variety of equipment
 - Common mistakes
 - Treat the cause not the symptoms

- Not addressing the contra-lateral side
- Postural defects, anatomical mal-alignment, and biomechanical imbalances
- Appropriate goal setting.
- Components of a rehabilitation program.
- Phase I
 - Body conditioning/maintain cardiovascular fitness throughout all phases
 - Control swelling
 - Control pain
 - Increase range of motion
- Phase II
 - Restore full range of motion
 - Strength, endurance, speed, power in all muscle groups
 - Begin skill patterns and proprioception
- Phase III
 - Functional and sport specific skills
 - Restore balance and proprioception
 - Return to sport
- Relate the different exercise principles to rehabilitation
 - SAID
 - Overload

Standard 4

Vocabulary

- Analgesic
- Contraindicate
- Cryotherapy
- Hydrotherapy
- Indicate
- Modality
- Thermotherapy
- Vasoconstrictor
- Vasodilator

Skill Certificate Test Points by Strand

Test Name	Test #	1	2	3	4	5	6	7	8	9	10	11	12	Total Points	Total Questions
Exercise Science/Sports Medicine	701	11	4.5	8	8	3	3	14	8	11	10	7.5	7.5	95.5	60