Exercise Science and Sports Medicine

Exam Information	Description
Exam number **701** **Items** **60** **National Career Cluster** **Healthcare & Human Services** **Certification available** **Yes**	The Exercise Science & Sports Medicine industry certification exam assesses components of exercise science and sports medicine, including the 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.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Fundamental Aspects	6%
2. Sports Psychology	4%
3. Injury & Healing Process	12%
4. Head & Neck Injuries	8%
5. Sports Nutrition	4%
6. Body Composition & Diseases	4%
7. Lower Extremities Injuries	19%
8. Performance Enhancement Philosophies	8%
9. Strength Training/Flexibility/Ergogenic Aids	8%
10. Upper Extremities Injuries	9%
11. Common Injuries	9%
12. Rehabilitation Exercises	9%

Standard 1 - Fundamental Aspects

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

Objective 1 Identify Members of the Sports Medicine team.

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

Objective 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:

1. Athletic Trainer (AT)
2. Physical Therapist (PT)
3. Physical Therapy Assistant (PTA)
4. Occupational Therapist (OT)
5. Occupational Therapy Assistant (OTA)
6. Exercise Physiologist
7. Orthopedic Surgeon
8. Physician
    a. DO
    b. MD
9. Physician Assistant (PA)
10. Nurse Practitioner (NP)
11. Biomechanist
12. Prosthetist
13. Orthotist
14. Podiatrist
15. Chiropractor (DC)
16. Sports Psychologist
17. Emergency Medicine
    a. EMT
    b. Paramedic
18. Certified Strength & Conditioning Specialist/Personal Trainer (CSCS)
19. Registered Dietician (RD)
20. Massage Therapist (LMT)

Objective 3 Explain legal issues and legal terminology.

1. Discuss risk management in an athletic setting.
    a. Types of sports
        i. Collision sports
        ii. Contact sports
        iii. Non-contact sports
    b. Surfaces
2. Define legal terminology and discuss issues, including:
    a. Assumption of risk
    b. Battery
    c. Failure to warn
    d. Health Insurance Portability and Accountability Act (HIPAA)

e. Informed consent
f. Liability
g. Negligence
    i. Duty of care
    ii. Breach of duty
    iii. Damage/injury occurred
    iv. Proximate cause
h. Malpractice
i. Commission
j. Omission
k. Standard of care
l. Statute of limitations
m. Good Samaritan law

3. Discuss parameters of ethical conduct and associated issues, including:
    a. Americans with Disabilities Act (ADA)
    b. Cheating
    c. Drug testing
    d. Fair play and sportsmanship
    e. Performance enhancing drugs
    f. Scope of practice
    g. Title IX
4. Review preventative measures to reduce potential risks of litigation.
    a. Medical History & Pre-participation Physical Examination
    b. Carry liability insurance
    c. Maintain professional credentials and appropriate continuing education
    d. Appropriate documentation
    e. Follow physician orders and recommendations
    f. Have an emergency action plan (EAP)
    g. Maintain adequate supervision
    h. Maintain good rapport with the Sports Medicine Team

Standard 2 - Sports Psychology

Candidates will describe principles of sports psychology.

Objective 1 Identify the psychological implications of an injury to an athlete.

1. Describe the five psychological stages an athlete experiences following an injury.
    a. Denial
    b. Anger
    c. Bargaining
    d. Depression
    e. Acceptance
2. Compare and contrast how some athletes may view pain.
    a. Deny pain and loss of function.
    b. Injury as a source of relief.

Objective 2 Identify effective psychological intervention skills.

1. Describe the importance of goal setting.
    a. Performance goals (SMART goals)
    b. Specific
    c. Measurable
    d. Attainable/Achievable
    e. Realistic/Relevant
    f. Time based
    g. Outcome goals
2. Examine different relaxation techniques and how they can help performance.
    a. Focused breathing
    b. Progressive muscle relaxation
    c. Visual Imagery

Objective 3 Identify potential problems associated with overtraining.

1. Compare and contrast staleness and burnout.
2. Identify interventions to prevent or treat staleness or burnout.
    a. Remove from activity
    b. Time off
    c. Allow athlete to have more control
    d. Decrease emotional and stressful demands
    e. Avoid repetition
    f. Sufficient attention to complaints and small injuries
    g. Supportive and caring environment

Objective 4 Discuss different mental health challenges that athletes may deal with.

1. Anxiety
    a. Trauma induced anxiety
    b. Stress related anxiety
    c. Phobias that affect performance
2. Depression
    a. Causes of depression
        i. Physical injuries
        ii. Overtraining
        iii. Pressure to perform
        iv. Loss of identity and social support
3. Resources and coping strategies

Standard 3 - Injury And Healing Process

Candidates will describe the injury and healing process, including basic injury assessment.

Objective 1 Discuss the inflammatory response and the healing process.

1. Compare and contrast acute and chronic injuries.
2. Discuss the purpose of inflammation.
3. Categorize the stages of acute injury healing and explain the processes involved in each.
4. Acute (Inflammation) Phase
    a. Signs and symptoms of inflammation

. Heat
i. Redness
ii. Swelling
iii. Pain
iv. Loss of function

b. Time frame – 48 to 72 hours
c. Define vasodilation and explain why it occurs.
d. Define hypoxia and explain its role in secondary cell death.
e. Compare and contrast the following methods to treat acute injuries:
5. Rest, Ice, Compression, Elevation (RICE)
6. Protect, Optimal Load, Ice, Compression, Elevation (POLICE)
7. Protection, Elevation, Avoid anti-inflammatories, Compression, Education & Load, Optimism,
Vascularization, Exercise (PEACE & LOVE)

8. Subacute (Repair and Regeneration) Phase
a. Time frame – 3 to 4 weeks
b. Explain the role of fibroblasts and collagen in scar tissue formation.
9. Remodeling (Maturation) Phase
a. Time frame – up to one year
b. Define adhesions
c. Explain Wolff's Law

Objective 2 Explain an injury assessment: History, Inspection/Observation, Palpation, Special Tests (HIPS/HOPS).

1. Identify the components included in obtaining an accurate history.
2. Identify the components of an inspection/observation.
3. Describe the process of palpation.
4. Describe the purposes of special tests.
a. Range of Motion (ROM)
. Passive
i. Active
ii. Resistive
b. Stress Tests (structural integrity)
c. Neurological
d. Functional
5. Discuss the decisions that can be made from a HIPS/HOPS evaluation.

Objective 3 Compare and contrast injury classifications.

1. Describe first degree injuries.
2. Describe second degree injuries.
3. Describe third degree injuries.

Objective 4 Describe common fractures.

1. Classifications
a. Open/compound
b. Closed
2. Types
a. Compression
b. Depressed
c. Greenstick

d. Comminuted
e. Avulsion
f. Spiral
g. Transverse
h. Stress

Objective 5 Vocabulary

1. Anatomical Planes
    a. Sagittal Plane/Midsagittal
    b. Frontal/Coronal
    c. Transverse/Horizontal
2. Signs & Symptoms
    a. Acute
    b. Chronic
    c. Constriction
    d. Dilation
    e. Ecchymosis
    f. Edema
    g. Effusion
    h. Inflammation
    i. Joint laxity

Standard 4 - Head And Neck Injuries

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

Objective 1 Identify the anatomy of the head and neck.

1. Bones
    a. Frontal
    b. Occipital
    c. Parietal
    d. Temporal
    e. Mandible
    f. Maxillae
    g. Zygomatic
    h. Nasal
    i. Vertebrae
2. Muscles
    a. Sternocleidomastoid- neck lateral flexion
    b. Trapezius – shoulder elevation
3. Structures
    a. Brain including meninges
    b. Intervertebral discs
4. Nerves
    a. Cervical Plexus
    b. Brachial Plexus

Objective 2 Describe common head and neck injuries as well as their mechanism of injury, signs and symptoms, treatment, and prevention.

1. Recognize common injuries to the head and neck to include:
    a. Concussion
    b. Second impact syndrome
    c. Subdural hematoma
    d. Epidural hematoma
    e. Cervical spine fracture
    f. Brachial plexus injuries
    g. Nose bleeds/epistaxis
    h. Dental injuries
2. Identify the mechanism of each injury (MOI).
3. Identify the signs and symptoms of each injury.
4. Indicate appropriate treatment for each injury.
5. Describe injury prevention strategies.

Objective 3 Describe the basic principles and specialized equipment used in the prevention of athletic injuries.

1. Recognize types and functions of protective equipment.
    a. Helmet (including helmet covers), facemask, ear guards
    b. Mouth guards
    c. Neck collars/guards
    d. Padding
    e. Sports bras
    f. Compression shorts/cup
2. Discuss the legal ramifications of manufacturing, buying, and issuing equipment.
    a. National Operating Committee on Standards for Athletic Equipment (NOCSAE) warning
    b. Modification of equipment
    c. Proper fit and selection
    d. Use of defective or worn-out equipment

Objective 4 Vocabulary

1. Amnesia
2. Articulation
3. Innervate
4. Mechanism of Injury (MOI)
5. Point tenderness
6. Range of Motion (ROM)-Active, Passive, Resistive
7. Referred Pain
8. Lateral flexion
9. Rotation

Standard 5 - Sports Nutrition

Candidates will explore various aspects of sports nutrition.

Objective 1 Describe the basic components (kcal/gram, functions, energy vs. nutrients, healthy diet guidelines) of nutrition and the sources of the following nutrients.

1. Carbohydrates
2. Proteins
3. Fats
4. Vitamins
5. Minerals
6. Water

Objective 2 Examine the importance of fluid replacement and hydration.

1. Examine the importance of water and its role in the body.
2. Explain the correct process of hydration during athletic activity.
    a. Identify the dangers of inappropriate hydration techniques.
        i. Hyponatremia
        ii. Timing/Frequency
    b. Identify the dangers of dehydration.
3. Compare and contrast advantages and disadvantages of sports drinks.
    a. Identify the role of sports drinks in hydration.
    b. Discuss the importance of the correct chemical make-up of sports drinks.

Objective 3 Identify the components of a pre-event and post event meal and explain the value of each.

1. Identify the recommended nutrients included in pre-event and post event meals.
2. Identify foods that are easily digested.
3. Identify foods that should be avoided.
4. Identify when pre-event and post event meals should be eaten.
5. Discuss the concept of carbohydrate loading and discuss the benefits.

Standard 6 - Body Composition And Diseases

Candidates will explore the fundamentals of body composition, and the diseases and disorders related to body image.

Objective 1 Describe basic body composition.

1. Define body composition.
2. Compare and contrast the most common methods for analyzing body composition.
    a. Dual Energy X-ray Absorptiometry (DXA)
    b. Air displacement plethysmography - Bod Pod
    c. Skin-fold calipers
    d. Bio-Impedance Analysis (BIA)
    e. Hydrostatic weighing

f. Emerging technologies

3. Describe the parameters of safe weight loss and weight gain.

Objective 2 Recognize common conditions and disorders associated with nutrition.

1. Explore the effects of generalized disordered eating.
2. Identify signs, symptoms, and effects of Anorexia Nervosa.
3. Identify signs, symptoms, and effects of Bulimia Nervosa.
4. Identify signs, symptoms, and effects of Muscle Dysmorphia.
5. Identify signs, symptoms, and effects of the Female Athlete Triad/Relative Energy Deficiency in Sport (RED-S).

Standard 7 - Lower Extremities Injuries

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

Objective 1 Identify the anatomy of the lower extremities.

1. Bones
    a. Femur
    b. Tibia
    c. Fibula
    d. Patella
    e. Talus
    f. Calcaneus
    g. Metatarsals
    h. Phalanges
2. Joints
    a. Tibiofemoral
    b. Patellofemoral
    c. Talocrural
    d. Subtalar
    e. Midfoot
    f. Metatarsophalangeal (MTP)
    g. Proximal Interphalangeal (PIP)
    h. Distal Interphalangeal (DIP)
3. Soft Tissues
    a. Iliotibial Band (ITB)
    b. Patellar Tendon
    c. Anterior Cruciate Ligament (ACL)
    d. Posterior Cruciate Ligament (PCL)
    e. Medial Collateral Ligament (MCL)
    f. Lateral Collateral Ligament (LCL)
    g. Lateral and Medial Meniscus
    h. Achilles Tendon
    i. Anterior Talofibular ligament (ATF)
    j. Deltoid ligament
4. Muscles
5. Quadriceps – knee extension
6. Hamstrings – knee flexion
7. Peroneals – ankle eversion

8. Tibialis Anterior – ankle dorsiflexion
9. Tibialis Posterior – ankle inversion and plantarflexion
10. Gastrocnemius – ankle plantarflexion
11. Soleus – ankle plantarflexion

Objective 2 Describe common lower extremity injuries as well as their mechanism of injury, signs and symptoms treatment, and prevention.

1. Recognize common injuries to the lower extremity to include:
    a. Cruciate/Collateral Ligament sprains
    b. Meniscal injury
    c. Patellofemoral injuries
    d. Ankle sprains
    e. Plantar Fasciitis
    f. Turf toe
    g. Thigh contusions
    h. Quadriceps/Hamstring strains
    i. Medial Tibial Stress Syndrome (MTSS)
    j. IT Band Syndrome
2. Identify the mechanism of each injury.
3. Identify the signs and symptoms of each injury.
4. Indicate appropriate treatment for each injury.
5. Describe injury prevention strategies.
    a. Shin Guards
    b. Shoes
    c. Other sport specific protection devices
    d. Correcting biomechanics

Objective 3 Demonstrate theory and principles of prophylactic taping.

1. Analyze the basic principles of prophylactic taping.
2. Identify the necessary supplies and their purpose for prophylactic taping.
    a. Athletic tape (various sizes)
    b. Prewrap
    c. Heel and lace pad
    d. Adhesive spray
    e. Shark/Scissors
3. Explain the basic principles of proper tape removal.
4. Explain the terminology associated with prophylactic taping procedures.
    a. Anchor
    b. Stirrup
    c. Horseshoe
    d. Spica
    e. Heel-lock
    f. Checkrein/Fan

Objective 4 Identify principles of protective bracing.

1. Discuss the differences between functional bracing and prophylactic bracing.
2. Identify the function of compression sleeves

Objective 9 Vocabulary

1. General Terms
    a. Atrophy
    b. Bursa
    c. Cartilage
    d. Crepitus
    e. Ligament
    f. Tendon
2. Anatomical Positions and Directions
    a. Superior/Inferior
    b. Anterior/Posterior
    c. Medial/Lateral
    d. Proximal/Distal
    e. Superficial/Deep
    f. Ventral/Dorsal
    g. Prone/Supine
    h. Unilateral/Bilateral/Contralateral
    i. Valgus/Varus
3. Movements of the Foot and Ankle
    a. Inversion/Eversion
    b. Dorsiflexion/Plantarflexion

Standard 8 - Performance Enhancement Philosophies

Candidates will examine performance enhancement philosophies.

Objective 1 Define terms associated with performance enhancements.

1. Cardiovascular endurance
2. Muscular endurance
3. Power
4. Speed
5. Strength

Objective 2 Discuss general conditioning principles.

1. Adaptation
2. Overload
3. Specificity
4. Reversibility
5. Periodization

Objective 3 Examine the role the cardiovascular and respiratory systems have on fitness and athletic performance.

1. Identify and describe the structures and functions of the cardiovascular and respiratory systems and their interrelationship.
    a. Heart
        i. 4 chambers
        ii. 4 valves
        iii. 5 blood vessels

    b. Lungs - Oxygen exchange from alveoli to capillaries
2. Identify vital signs related to the cardiovascular and respiratory systems.
    a. Describe and accurately measure blood pressure (systolic/diastolic).
    b. Describe and accurately measure respiratory rate.
    c. Describe and accurately measure pulse rate.
    d. Describe lung volumes.
        i. Tidal volume
        ii. Vital capacity
    e. Describe the importance of cardiac output, stroke volume, and heart rate during exercise.
3. Examine different types of tests used to quantify cardiovascular fitness.
    a. VO2max
    b. Step tests
    c. Run tests
    d. Walk tests
4. Describe the effects exercise has on the cardiovascular and respiratory systems.
    a. Immediate effects of exercise
        i. Heart rate
        ii. Ventilation
    b. Long term effects of exercise
        i. Resting heart rate
        ii. Heart rate variability (HRV)
        iii. Stroke volume
        iv. Cardiac output
5. Compare and contrast aerobic/anaerobic training.
6. Examine the importance of a warmup/cool down in a training program.
7. Examine different cardiovascular training methods.
    a. Interval
    b. Fartlek
    c. Circuit
    d. Continuous
8. Apply general conditioning principles to improve cardiovascular fitness.
    a. Rate of perceived exertion (BORG scale)
    b. Target heart rate

Objective 4 Examine the effects of the environment on training and performance.

1. Discuss the effects of high and low altitude.
2. Describe the effects of acclimatization.
3. Recognize the effects of travel on the body.

Standard 9 - Strength, Flexibility And Ergogenic Aids

Candidates will examine strength training principles, flexibility, and ergogenic aids/performance enhancing drugs (PED).

Objective 1 Examine the role strength training has on fitness and athletic performance.

1. Describe the sliding filament model of muscle contraction.
2. Sarcomere proteins
    a. Actin
    b. Myosin
3. Compare and contrast the difference between slow twitch and fast twitch muscle fibers.

a. Common slow twitch athletic activities
b. Common fast twitch athletic activities

4. Compare and contrast different types of movements related to strength training.
    a. Isometric/Isotonic/Isokinetic
    b. Eccentric/Concentric
    c. Closed chain/Open chain
    d. Plyometrics
5. Identify methods of resistance training.
6. Apply general conditioning principles to improve strength.
    a. Speed
    b. Muscular endurance
    c. Power
    d. Periodization

Objective 2 Examine the importance of flexibility in fitness and athletic performance.

1. Explain the general guidelines of flexibility.
    a. Define ROM and how it relates to fitness and athletic performance.
    b. Identify the benefits of flexibility.
        i. Decrease risk of injury.
        ii. Reduce muscle soreness.
        iii. Improve muscular balance and postural awareness.
    c. Investigate the risks of hypermobility.
    d. Demonstrate proper timing of flexibility techniques.
        i. Before activity
        ii. After activity
2. Identify the different methods to increase flexibility and the safety/effectiveness of each.
    a. Static stretching
    b. Ballistic stretching
    c. Dynamic stretching
    d. Proprioceptive Neuromuscular Facilitation (PNF) stretching
        i. Contract/Relax
        ii. Hold/Relax

Objective 3 Compare and contrast the physiological and psychological effects of ergogenic aids.

1. Define ergogenic aid.
2. Recognize and discuss the effects and possible dangers of common ergogenic aids/performance enhancing drugs (PED).
    a. Stimulants
        i. Energy drinks
        ii. Pre-workout
        iii. Nicotine
    b. Narcotics
    c. Anabolic steroids
    d. Beta blockers
    e. Diuretics
    f. Human growth hormone (HGH)
    g. Blood doping products
        i. Blood transfusions
        ii. Erythropoietin (EPO)
    h. Anesthetics
    i. Corticosteroids

j. Creatine

Standard 10 - Upper Extremities Injuries

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

Objective 1 Identify the anatomy of the upper extremity.

1. Bones
    a. Scapula
    b. Clavicle
    c. Humerus
    d. Radius
    e. Ulna
    f. Carpals
    g. Metacarpals
    h. Phalanges
2. Joints
    a. Shoulder
        i. Sternoclavicular (SC)
        ii. Acromioclavicular (AC)
        iii. Glenohumeral (GH)
        iv. Scapulothoracic (ST)
    b. Elbow
    c. Wrist
    d. Metacarpophalangeal (MCP)
    e. Distal Interphalangeal (DIP)
    f. Proximal Interphalangeal (PIP)
3. Soft tissues
    a. Sub-acromial bursa
    b. AC ligaments
    c. Glenoid labrum
4. Muscles
    a. Deltoid – Abduction of arm
    b. Pectoralis Major – Shoulder horizontal adduction
    c. Latissimus Dorsi – Shoulder extension and adduction
    d. Rotator Cuff (SITS)
        i. Supraspinatus - Shoulder abduction
        ii. Infraspinatus – Shoulder external rotation
        iii. Teres minor - Shoulder external rotation
        iv. Subscapularis – shoulder internal rotation
    e. Biceps brachii – elbow flexion and shoulder flexion
    f. Triceps brachii – elbow extension
    g. Wrist flexors
    h. Wrist extensors

Objective 2 Describe common upper extremity injuries as well as their mechanism of injury, signs and symptoms, treatment, and prevention.

1. Upper extremity injuries

a. Clavicle fracture
b. Impingement syndrome
c. Rotator cuff injuries
d. Glenohumeral dislocation/subluxation
e. AC joint separation
f. Epicondylitis
    i. Lateral (Tennis elbow)
    ii. Medial (Little leaguer's elbow)
g. Wrist hyperextension
h. Ulnar collateral ligament (UCL) sprain
    i. Elbow
    ii. Thumb (Gamekeeper's Thumb)
i. Interphalangeal dislocation

2. Identify the mechanism of each injury.
3. Identify the signs and symptoms of each injury.
4. Indicate the appropriate treatment for each injury.
5. Describe injury prevention strategies.

Objective 3 Vocabulary

1. Movements
    a. Flexion/Extension/Hyperextension
    b. Abduction/Adduction
    c. Pronation/Supination
    d. Protraction/Retraction
    e. Elevation/Depression
    f. Horizontal Abduction/Adduction
    g. Rotation
        i. Internal rotation
        ii. External rotation
    h. Circumduction
2. Movements of the Wrist & Thumb
    a. Radial/Ulnar deviation
    b. Opposition

Standard 11 - Common Injuries

Candidates will be able to recognize common injuries and administer proper care.

Objective 1 Identify proper personal protective equipment (PPE)/body substance isolation (BSI) precautions.

Objective 2 Identify soft tissue injuries and skin conditions.

1. Differentiate signs, symptoms, and treatment for:
    a. Abrasions
    b. Avulsions
    c. Puncture
    d. Bites
    e. Blisters

f. Contusions
g. Lacerations
h. Stings

2. Differentiate signs, symptoms, and treatment for:
    a. Fungal infections
        i. Tinea corporis -Ring worm
        ii. Tinea cruris - Jock itch
        iii. Tinea pedis - Athlete's foot
    b. Bacterial infections
        i. Impetigo
        ii. Methicillin Resistant Staphylococcus Aureus (MRSA)
    c. Viral Infections
        i. Veruca vulgaris – common warts
        ii. Verruca plantaris – plantar warts
    d. Eczema

Objective 3 Recognize abdominal injuries, bleeding, and shock.

1. Discuss external bleeding.
2. Demonstrate proper procedures to control bleeding.
    a. Apply direct pressure
    b. Cover with sterile gauze and apply roller bandage.
    c. Determine if tourniquet is needed
3. Identify signs, symptoms, and treatment of internal bleeding.
    a. Identify signs, symptoms, and treatment of abdominal injuries.
    b. Ruptured spleen
    c. Appendicitis
    d. Hernia
4. Identify signs, symptoms and treatment for shock.

Objective 4 Discuss immobilization techniques.

1. Identify fracture signs and symptoms.
2. Explain the steps of immobilization.
    a. Splint in the position found.
    b. Immobilize the injured area.
    c. Check circulation distal to the injury.
3. Explain head/neck stabilization.
    a. Maintain stabilization in the position found.
    b. Monitor airway, breathing, and circulation (ABC's).

Objective 5 Recognize and provide treatment for environmental conditions.

1. Compare and contrast the causes, signs, symptoms, and treatment of heat illnesses.
    a. Dehydration
    b. Heat/muscle cramps
    c. Heat exhaustion
    d. Heat stroke
2. Compare and contrast the causes, signs, symptoms, and treatment of cold exposure.
    a. Hypothermia
    b. Frostbite

Objective 6 Describe the treatment for medical conditions.

1. Seizures
2. Syncope/Fainting
3. Blood sugar related issues
4. Anaphylactic shock
5. Asthma
6. Exertional sickling
7. Sudden cardiac arrest

Objective 7 Vocabulary

1. General Vocabulary Terms
    a. Cyanosis
    b. Diagnosis
    c. Incision
    d. Palpation
    e. Prognosis
    f. Reduction
    g. Shock
2. Injuries
    a. Bursitis
    b. Dislocation
    c. Subluxation
    d. Fracture
    e. Hematoma
    f. Separation
    g. Sprain
    h. Strain

Standard 12 - Rehabilitation Techniques

Candidates will explain therapeutic modalities and rehabilitation techniques.

Objective 1 Explore therapeutic modalities.

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

Objective 2 Describe the physiological effects, indications, contraindications, and application of the following:

1. Cryotherapy
    a. Ice packs
    b. Ice massage
    c. Ice immersion (cryokinetics)
    d. Cold whirlpool
    e. Chemical coolant
2. Thermotherapy

    a. Heat packs
    b. Ultrasound
    c. Hot whirlpool
3. Electrotherapy
4. Manual Therapy
    a. Massage
    b. Cupping
    c. Scraping techniques

Objective 3 Describe the structure and function of the red blood cells (RBCs).

1. Identify the general guidelines of a rehabilitation program.
    a. Individualize each program
    b. Optimal loading of tissues through all phases
    c. Use a variety of equipment
    d. Common mistakes
        i. Treating only the symptoms rather than also addressing the cause
        ii. Not addressing the contralateral side
        iii. Not addressing postural defects, anatomical malalignment, and biomechanical imbalances
    e. Appropriate goal setting.
2. Components of a rehabilitation program.
    a. Phase I
        i. Body conditioning/maintain cardiovascular fitness throughout all phases
        ii. Control swelling
        iii. Control pain
        iv. Increase range of motion
    b. Phase II
        i. Restore full range of motion
        ii. Strength, endurance, speed, power in all muscle groups
        iii. Begin skill patterns and proprioception
    c. Phase III
        i. Functional and sport specific skills
        ii. Restore balance and proprioception
        iii. Return to sport
    d. Relate the different exercise principles to rehabilitation.
        i. Specific Adaptations to Imposed Demands (SAID) principle
        ii. Overload

Objective 4 Vocabulary

1. Analgesic
2. Contraindicate
3. Cryotherapy
4. Hydrotherapy
5. Indicate
6. Modality
7. Thermotherapy
8. Vasoconstrictor
9. Vasodilator

Performance Skills

1. Present and answer questions about an Exercise Science/Sports Medicine related career.
2. Candidates will design and illustrate a modification to an existing piece of protective equipment or create a new piece of protective equipment. Can be done as a team or individual.
3. Document an injury evaluation using the SOAP format:
    a. Subjective
    b. Objective
    c. Assessment
    d. Plan
4. Simulate a HIPS/HOPS assessment.
5. Tape an ankle using a standard prophylactic taping method.
6. Tape an arch using the standard prophylactic taping method. (Optional additional skill)
7. Tape a thumb using a standard prophylactic taping method.
8. Tape a wrist using the standard prophylactic taping method. (Optional additional skill)
9. Demonstrate crutch fitting to any size individual and instruct patient in proper use.
10. Lead a team to stabilize head/neck in position found. (Optional additional skill)
11. Demonstrate the proper techniques of static stretching for ALL major muscle groups.
12. Demonstrate a dynamic stretch for the lower extremity.
13. Prepare an ice bag/pack.
14. Apply a compression wrap to an ankle.
15. Apply a compression wrap to a knee. (Optional additional skill)

Durable Skills

1. Professionalism
2. Collaboration
3. Communication
4. Leadership
5. Innovation
6. Adaptability

KEY VOCABULARY CLARIFICATIONS

Active Range of Motion (AROM): movement of a joint by the individual themselves.

Adhesion: a band of scar tissue that joins two surfaces not usually connected.

Air displacement plethysmography (Bod Pod): method used to measure body composition by estimating body density; by determining the volume of air it displaces inside an enclosed chamber.

Anchor: the starting and ending points of tape application.

Articulation: a point where two bones meet; a joint.

Bio-Impedance Analysis (BIA): method used to estimate body composition by measuring the resistance of electrical currents flowing through the body.

Blood doping: misuse of certain techniques and/or substances to increase the number of circulating red blood cells to increase endurance performance.

Checkrein/Fan: reinforced tape to prevent movement.

Closed chain: movement where the distal end is fixed (hand or foot), and the proximal end can move.

Contracture: permanent tightening of muscles, tendons, skin or other soft tissues causing joint stiffness.

Cryokinetics: rehabilitative exercise technique combining cryotherapy with active movement.

Cupping: a manual therapy technique using suction cups to pull blood into the skin.

Depression:

- movement of a body part downward (or inferior)
- type of skull fracture where broken bone is forced inward (depressed)
- mental disorder that negatively affects how people feel, think, and behave. Characterized by persistent feelings of sadness and loss of interest in activities.

Dual Energy X-ray Absorptiometry (DXA): a medical imaging technique used to measure bone density and body composition.

Fixation: process of stabilizing or aligning broken bones or damaged joints to facilitate healing.

Gate Control Theory: a principle of pain perception where the spinal cord can modulate which pain signals can be sent to the brain.

Horseshoe: a piece of felt used to control swelling around the malleolus after an ankle injury

Hyponatremia: a dangerous condition where there is a low level of sodium in the blood.

Meniscus: fibrous cartilage between the femur and tibia

Methicillin Resistant Staphylococcus aureus (MRSA): a bacterial infection that can be resistant to several antibiotics.

Modality: a method or tool used to produce a therapeutic effect on human tissue.

Open chain: movement where the distal end is free to move (hand or foot), and the proximal end is fixed.

Optimal load: a resistance that is both effective and safe for promoting tissue functional recovery.
Passive Range of Motion (PROM): joint movement performed by an external force such as another person or device, without any muscular effort from the individual.
Pronation: turning the hand upward Reduction: the process of restoring a bone or joint to its natural position, such as after a fracture or dislocation.
Proprioception: body's awareness of its own position and movement in space.
Proprioceptive Neuromuscular Facilitation (PNF): an advanced form of flexibility training that involves both stretching and contracting (activation) of the muscle group being targeted in order to achieve maximum static flexibility.
Rapport: a close and harmonious relationship in which the people or groups concerned understand each other's feelings or ideas and communicate well.
Relative Energy Deficiency in Sport (RED-S): stands for Relative Energy Deficiency in Sport; a syndrome that occurs when an athlete's energy intake is insufficient to meet the demands of training and daily life, leading to impaired physiological and psychological functions.
Scraping techniques: a manual therapy technique used in physical therapy to address soft tissue injuries and dysfunctions; involves using specialized tools to apply targeted pressure to muscles, tendons, and fascia, breaking down scar tissue and adhesions, reducing muscle tension, and promoting healing.
Separation: occurs when the outer end of the collarbone (clavicle) separates from the end (acromion) of the shoulder blade because of torn ligaments. This injury occurs most often from a blow to the top of the shoulder or a fall onto the shoulder.
SOAP note: stands for Subjective, Objective, Assessment, Plan; way to document injuries and injury care.
Specificity (SAID): a general conditioning principle that stands for specific adaptations for imposed demands.

Stress Tests:

- measure how well your heart, lungs, and blood vessels work together to deliver oxygen to muscles during exercise.
- tests that apply forces to a joint while observing for excessive joint opening (laxity) or pain indicating possible ligament damage

Supination: turning the palm upward in the lower extremity, an outward rolling of the foot, causing the weight to be distributed primarily on the outer side of the foot.
Talocrural: a joint of the lower extremity that is the junction between the talus and the tibia and fibula; ankle joint.
Tinea corporis: ringworm.
Tinea cruris: jock itch.
Tinea pedis: athlete's foot.

Ultrasound: a thermotherapy technique that utilizes sound waves.

Wolff's Law: a principle in anatomy and physiology, states that bone tissue will adapt to the mechanical stresses it experiences.