



EXAM INFORMATION

Items

80

Points

100

Prerequisites

NONE

Recommended

Course Length

ONE TO TWO YEARS

National Career Cluster

HEALTH SCIENCE

Performance Standards

INCLUDED (OPTIONAL)

Certificate Available

YES

DESCRIPTION

Sports Conditioning and Exercise Science is designed to teach students the components of exercise science and human performance. The information taught includes exploration of medical terminology, exercise science principles, anatomy, physiology, biomechanics, kinesiology, sports nutrition, sports psychology, exercise programming, strength & conditioning, fitness and performance assessments, and special population training principles. It also introduces the guiding principles of various careers such as physical therapy, chiropractic, massage therapy, occupational therapy, dietician, athletic training, physical education teacher, coaching, and personal training.

EXAM BLUEPRINT

STANDARD

PERCENTAGE OF EXAM

1 – Career Exploration, the Scope of Practice, Code of Ethics	4%
2 – Muscular and Skeletal Anatomy	19%
3 – Basic Exercise Physiology	8%
4 – Intro to Human Kinesiology and Biomechanics	7%
5 – Nutrition Sciences	4%
6 – Weight Management	5%
7 – Muscular Strength and Endurance Principles	8%
8 – Cardiovascular Training Principles	9%
9 – Flexibility	6%
10 – Subjective and Objective Assessments	10%
11 – Exercise Programming	8%
12 – Muscular and Skeletal Injuries and Healing	5%
13 – Common Diseases and Illnesses	4%
14 – Fitness Business and Marketing	3%



STANDARD 1

STUDENTS WILL EXPLORE THE FUNDAMENTAL ASPECTS OF THE HEALTHCARE CONTINUUM, HEALTH BASED CAREERS PATHWAYS, LEGAL AND ETHICAL ASPECTS OF THE HEALTHCARE INDUSTRY.

Objective 1 Research and differentiate various health careers and their relationship with total healthcare.

1. Career exploration and a basic understanding of the major roles for the following careers:
 1. Athletic Trainer
 2. Personal Trainer
 3. Strength & Conditioning Coach
 4. Massage Therapist
 5. Physical Education teacher
 6. Chiropractor
 7. Dietician
 8. Occupational Therapist
 9. Physical Therapist
 10. Kinesiologist
2. Identify the scope of practice and legal considerations for healthcare professionals
 1. Legalities of patient/client confidentiality
 1. HIPPA
 2. Educational requirements for each health professional
 1. Licensure
 2. Certification
 3. Registry
 4. Continuing education
 5. Local, state and governmental
 3. Consequences for breaking the scope of practice
 1. Legal ramifications
 2. Losing candidacy of licensure or certification
3. Identify the Code of Ethics for the healthcare professional
 1. The differences between code of ethics and scope of practice
 2. Consequences of unethical actions outside of code of ethics
 3. Communicating code of ethics between coworkers and clients/patients

STANDARD 2

STUDENTS WILL LEARN AND APPLY MEDICAL TERMINOLOGY INCLUDING ANATOMICAL TERMS, AND SKELETAL AND MUSCULAR ANATOMY OF THE BODY.

Objective 1 Be able to define and apply basic anatomical terms and functional skeletal and muscular anatomy.

1. Planes of motion and joint movements within each plane
 1. Sagittal
 2. Frontal/Coronal
 3. Transverse
2. Joint Movements and applying definitions
 1. Flexion/Extension/hyperextension
 2. Adduction/Abduction



3. Supination/Pronation
4. Eversion/Inversion
5. Upward rotation/Downward rotation
6. Elevation/Depression
7. Protraction/Retraction
8. Horizontal adduction/flexion
9. Horizontal abduction/extension
10. Internal/external rotation
11. Pronation/Supination
12. Rotation
13. Lateral flexion
14. Dorsiflexion/plantarflexion
15. Circumduction
3. Define and apply directional terms
 1. Anterior/posterior
 2. Superior/inferior
 3. Proximal/distal
 4. Lateral/medial
 5. Dorsal/ventral
 6. Superficial/deep
 7. Supine/prone
 8. Plantar/palmer
 9. Midline
4. Define and apply skeletal anatomy
 1. Axial
 2. Appendicular
 3. Major landmarks
 1. Fossa
 2. Depression
 3. Tubercle
 4. Process
 5. Tuberosity
 6. Epicondyle/condyle
5. Define and apply muscular anatomy
 1. Lower Leg
 2. Hamstring
 3. Quadriceps
 4. Hip musculature
 5. Abdominal
 6. Back
 7. Shoulders
 8. Rotator Cuff
 9. Arm (upper and lower) musculature
 10. Neck

Standard 2 Performance Evaluation included below (Optional)



STANDARD 3

STUDENTS WILL LEARN AND APPLY EXERCISE PHYSIOLOGY PRINCIPLES INCLUDING ACUTE AND CHRONIC ADAPTATIONS TO EXERCISE.

- Objective 1** Research, define and apply various aspects of exercise physiology and the application for improving human performance.
1. Describe the physiology of the cardiorespiratory system
 1. Systems and processes
 2. Explain the aerobic and anaerobic energy pathway systems
 1. ATP/ADP/CP
 2. Energy system phases - Phosphagen, Anaerobic, Aerobic
 3. VT1 & VT2
 3. Describe the acute and chronic responses to aerobic training
 1. Respiratory quotient
 2. Stroke volume
 4. Explain the physiological adaptations to strength training
 1. Acute vs chronic adaptations
 2. Hypertrophy/hyperplasia
 3. Muscle fiber types
 5. List some of the hormonal responses to exercise
 1. Endocrine system anatomy and function
 2. Acute and chronic adaptations to exercise
 3. Differences in various demographics
 1. Age
 2. Gender
 3. Illnesses/diseases
 6. Take into account environmental considerations during exercise
 1. Elevation
 2. Heat
 3. Cold

STANDARD 4

STUDENTS WILL EXPLORE THE HUMAN MOVEMENT SYSTEM INCLUDING PHYSICS OF THE BODY, ANALYZING MOVEMENT PATTERNS AND COMMON DYSFUNCTIONS IN MOVEMENT.

- Objective 1** Explore, describe and understand basic principles of biomechanics and kinesiology.
1. Describe certain biomechanical principles applied to human movement
 1. Newton's laws
 2. Wolf's Law
 3. Lever classes
 4. Types of motion
 5. Forces
 1. External/internal
 2. Motive/resistive
 2. Explain the kinesiology and muscle function of the upper and lower extremities
 1. Contraction types
 1. Isometric, concentric and eccentric
 2. Agonist/Antagonist/Synergist
 3. Open vs closed chain
 2. Muscle fiber arrangements and line of pull



1. Penniform, longitudinal
3. Center of gravity
 1. Center of mass
 2. Base of support
3. Describe obesity- and age-related biomechanical considerations
 1. Postural distortions
 1. Kyphosis
 2. Lordosis
 3. Sway back
 4. Flat back
 5. Scoliosis
 2. Range of joint motions

Standard 4 Performance Evaluation included below (Optional)

STANDARD 5

STUDENTS WILL APPLY NUTRITION PRINCIPLES INCLUDING BASIC NUTRITIONAL RECOMMENDATIONS FOR OPTIMAL HEALTH AND PERFORMANCE, BIOENERGETICS, COMPONENTS OF METABOLISM AND SUPPLEMENTAL AIDS.

Objective 1 Contrast various aspects of nutrition science and understand how nutrition directly and indirectly affects human performance and body composition.

1. List the macronutrient and micronutrient components and describe their functions in the body
 1. Carbohydrates
 2. Proteins
 3. Fat
 4. Water
 5. Vitamins
 6. Minerals
2. Explain the basic physiology of digestion and absorption
 1. Steps of chemical and mechanical digestion
 2. Nutrient timing
 3. Principles of absorption rates
3. Educate individuals on how to read food labels
 1. Ingredient lists
 2. Portion sizes
 3. Food label regulations
 4. Calculations
 5. Legalities of the food industry
4. Describe how to fuel the body for optimal performance
 1. Bioenergetics
 2. Pre-workout, post-workout nutrition
 3. Carbohydrate loading and event preparation
 4. Energy balance
 5. Nutrient ratios
 6. Glycemic Index
5. Explain nutritional considerations for special populations
 1. Diabetes
 2. Age
 3. Athletics/physical activity levels
 4. Hypertension



5. Osteoporosis
6. Vegetarian
7. Food allergies
8. Fad diets/nutrition myths
6. List the scope of practice issues related to nutrition
 1. Discuss nutritional supplement regulations
 2. Legalities of nutritional counseling
 3. Available resources for nutritional information
7. Definition of a “calorie”

STANDARD 6

STUDENTS WILL EXPLORE WEIGHT MANAGEMENT TOPICS AND PRINCIPLES INCLUDING EATING DISORDERS, PERFORMANCE ENHANCING SUBSTANCES, BODY IMAGE, AND COMMON BODY TYPES.

Objective 1 Describe basic body composition and various methods to assess body composition as well as safe weight loss and gain methods.

1. Define body composition
2. Compare and contrast the most common methods for analyzing body composition.
 1. Hydrostatic
 2. Bod Pod
 3. Calipers
 4. DEXA
 5. Infrared
3. Describe the parameters of safe weight loss and weight gain.
 1. BMR - Basal Metabolic Rate
 2. RMR - Resting Metabolic Rate
 3. Goal Specific Caloric Needs
 4. Fad Diets
 5. Exercise programming for safe weight gain
 6. Exercise programming for safe weight loss (1-2 pounds per week)
 7. Caloric formulas and calculations regarding safe weight gain and weight loss
4. BMI - Body Mass Index
 1. The use of BMI in health settings

Objective 2 Recognize disorders associated with nutrition and sports psychology

1. Identify signs, symptoms, and effects of Anorexia Nervosa, Binge Eating, Bulimia Nervosa, Bigorexia, Female Athlete Triad
2. Discuss and contrast the three body types
 1. Mesomorph
 2. Ectomorph
 3. Endomorph
3. Analyze training variables for each body type
 1. F.I.T.T. factors specific to each body type
4. Anthropometric Measurements
 1. Girth measurements
 1. Arm
 2. Chest
 3. Abdomen/waist
 4. Hips
 5. Thigh
 6. Calf
 2. Height
 3. Weight



5. Assess Blood pressure
 1. Define blood pressure
 2. Learn the procedure for assessing blood pressure and equipment involved
 3. Define systolic, diastolic, prehypertension, hypertension, and hypotension
 4. Compare blood pressures to healthy blood pressures
 5. Review the anatomy of the heart and blood flow pathway
6. Assess Resting Heart Rate
 1. Define resting heart rate
 2. Learn the procedure for assessing resting heart rate
 3. Calculate the resting heart rate using various time measurements
 1. Example: Assess for 10 seconds and multiply by 6
 4. Define systolic, diastolic, prehypertension, hypertension, and hypotension
 5. Review the anatomy of the heart and blood flow pathway
 6. Analyze various physiological factors in weight management
 1. Hypothyroidism
 2. Hyperthyroidism
 3. Diabetes - Type 1, 2 and gestational
 4. Metabolic disorders
7. Weight management protocols
 1. Safe weight gain
 2. Safe weight loss (1 - 2 pounds per week)

STANDARD 7

STUDENTS WILL APPLY MUSCULAR STRENGTH AND ENDURANCE PRINCIPLES INCLUDING IMPROVING STRENGTH AND ENDURANCE, BENEFITS, MUSCLE LENGTH-TENSION, AND COMMON MUSCULAR DISTORTIONS.

Objective 1

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

1. Describe and know the function of the following muscular structures:
 1. Anatomy of the muscle
 1. Spindle
 2. Golgi tendon organ
 3. Fiber
 4. Myofibrils
 5. Sarcomere
 6. Epimysium
 7. Endomysium
 8. Fascicle
 9. Fascia
 10. Periosteum
 11. Actin
 12. Myosin
 13. Tropomyosin
 14. All or none principle
 15. Tendon
 16. Ligament
 17. Neuromuscular junction
 2. Sliding filament theory
2. Compare and contrast the difference between slow twitch and fast twitch muscle fibers and the type of athletic performance each influence.
3. Compare and contrast different types of movements related to strength training



1. Isometric/isotonic/isokinetic
2. Eccentric/concentric
3. Closed chain/open chain
4. Plyometrics
 1. Identify methods of resistance
4. Apply general conditioning principles to resistance training and function
 1. Speed and power
 2. Muscular endurance
 3. Muscular strength
 4. Stabilization
5. Acute and chronic adaptations to resistance training
 1. Force production
 2. Force-velocity curve
6. Basic strength training equipment usage
 1. Proper usage
 2. Safety concerns
 3. Setup and cleanup
 4. Basic maintenance
 5. Progressions and regressions
7. Programming considerations for resistance training
 1. FITT principles for resistance training
 2. Progression, overload and specificity principles of resistance training

STANDARD 8

STUDENTS WILL APPLY CARDIOVASCULAR TRAINING PRINCIPLES INCLUDING RESPIRATORY SYSTEM, CIRCULATORY SYSTEM, ACUTE AND CHRONIC CARDIOVASCULAR ADAPTATIONS TO EXERCISE.

Objective 1 Describe the various parts and systems within the cardiovascular, respiratory systems and their functions within the body.

1. Cardiovascular system
 1. Heart
 1. Chambers of the heart
 2. Blood
 3. Blood vessels
 1. Arteries
 2. Veins
 3. Transportation system (circulatory)
2. Respiratory System
 1. Respiratory airways
 2. Lungs
 1. Exchange of gases
 3. Respiratory muscles
 4. Inspiration
 5. Expiration
 6. Metabolic Equivalent (MET)
 1. Peak Metabolic Equivalent
 2. Maximum Heart Rate
 3. Heart Rate Reserve Method
 7. VO₂ Max
 1. Peak VO₂ Max
 2. VO₂ Reserve Method



8. Exercise Intensity Prescriptions
 1. Rating of Perceived Exertion Scale
 2. Talk Test
3. Functions of the heart
 1. Stroke Volume
 2. Heart Rate
 3. Cardiac Output
4. Blood
 1. Plasma
 2. White Blood cells
 3. Platelets
 4. Transportation
 5. Regulation
 6. Protection
5. Cardiorespiratory Fitness
 1. Warm-Up
 1. General warm-ups
 2. Specific warm-ups
 2. Conditioning Phase
 3. Cool-Down
 1. Cardiorespiratory Exercise
 2. Self-Myofascial Release
 3. Static Stretching
6. Specificity
 1. Specific Adaptations to Imposed Demands (S. A. I. D. Principle)
7. Circuit Training
8. Postural Considerations
 1. Forward Head
 2. Upper Crossed Syndrome
 3. Lower Crossed Syndrome
 4. Pronation Distortion Syndrome
9. Programming considerations for cardiorespiratory training
 1. FITT principles for cardiorespiratory training
 2. Progression, overload and specificity principles of cardiorespiratory training

STANDARD 9

STUDENTS WILL APPLY PRINCIPLES OF FLEXIBILITY, ACUTE AND CHRONIC VARIABLES, MODALITIES OF FLEXIBILITY, PATTERN OVERLOAD, AND ALIGNMENT.

Objective 1

Examine the importance of flexibility in fitness/athletic performance.

1. Explain the general guidelines of flexibility
 1. Define ROM and how it relates to fitness/athletic performance
 2. Identify the benefits of flexibility
 3. Decrease the risk of injury
 4. Reduce muscle soreness
 5. Improve muscular balance and postural awareness
2. Demonstrate proper timing of flexibility techniques
 1. Before exercise
 2. After exercise
 3. During exercise
3. Identify the different methods to increase flexibility and the safety/effectiveness of each.
 1. Active Isolated Stretch



2. Ballistic stretching
3. Proprioceptive Neuromuscular Facilitation
4. Static Stretching
5. Self-myofascial release
4. Programming considerations for flexibility
 1. FITT principles for flexibility
 2. Progression, overload and specificity principles of flexibility

Standard 9 Performance Evaluation included below (Optional)

STANDARD 10

STUDENTS WILL EXPLORE AND APPLY THE SUBJECTIVE AND OBJECTIVE CLIENT ASSESSMENTS INCLUDING LIFESTYLE, PHYSIOLOGICAL, ANTHROPOMETRIC, SKILL, POSTURAL ALIGNMENT AND PERFORMANCE ASSESSMENTS.

Objective 1 Properly identify, explain and perform subjective and objective assessments on clients/patients to gain baseline information and data.

1. Subjective Information
 1. General and Medical History
 1. General Health History
 1. Physical
 2. Mental
 3. Emotional
 4. Sociocultural
 5. Spiritual
 2. Client intake form (health history)
 3. Review of chronic disease risk factors
 4. Medications
 1. Beta-Blockers
 2. Calcium Channel Blockers
 3. Nitrates
 4. Diuretics
 5. Bronchodilators
 6. Vasodilators
 7. Antidepressants
 2. Occupation Information
 1. Common repetitive movement patterns
 2. Typical energy expenditures
 3. Potential Health and Physical Limitations
 4. Extended sitting periods
 5. Kinetic Chain dysfunctions
 6. Mental Stress
 3. Lifestyle Information
 1. Recreational Activities
 2. Hobbies
 4. S.M.A.R.T. client goals
 1. Specific goals
 2. Measurable goals
 3. Attainable goals
 4. Realistic goals
 5. Time-sensitive goals
2. Objective Information



Sports Conditioning and Exercise Science

1. Performance Assessments
2. YMCA 3 Minute Step Test
3. Rockport Walk Test

Standard 10 Performance Evaluation included below (Optional)

STANDARD 11

STUDENTS WILL APPLY TRAINING AND EXERCISE PROGRAMMING PRINCIPLES INCLUDING PHASES, EXERCISE PROGRAMMING METHODS, AND SPECIAL POPULATION CONSIDERATIONS.

Objective 1 Assess, design, differentiate and apply various exercise programming methods and modalities for clients/patients based on assessments.

1. Periodization/ Training Principles/ Training Design Terminology
 1. Multilateral Development Versus Specialization
 2. Adaptation
 3. Load Progression
 4. Fatigue, Overreaching, Overtraining
 5. Injury Resistance
 6. Supercompensation
 7. General Adaptation Syndrome
 8. Annual Plan
 9. Microcycle, Mesocycle, Macrocycle
 10. Variables of Training
 11. Volume
 12. Intensity
 13. Frequency
 14. Complexity
2. Sequence of Training
 1. Step Loading
 2. Concentrated Loading
 3. Conjugated Sequence
 4. Training Phases- General, Specific, Competitive
3. Training Methods
 1. Strength and Power Development
 2. Endurance Training
 3. Speed and Agility
4. Exercise Intensity
 1. Target Heart Rate
 2. Heart Rate Reserve
 3. Karvonen Formula
 4. 1 Rep Maximum
5. General circuit training

Standard 11 Performance Evaluation included below (Optional)

STANDARD 12

STUDENTS WILL LEARN AND EXPLORE COMMON MUSCULAR AND SKELETAL INJURIES AND RECOVERY, SOFT TISSUE INJURIES, POSTURAL DISTORTIONS AND MOVEMENT INEFFICIENCIES, MUSCULAR IMBALANCES, AND CORRECTIVE EXERCISES AND STRETCHING.



Objective 1

Be able to assess and explain common soft tissue injuries, imbalances and how they relate to proper static and dynamic posture.

1. Discuss proper length-tension relationships of muscles
 1. Opposing muscle length-tension relationships
 2. Muscle length for stabilization
 3. Synergistic dominance
 4. Reciprocal inhibition
2. Demonstrate postural assessments
 1. Dynamic posture
 1. Overhead squat
 2. Bend and lift
 3. Pushing-pulling assessments
 3. Static posture
 1. Five points of alignment
 1. Ear
 2. Shoulder
 3. Hip
 4. Knee
 5. Elbow
4. Strain vs sprain
5. Skeletal and muscular injuries - contraindications and considerations
 1. Scoliosis
 2. Tendinitis
 3. Arthritis
 4. Osteoporosis
 5. ACL, PCL, LCL and MCL injuries
 6. Spinal injuries
 1. Lower back pain and dysfunction
 7. Plantar fasciitis
 8. Shin splints
6. Acute vs chronic injuries

STANDARD 13

STUDENTS WILL LEARN THE CONSIDERATIONS FOR WORKING WITH DISEASES AND ILLNESSES SUCH AS METABOLIC DISEASES, CONTROLLABLE AND NON-CONTROLLABLE RISK FACTORS.

Objective 1

Recognize and discuss treatment for environmental conditions.

1. Compare and contrast the causes, signs, symptoms, and treatment of heat illnesses.
 1. Acclimatization
 2. Heat cramps
 3. Heat exhaustion
 4. Heat stroke
2. Compare and contrast the causes, signs, symptoms, and treatment of cold exposure.
 1. Acclimatization
 2. Hypothermia
 3. Frostbite
3. Discuss training in higher elevation
 1. Acclimatization
 2. Elevation sickness
4. Genetic diseases
 1. Diabetes



2. Gender specific diseases
3. Cardiovascular disease
5. Stress
 1. Disorders and relief
6. Substance abuse
 1. Alcohol
 2. Tobacco
 3. Performance enhancing substances
 4. Caffeine
 5. Narcotics

STANDARD 14

STUDENTS WILL LEARN BUSINESS FUNDAMENTALS, SPECIFIC FITNESS MARKETING STRATEGIES, CLIENT/PATIENT RAPPORT AND RETENTION, BUSINESS RELATIONSHIPS, RESUME AND INTERVIEWING SKILLS AND MANAGEMENT TRAINING.

- Objective 1** Research and contrast aspects of fitness and health marketing, business ethics, legalities and the functions of the client/patient-health professional relationships.
1. Rapport
 1. Client-trainer or patient-health professional relationships
 2. HIPPA
 3. Motivational interviewing
 2. Professionalism
 1. Scope of practice
 2. Code of ethics
 3. Appearance
 4. Body language
 5. Vocalics
 3. Teaching styles
 1. Tell, show, do (audio, visual, kinesthetic)
 4. Client/patient retention
 1. Sales
 2. Marketing
 3. Finance
 4. Marketability
 5. Experience
 6. Knowledge
 7. Employers
 8. Resumes
 9. Interview Skills
 5. Entrepreneurship
 1. Types of businesses
 1. LLC, corporation, contractor, etc.
 6. Job interview skills
 1. Proper dress
 2. Legalities of what can be legally asked during job interviews
 3. Body language during a job interview
 7. Resume skills



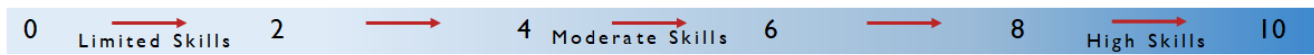
Sports Conditioning and Exercise Science Performance Standards (Optional)

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of **8 or higher** on the rating scale. Students may be encouraged to repeat the objectives until they average **8 or higher**.

Students Name _____

Class _____

PERFORMANCE RATING SCALE



STANDARD 2 – Muscular and Skeletal Anatomy

Score:

- Describe joint movements and planes of motion
 - The student will explain/describe the joint movements and planes of motions for various movement patterns given by the assessor

STANDARD 4 – Intro to Human Kinesiology and Biomechanics

Score:

- The student will identify the contraction type (eccentric, isometric or concentric) of various exercise movements
 - The student can identify either concentric, isometric or eccentric muscular contraction during selected exercises

STANDARD 9 – Flexibility

Score:

- Instruct/explain proper, safe flexibility procedures for the following muscles/muscle groups
 - Static: calves, pectorals, deltoids, quadriceps, hamstring, neck
 - Active isolated stretch: hamstrings, pectorals

STANDARD 10 – Subjective and Objective Assessments

Score:

- Assess resting heart rate
 - The student can fully explain the rationale for assessing pulse
 - The student will properly assess resting heart rate for a full minute on the radial pulse site
- Demonstrate proper blood pressure measurement
 - The student will demonstrate the safe and effective procedure for assessing blood pressure using a stethoscope and sphygmomanometer
 - The student fully explains the purpose and procedure for assessing blood pressure
 - The student utilizes equipment properly during the blood pressure assessment
 - The student inflates the cuff to the appropriate mmHg and slowly deflates (2 to 3 mmHG/second)
 - The student records the proper systolic and diastolic blood pressure and explains to the client the result and category of the result



STANDARD II – Exercise Programming

Score:

- Demonstrate proper exercise instruction using the “tell, show, do” method
 - The student can explain and instruct the proper way to perform an exercise using the tell (explain), show (visually show the movement) and do (client performs the exercise movement(s) while the trainer gives constructive feedback)

PERFORMANCE STANDARD AVERAGE SCORE:

Evaluator Name _____

Evaluator Title _____

Evaluator Signature _____

Date _____