Syllabus

HPE 260 Kinetics of Exercise and Sport

General Information

Date

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Author

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Department

Physical Education and Integrated Health Care

Course Prefix

HPE

Course Number

260

Course Title

Kinetics of Exercise and Sport

Course Information

Credit Hours

3

Lecture Contact Hours

3

Lab Contact Hours

0

Other Contact Hours

0

Catalog Description

This course is a requirement for all students enrolled in the AS Kinesiology and Human Performance, and AS Physical Education and Exercise Science programs. In addition, this course is appropriate for students intending to transfer to pursue a degree in sports medicine (e.g. athletic training, exercise science, and physical/occupational therapy). Students will be introduced to simple patterns of movement and progress to the analysis of complex motor skills that comprise the biomechanical and kinesiological basis of movement in exercise and sport. Topics include the musculoskeletal and neurological components of human anatomy; isolated and combined joint actions; and basic physics principles related to movement.

Key Assessment

This course does not contain a Key Assessment for any programs

Prerequisites

BIO 110 or BIO 171 with a C or better

Co-requisites

None

Grading Scheme

Letter

First Year Experience/Capstone Designation

This course DOES NOT satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

None

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Vitality
Inquiry
Perseverance
Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Classify anatomical and physiological components of human movement patterns.
2. Interpret the biomechanical factors that influence both basic and sport/exercise-specific movement patterns.
3. Perform qualitative and quantitative analyses on both basic and sport/exercise-specific movement patterns.
4. Consider patterns of movement to increase the skill level and decrease the risk of physical injury associated with sport/exercise-specific activities.

Outline of Topics Covered

1.

Biomechanics and problem solving

1. Areas of biomechanical study
2. Quantitative vs. qualitative analysis
3. Problem solving technique

2. Concepts for analyzing human motion
    1. Forms of motion
        1. Linear
        2. Angular
        3. General
    2. Standard reference terminology
        1. Anatomical position/reference planes
        2. Directional terms/joint movement terminology
    3. Mechanical loads on the human body
    4. Vector algebra
3. Biomechanics of bone
    1. Composition of bone
    2. Bone growth and development
    3. Bone response to stress
        1. Modeling and remodeling
        2. Wolff's Law
    4. Common bony injuries
4. Biomechanics of skeletal articulations
    1. Structural classification of joints
    2.

Functional classification of joints

3. Stabilizing structures
4. Flexibility
    1. Measuring range of motion
    2. Techniques for improving flexibility
5. Common joint injuries

5. Biomechanics of skeletal muscle
    1. Properties of the musculotendinous unit
    2. Structural organization of skeletal muscle
    3. Functions of skeletal muscle
    4. Factors affecting muscular force generation
        1. Force-velocity relationship
        2. Length-tension relationship
    5. Muscular strength, endurance, and power
    6. Common skeletal muscle injuries
6. Biomechanics/skeletal muscles of the upper extremity
    1. Structure of the shoulder/shoulder articulations
    2. Movements of the shoulder complex
    3. Common injuries of the shoulder
    4. Structure of the elbow/elbow articulations
    5. Movements of the elbow complex
    6. Common injuries to the elbow
    7. Structure of the wrist/hand
    8.

Movements of the wrist/hand

9. Common injuries of the wrist/hand

7. Biomechanics/skeletal muscles of the lower extremity
    1. Structure of the hip
    2. Movements of the hip
    3. Common injuries of the hip
    4. Structure of the knee
    5. Movements of the knee
    6. Common injuries of the knee
    7. Structure of the foot/ankle
    8. Movements of the foot/ankle
    9. Common injuries to the foot/ankle
8. Biomechanics/skeletal muscles of the spine
    1. Regions of the vertebral column
    2. Movements of the spine
        1. Single-side muscle contractions
        2. Bilateral muscle contractions
    3. Common injuries to the spine
9. Linear kinematics
    1. Distance/displacement
    2. Speed/velocity
    3. Acceleration
    4. Projectile motion/trajectory
10.

Angular kinematics

1. Angular distance/displacement
2. Angular speed/velocity
3. Angular acceleration
4. Relationship between linear and angular motion

11. Linear kinetics
    1. Newton’s laws of motion
    2. Friction/momentum/impulse
    3. Types of impacts
    4. Work/power/energy
12. Equilibrium and human movement
    1. Torque
    2. Levers/anatomical levers
    3. Static/dynamic equilibrium
    4. Center of gravity
    5. Stability/balance
13. Angular kinetics
    1. Moment of inertia
    2. Angular momentum
    3. Angular analogies of Newton’s laws of motion
    4. Centripetal force
14. Movement in a fluid medium
    1. Types of flow
    2.

Buoyancy

3. Types of drag

4. Lift force

5. Propulsion in a fluid medium