Kinesiology & Biomechanics #490048

Kinesiology & Biomechanics is a one-credit course that provides an overview of the field of kinesiology and biomechanics, as well as exposes students to fundamental skills involved in a sports medicine healthcare setting. Students will learn about the musculoskeletal anatomy of the human body, as well as the mechanical properties and structural behavior of the different body tissues. This course will introduce students to concepts of mechanics as they apply to human movement, particularly those pertaining to exercise, sport, and physical activity. Topics covered in this class will include structural and functional relationships in musculoskeletal tissues, application of stress and strain analysis to biological tissues, analysis of forces in human movement and function, and introduction to viscoelasticity of tissues.

Career and technical student organizations are integral, co-curricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

1. Explain the concepts of kinesiology, biomechanics, and trace their origin.
    - Define kinesiology, biomechanics, and kinematics.
    - Examine the rationale for the study of kinesiology and the application of biomechanics.
    - Evaluate types of biomechanics (e.g. sports, clinical).
    - Discuss related career options (e.g. physical therapist, respiratory therapist, biomechanist, medical doctor, etc).

2. Apply mechanical principles to the study of biological systems.
    - Analyze Newton's laws of motion and relate them to exercise science.
    - Explain the effects of significant forces encountered in biomechanical analysis and the basic terminology involved in the kinetics of angular motion (e.g. force, angular momentum, moment of inertia, torque).

3. Investigate the musculoskeletal anatomy of the human body and describe its relationship with various body movements.
    - Examine the various joints in the human body (e.g. ankle, knee, hip, shoulder, spine).
    - Differentiate between the common body movements (e.g. flexion, extension, abduction, adduction).
    - Examine the musculoskeletal levers in the body.
    - Identify the role of muscles in the body and the various muscle contractions (e.g. prime movers, antagonists; isometrics, isotonics).

4. Analyze the mechanics of movement in the human body.
    - Investigate the forces on a skeletal joint for various static and dynamic human activities.
    - Evaluate an individual’s technique during various movements.

5. Analyze body mechanics and its relationship with the nervous system.
    - Describe various types of nerves and their functions (cranial, peripheral, spinal).
    - Investigate the relationship between nerve impulses and muscle contraction (e.g. innervation, neuromuscular junction, etc).
    - Identify factors associated with nerve impairment and the impact o of nerve impairment on muscle contraction.

6. Apply concepts of kinesiology to the design of physical conditioning exercises.
    - Calculate energy expenditure and power required to perform an activity.
    - Differentiate open-chain versus closed-chain body movements and exercises.

7. Investigate current concepts and trends in adapted physical education.
    - Assess the physical abilities of an individual requiring adapted physical education.
    - Create modified activities to meet individual needs.
    - Demonstrate a positive attitude and a knowledge of sport opportunities available to students with disabilities.

8. Analyze the safety strategies related to kinesiology and biomechanics.
    - Demonstrate proper use of personal protective equipment (e.g. handle biological and chemical hazards properly).
    - Utilize appropriate safety procedures in the classroom, sports medicine clinic, and lab.
    - Describe exercise/sport-specific injury prevention.
    - Explain appropriate injury documentation protocol.

9. Investigate the evolution of safety technology and critique its progress.
    - Compare various types of protective equipment and describe their use and benefits (e.g. orthotics, helmets).
    - Discuss the safety standards and legal concerns of protective equipment (e.g. ergonomic chairs, helmets).
    - Understand safety policies implemented throughout sporting events which aim to protect participants from high risk exposure.
    - Examine biomedical research which continues to improve the quality and durability of sports equipment.