

CUMBERLAND COUNTY COLLEGE

Course: HS 245 Exercise Science II

Credits: 3

Prerequisites

HS 145 or permission of instructor

Course Description

In this course the student will learn the basic principles of exercise science. The following areas will be examined: human adaptations to strength and cardiovascular training, muscular development, skeletal and neural components of force production, as well as the acute variables of resistance and cardiovascular training program design.

Learning Outcomes

At the completion of this course, students will be able to:

- Define terminology of exercise, movements, directions and units of measure.
- Describe the structure, role and function of the musculoskeletal system.
- Describe the structure, role and function of the cardiovascular system.
- Identify the factors contributing to human strength, power and endurance.
- Identify short and long term responses to resistance training.
- Identify short and long terms responses to cardiovascular training.
- Compare and contrast nutritional practices that enhance responses to resistance and cardiovascular training.
- Design a resistance training program for a healthy adult.
- Design a cardiovascular training program for a healthy adult.
- Recognize contra-indications to exercise.
- Examine legal and ethical issues within the field of exercise science.
- Locate, retrieve and critically evaluate information and information resources pertaining to the field of exercise science.

Topical Outline

- Industry Introduction
 - Terms of anatomy and physiology
 - Directional Terminology
 - Units of measure
- Musculoskeletal system
 - Skeletal, cardiac and smooth muscle
 - Agonist, antagonist and stabilization muscle functions
 - Anatomy and physiology of muscle contraction
 - Organization of nervous system
 - Anatomy of a nerve cell
 - Conduction of nerve impulse
 - Related connective tissue
- Resistance Training Adaptations
 - Acute adaptations to resistance training

- Chronic adaptations to resistance training
- Neurological changes
- Muscular changes
- Endocrine changes
- Skeletal changes
- Metabolic changes
- Cardiovascular changes
- Body composition changes
- Factors affecting specific adaptation
- Overtraining
- Resistance Training Program Design
 - Principles of training
 - Program design variables
 - Consultation and evaluation
 - Identification of training goals
 - Selection of acute variables
 - Strength testing
 - Resistance training variations
 - Exercise progression
- Cardiovascular system
 - Cardiovascular anatomy and physiology
 - Control of circulation
 - Oxygen and carbon dioxide exchange
 - Oxygen uptake
 - Respiratory anatomy and physiology
 - Control of respiration
- Aerobic Endurance Training Program Design
 - Specificity of aerobic endurance training
 - Components of an aerobic training program
 - Calculations of intensity using heart rate and mets
 - Progression
 - Types of aerobic training programs
 - Combination training
- Plyometric and Speed Training
 - Mechanics and physiology of speed training
 - Timing of plyometric techniques
 - Injury prevention
 - Contraindications
 - Needs analysis
 - Determination of specific variables
 - Consideration for program inclusion
 - Overview of plyometric techniques
- Nutritional Considerations
 - Role of the exercise professional
 - Food pyramid and intake data
 - Diet analysis
 - Overview of major nutrients
 - Calorie levels for weight loss and gain

- Fluid levels for exercise
- Evaluating supplements
- Orthopedic, Injury, and Rehab Concerns
 - Phases of tissue healing
 - Injury classification
 - Low back considerations
 - Shoulder and arm issues
 - Hip, leg and knee injury guidelines
 - Arthritis
- Athletes
 - Factors in program design
 - Linear and non-linear periodization
 - Training cycles and phases
 - Specific exercise selection
 - Sample programs for athletes
- Facility / Equipment Layout & Maintenance
 - Equipment layout
 - Organization and placement
 - Spacing
 - Considerations for home settings
 - Equipment maintenance

Required Texts and Other Materials

Powers, S. and Howley, E., *Exercise Physiology: Theory and Application to Fitness and Performance*, McGraw-Hill.

Student Assessment

Assessment may be accomplished through projects, portfolios, exams, presentations and/or papers.

Academic Integrity

Plagiarism is cheating. Plagiarism is presenting in written work, in public speaking, and in oral reports the ideas or exact words of someone else without proper documentation. Whether the act of plagiarism is deliberate or accidental [ignorance of the proper rules for handling material is no excuse], plagiarism is, indeed, a “criminal” offense. As such, a plagiarized paper or report automatically receives a grade of **ZERO** and the student may receive a grade of **F** for the semester at the discretion of the instructor.

Available Resources

If you are having difficulty with work in this class, tutoring is available through the Success Center. If you think that you might have a learning disability, contact Project Assist at 856.691.8600, x1282 for information on assistance that can be provided to eligible students.

(List availability of open labs and/or writing center)

Before Withdrawing From This Course

If a student experiences adverse circumstances while enrolled in this course and considers withdrawing, s/he should see an advisor (division or advisement center) BEFORE withdrawing

from the class. A withdrawal may cause harmful repercussions to completion rate standards and overall GPA which can limit or eliminate future financial aid in addition to causing academic suspension.