

# KINS 8A: THEORY & CONCEPTS OF EXERCISE PHYSIOLOGY I

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	5
Hours:	5 lecture per week (60 total per quarter)
Advisory:	Maximum UC credit awarded for any or all of the following courses combined is 12 units: KINS 2, 3, 8A, 8B; not open to students with credit in PHED 8.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU/UC
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

## Student Learning Outcomes

- A successful student will be able to explain the theories of exercise physiology as they relate to the body and its ability to perform exercise.
- A successful student will be able to acquire and interpret the basic anatomy and exercise physiology terminology.

## Description

Basic concepts and principles of exercise physiology and how the human body responds to the demands of physical activity. Emphasis on anatomy and physiology of human organ systems; cardiorespiratory function; neural and hormonal control; energy systems, expenditure, and fatigue; adaptations to resistance, aerobic, and anaerobic training; body composition and nutrition; and principles of training for sport.

## Course Objectives

The student will be able to:

- Identify the basic anatomy and exercise physiology terminology.
- Describe the theories of exercise physiology as they relate to the body and its ability to perform exercise.
- Explain the structure and function of exercising muscle.
- Describe the three energy systems.
- Explore current concepts of bioenergetics, muscle metabolism and causes of fatigue.
- Understand the neural and hormonal systems and their responses to exercise.
- Understand the cardiorespiratory systems and their responses to exercise.
- Apply the basic concepts of exercise physiology to training programs.

- Explain the adaptations to resistance, aerobic, and anaerobic training.
- Analyze body composition and nutrition for sport.

## Course Content

- Structure and function of exercising muscle
  - Anatomy of skeletal muscle
  - Muscle fiber contraction
  - Muscle fiber types
  - Skeletal muscle and exercise
- Fuel for exercise: bioenergetics and muscle metabolism
  - Energy substrates
  - Controlling the rate of energy production
  - Storing energy: high-energy phosphates
  - The basic energy systems
    - The ATP-PCr system
    - The glycolytic system
    - The oxidative system
  - Interaction of the energy systems
  - The oxidative capacity of muscle
- Neural control of exercising muscle
  - Structure and function of the nervous system
  - Central nervous system
  - Peripheral nervous system
  - Sensory-motor integration
- Hormonal control during exercise
  - The endocrine system
  - Endocrine glands and their hormones
  - Hormonal regulation of metabolism during exercise
  - Hormonal regulation of fluid and electrolytes during exercise
  - Hormonal regulation of caloric intake
- Energy expenditure and fatigue
  - Measuring energy expenditure
  - Energy expenditure at rest and during exercise
  - Fatigue and its causes
  - Muscle soreness and muscle cramps
- The cardiovascular system and its control
  - Heart
  - Vascular system
  - Blood
- The respiratory system and its regulation
  - Pulmonary ventilation
  - Pulmonary volumes
  - Pulmonary diffusion
  - Transport of oxygen and carbon dioxide in the blood
  - Gas exchange at the muscles
  - Regulation of pulmonary ventilation
- Cardiorespiratory responses to acute exercise
  - Cardiovascular responses to acute exercise
  - Respiratory responses to acute exercise
- Principles of exercise training
  - Terminology
  - General principles of training
  - Resistance training programs
  - Anaerobic and aerobic power training programs

- j. Adaptations to resistance training
  - i. Resistance training and gains in muscular fitness
  - ii. Mechanisms of gains in muscle strength
  - iii. Interaction between resistance training and diet
  - iv. Resistance training for special populations
- k. Adaptations to aerobic and anaerobic training
  - i. Adaptations to aerobic training
  - ii. Adaptations to anaerobic training
  - iii. Adaptations to high-intensity interval training
  - iv. Specificity of training and cross-training
- l. Body composition and nutrition for sport
  - i. Assessing body composition
  - ii. Body composition, weight, and sport performance
  - iii. Classification of nutrients
  - iv. Water and electrolyte balance
  - v. The athlete's diet
- m. Training for sport
  - i. Optimizing training
  - ii. Periodization of training
  - iii. Overtraining
  - iv. Tapering for peak performance
  - v. Detraining

## Lab Content

Not applicable.

## Special Facilities and/or Equipment

When taught as an online distance learning or hybrid section, students and faculty need ongoing and continuous internet and email access.

## Method(s) of Evaluation

Exams and quizzes: multiple choice, matching and essay questions to assess student learning outcomes

Analysis of selected case studies using various training scenarios

Research paper on current exercise physiology issue from a scientific, peer reviewed journal

Weekly homework assignments to emphasize course topics

Participation in classroom discussions

## Method(s) of Instruction

Lecture presentations and classroom discussion using the language of exercise physiology

Reading of textbook, use of multi-media, and related material to promote discussion and synthesis of objectives

Presentation of research projects followed by in-class discussion and evaluation

Problem solving exercises and discussion emphasizing objective analysis and critical thinking

## Representative Text(s) and Other Materials

Wilmore, Jack H., and David I. Costill. Physiology of Sport and Exercise, 7th ed. 2020.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- a. Weekly reading assignments from text, online curriculum, and outside sources
- b. Homework assignments including terminology and responses to discussion questions
- c. Responses to essay questions on mid-term and final exam
- d. Research paper on topic from scientific peer reviewed journal
- e. Weekly discussion posts on topics relevant to course material

## Discipline(s)

Kinesiology