KIN A282: INTRODUCTION TO EXERCISE PHYSIOLOGY

Item	Value
Curriculum Committee Approval Date	11/04/2020
Top Code	083520 - Fitness Trainer
Units	3 Total Units
Hours	72 Total Hours (Lecture Hours 45; Lab Hours 27)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Associate Arts Local General Education (GE)	• OC Physical/Biological Sci - AA (OB) • OC Life Skills - Theory - AA (OE1)
Associate Science Local General Education (GE)	• OCC Physical/Biological Sci-AS (OSB)

Course Description

An introduction to the study of human physiological processes during exercise and activity. Includes study of metabolic changes to major body systems during acute exercise, the physiological adaptations due to chronic exercise and the effect of training upon performance. Students will practice fitness testing and apply practical knowledge in a lab setting. Enrollment Limitation: KIN A282H; students who complete KIN A282 may not enroll in or receive credit for KIN A282H. ADVISORY: BIOL A221. Transfer Credit: CSU; UC: Credit Limitation: Any or all of these HLED, KIN, PE Theory courses combined: maximum credit, 8 units.

Course Level Student Learning Outcome(s)

1. Explain the normal physiological changes that occur during an acute bout of exercise and how they affect sports performance and human health.
2. Explain the normal physiological adaptations that result from chronic exercise and how these adaptations affect sports performance and human health.
3. Analyze exercise training programs as they related to the changes in human physiology to optimize training effects.

Course Objectives

- 1. Explain the importance of exercise physiology as it relates to elite performance, exercise, and activity.
- 2. Describe the structure of muscle and explain how it functions.
- 3. Explain the acute and chronic effects of exercise on muscle.
- 4. Compare different types of exercise and activities as they relate to energy expenditure and fatigue.
- 5. Explain the structure and function of the central and peripheral nervous systems and why the nervous system is important to activity.
- 6. Contrast the differences in how the central and peripheral nervous systems are affected by acute versus chronic exercise.
- 7. Differential between aerobic and anaerobic exercise by describing their physiological basis.
- 8. Identify the major organs of the cardiovascular and respiratory systems and explain basic cardiorespiratory physiology.
- 9. Describe how the cardiovascular system is affected by acute exercise.
- 10. Describe how the respiratory system is affected by acute exercise.
- 11. Identify and describe how the cardiovascular and respiratory systems adapt to chronic aerobic exercise.
- 12. Identify how environmental conditions can be accommodated to provide optimal exercise training.
- 13. Identify conditions that threaten optimal training programs and explain their underlying physiological principles.
- 14. Practice testing and evaluation of exercise programs as they relate to exercise physiology and special populations.
- 15. Demonstrate the mechanisms of cardiovascular and strength fitness testing.
- 16. Identify risk factors for those who participate in physical activity.
- 17. Demonstrate appropriate techniques for participant screening and health appraisal for physical activity.

Lecture Content

Introduction Focus of Exercise and Sport Physiology Historical Events Acute and Chronic Responses to Exercise Structure and Function of Exercising Muscle Functional Anatomy of Skeletal Muscle Skeletal Muscle and Exercise Muscle Metabolism and Hormonal Control Metabolism and Bioenergetics Hormonal Control Neural Control of Exercising Muscle Overview of the Nervous System Structure and Function of the Nervous System Central Nervous System Peripheral Nervous System Sensory-Motor Integration Motor Response Energy Expenditure and Fatigue Measuring Energy Expenditure Energy Expenditure at Rest and During Exercise Fatigue and Its Causes The Cardiovascular System He art Vascular System Blood The Respiratory System 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 Adaptations to Resistance Training Resistance Training and Gains in Muscular Fitness Mechanisms of Gains in Muscle Strength Muscle Soreness Resistance Training for Special Populations Adaptations to Aerobic and Anaerobic Training Adaptations to Aerobic Training > Adaptations to Anaerobic Training Specificity of Training and Cross-Training Environmental Factors Exercise in Hot and Cold Environments: Thermoregulation Body Temperature Regulation Physiological Responses to Exercise in the Heat Health Risks During Exercise in the Heat Acclimation to Exercise in the Heat Physiological Responses to Exercise in the Cold Health Risks During Exercise in the Cold Adaptation to Exercise in the Cold Hypobaric Environments: Conditions at Altitude Physiological Responses to Acute Altitude Exposure Exercise and Sport Performance at Altitude Health

Risks of Acute Exposure to Altitude Altitude Acclimatization: Optimizing Training and Performance > XIII. Optimizing Training for Sport Excessive Training Overreaching Overtraining Tapering for Peak Performance Detraining Special Populations in Sport and Exercise Children and Adolescents Aging in Sport and Exercise Sex Differences in Sport and Exercise

Lab Content

Lab: 1. Health Risk and PARQ screening assessment 2. Health and Fitness Assessment A. Behavioral assessment and Goal Seeting (S.M.A.R.T.) B. Exercise Testing Selection C. Pre-exercise Testing (Biometrics) 1. Body Mass Index (BMI)- Hgt/Wgt and Girth Measurements 2. Calculating Target Heart Rates 3. Heart rate/ Blood pressure Testing 4. Body Composition: Skinfolds D. Exercise Testing Assessments 1. Cardiorespiratory fitness: VO2 testing 2. Muscular Strength and Endurance tests 3. Flexibility tests E. Formulas as they relate to Exercise testing F. Spirometery G. Functional Movement Assessment

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

Lecture, lab, discussion, demonstration, field-based experiments, media, youtube, video, live chats, computer demonstration, Internet exploration and problem solving.

Reading Assignments

Students will spend approximately 4 hours a week completing reading assignments. Student will read peer reveiwed, scientific research articles and professional journals related to concepts in exercise physiology.

Writing Assignments

Students will spend approximately 1-2 hours per week completing writing assignments. Exercise physiology reports may include written descriptions of graphs, analytical questions of concepts and procedures, evaluation of physiological responses in relationship to activities, and mathematical calculations. Optional assignments in lecture will include written summaries of scientific articles

Out-of-class Assignments

Students will spend approximately 1-2 hours a week completing out-of-class assignments. Exercise physiology reports, discussions, including written descriptions or graphs, analytical questions of concepts and procedures, evaluation of physiological responses in relationship to activities, and mathematical calculations.

Demonstration of Critical Thinking

Objective written exams, class projects, written reports, problem solving exercises, Internet assignments, lab work

Required Writing, Problem Solving, Skills Demonstration

Objective written exams, class projects, written reports, problem solving exercises, Internet assignments, lab work

Eligible Disciplines

Kinesiology: Masters degree in kinesiology, physical education, exercise science, education with an emphasis in physical education, kinesiology, physiology of exercise, or adaptive physical education OR Bachelors degree in any of the above AND Masters degree in any life science, dance physiology, health education, recreation administration or physical therapy OR the equivalent. Physical education: Masters degree in physical education, exercise science, education with an emphasis in physical education, kinesiology, physiology of exercise, or adaptive physical education, OR bachelors degree in any of the above AND masters degree in any life science, dance, physiology, health education, recreation administration, or physical therapy OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Kenney, W. L., Wilmore, J., Costill, D. L., . Physiology of Sport and Exercise, 6th ed. , 2011 (or latest) ed. Champaign, IL: Human Kinetics, 2015 2. Required Powers, S and Howley, E. . Exercise PHysiology: Theory and Application to Fitness and Performance, 7th or higher ed. Mcgraw Hill, 2019