George Mason University
College of Education and Human Development
Kinesiology

KINE 410 (002) - Exercise Physiology II
3 Credits, Spring 2019
T, R 12:00-1:15PM, Bull Run Hall 249- SciTech Campus

Faculty

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Prerequisites/Corequisites

BIOL 124, BIOL 125, ATEP 300, KINE 310

University Catalog Course Description

Provides study in the advanced theory of exercise physiology. Knowledge related to the physiologic, neuroendocrine, and biochemical changes of the human body associated with both a single bout of exercise and chronic exercise training will be addressed.

Course Overview

The purpose of this course is to learn basic knowledge of the functions of the human body in relation to exercise/activity with special emphasis of the neuromuscular, cardiovascular, endocrine, nervous, respiratory, and human metabolism. The course will offer a brief description of important physiologic systems and will utilize control and regulatory mechanisms specific to each system to explain function.

Course Delivery Method

The course is a mix of a lecture and discussion course. However, other approaches may be used to facilitate learning. These include: videos, demonstrations and in-class activities. Overall, this will be a highly interactive class and students will be encouraged to participate.

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

1. Discuss the dynamics of the bioenergetics, cardiorespiratory, and neuromuscular systems
2. Describe advanced physiologic responses to acute and chronic physical activity
3. Identify adaptations to exercise, the purported mechanism of action, and any risk and/or benefits of exercise.

Professional Standards (Commission on Accreditation of Allied Health Education Programs (CAAHEP)**)**
Upon completion of this course, students will have met the following professional standards:

Knowledge-Skill-Ability (KSA)	Description	Lecture, Lab, or both
	GENERAL POPULATION/CORE:	

	EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE	
1.1.9	Ability to describe the systems for the production of energy.	Lecture
1.1.10	Knowledge of the role of aerobic and anaerobic energy systems in the performance of various physical activities.	Both
1.1.11	Knowledge of the following cardiorespiratory terms: ischemia, angina pectoris, tachycardia, bradycardia, arrhythmia, myocardial infarction, claudication, dyspnea and hyperventilation.	Lecture
1.1.12	Ability to describe normal cardiorespiratory responses to static and dynamic exercise in terms of heart rate, stroke volume, cardiac output, blood pressure, and oxygen consumption.	Both
1.1.13	Knowledge of the heart rate, stroke volume, cardiac output, blood pressure, and oxygen consumption responses to exercise.	Both
1.1.14	Knowledge of the anatomical and physiological adaptations associated with strength training.	Lecture
1.1.16	Knowledge of the common theories of muscle fatigue and delayed onset muscle soreness (DOMS).	Both
1.1.17	Knowledge of the physiological adaptations that occur at rest and during submaximal and maximal exercise following chronic aerobic and anaerobic exercise training.	Lecture
1.1.18	Knowledge of the differences in cardiorespiratory response to acute graded exercise between conditioned and unconditioned individuals.	Lecture
1.1.19	Knowledge of the structure and function of the skeletal muscle fiber.	Lecture
1.1.20	Knowledge of the characteristics of fast and slow twitch muscle fibers.	Lecture
1.1.21	Knowledge of the sliding filament theory of muscle contraction.	Lecture
1.1.22	Knowledge of twitch, summation, and tetanus with respect to muscle contraction.	Lecture
1.1.26	Knowledge of the response of the following variables to acute static and dynamic exercise: heart rate, stroke volume, cardiac output, pulmonary ventilation, tidal volume, respiratory rate, and arteriovenous oxygen difference.	Lecture
1.1.27	Knowledge of blood pressure responses associated with acute exercise, including changes in body position.	Lecture
1.1.29	Knowledge of and ability to describe the physiological adaptations of the pulmonary system that occur at rest and during submaximal and maximal exercise following chronic aerobic and anaerobic training.	Lecture
1.1.30	Knowledge of how each of the following differs from the normal condition: dyspnea, hypoxia, and hyperventilation.	Lecture
	GENERAL POPULATION/CORE EXERCISE PRESCRIPTION AND PROGRAMMING	
1.7.16	Knowledge of special precautions and modifications of exercise programming for participation at altitude, different ambient temperatures, humidity, and environmental pollution.	Lecture
	GENERAL POPULATION/CORE: NUTRITION AND WEIGHT MANAGEMENT	
1.8.1	Knowledge of the role of carbohydrates, fats, and proteins as fuels for aerobic and anaerobic metabolism.	Lecture
1.8.14	Knowledge of common nutritional ergogenic aids, the purported mechanism of action, and any risk and/or benefits (e.g., carbohydrates, protein/amino acids,	Lecture

	vitamins, minerals, herbal products, creatine, steroids, caffeine).	
	GENERAL POPULATION/CORE: SAFETY, INJURY PREVENTION, AND EMERGENCY PROCEDURES	
1.10.6	Knowledge of the effects of temperature, humidity, altitude, and pollution on the physiological response to exercise and the ability to modify the exercise prescription to accommodate for these environmental conditions.	Lecture

Required Texts

McArdle, W.D., Katch, F.I, and Katch, V.L. (2014). *Exercise Physiology: Nutrition, Energy, and Human Performance, 8th* edition. Lippincott, Williams & Wilkins.

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Tk20, hard copy).

Assignments and/or Examinations

Midterm Examination One – 20%
Midterm Examination Two – 20%
Comprehensive Final Examination – 25%
Quizzes (unannounced, usually biweekly) – 20%
Lab Assignments & After Class Questions – 15%

After Class Questions (5%) – after several class sessions throughout the semester, before dismissal, you will be required to anonymously write down a question related to a topic that you are having difficulty with. If you comprehend all class information at the time, you can report that. We will start the next class by answering the student questions as a class. You must be present in class to participate and receive credit.

Grading

A = 94 – 100	B+ = 87 – 89	C+ = 77 – 79	D = 60 – 69
A- = 90 – 93	B = 84 – 86	C = 74 – 76	F = 0 – 59
	B- = 80 – 83	C- = 70 – 73	

Professional Dispositions

See https://cehd.gmu.edu/students/polices-procedures/

Students are to exhibit professional behaviors and dispositions at all times.
Students are held to the standards of the George Mason University Honor Code. You are expected to attend all class sections, actively participate in class discussions, complete in-class exercises and fulfill all assignments. Assignments must be turned in at the beginning of class on the specified date due or **no credit will be given**.

Tentative Class Schedule

Week	Topic	Reading/Assignment Due
1	Nutrition	Chapters 1 & 2
2	ATP, Carbohydrate Metabolism, Fat and Protein Metabolism, Energy system/Lactate Lab	Chapters 4, 6 & 7
3	Energy Systems and Adaptations to Activity Energy system/Lactate Lab	Chapters 5, 6, 7 & 21
4	Energy Transfer and Energy Expenditure	*Energy system/Lactate Lab due* Chapters 7, 8, & 9
5	Review, **Exam 1**	
6	The Cardiovascular System, Functional Capacity of the Cardiovascular System,	Chapter 15, 16 & 17
7	Functional Capacity of the Cardiovascular System, Cardiovascular Regulation, Integration, & Adaptations Cardiovascular Assessment and Lab	Chapters 17 & 32
8	EKG interpretation, ECG Lab	*Cardiovascular Lab due* Chapter 32
9	Kidneys and BP Regulation	*ECG Lab due* Chapters 12, 13 & 14
10	Review, **Exam 2**	
11	Nervous System	Chapter 19
12	Neuromuscular Control of Movement	Chapters 18, 19 & 22
13	Skeletal Muscle, Muscle Contraction	Chapters 18 & 22
14	Muscle Fiber Types and Muscle Adaptations, Muscle Fatigue Lab	Chapters 22 & 23
15	Muscle Adaptations, Soreness and Fatigue	*Muscle Fatigue lab due* Chapter 20
	Final Exam	

FINAL EXAM – See online for final exam schedule and policy.

Note: The instructor reserves the right to make changes to the course syllabus and/or schedule at any time. Students will always be informed of any changes made.

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: http://cehd.gmu.edu/values/.

GMU Policies and Resources for Students
Policies

- Students must adhere to the guidelines of the University Honor Code (see http://oai.gmu.edu/the-mason-honor-code/).
- Students must follow the university policy for Responsible Use of Computing (see http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/).

- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.

- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see http://ods.gmu.edu/).

- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or https://cehd.gmu.edu/aero/tk20. Questions or concerns regarding use of Blackboard should be directed to http://coursessupport.gmu.edu/.

- For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus

For additional information on the College of Education and Human Development, please visit our website https://cehd.gmu.edu/.

Academic Integrity

GMU is an Honor Code University; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? First, it means that when you are responsible for a task, you will be the one to perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives and traditions. When in doubt, please ask for guidance and clarification.

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