Medical Cardiovascular and Muscle Physiology

Course Syllabus

Course Number: GMS 6474
Credit Hours: 3 credit hours
Course Format: This online course is tailored for asynchronous distance learners.

COURSE DESCRIPTION
Medical Cardiovascular and Muscle Physiology (GMS6474) teaches the functions of muscle and the cardiovascular system of human body at a level required for clinical medicine and basic research in medical physiology. The course covers normal physiology, as well as selected diseases. Concepts are taught using a combination of lectures, functional genomics research assignments, and online problem sets. The research assignments are designed to help the student understand the integration of cardiovascular physiology with genetics, genomics, molecular biology, and cellular physiology as a basis for a better understanding of human disease. The ultimate goal is for students to develop an understanding of the integrated functions of the normal body and “problem solving” and “critical thinking” skills in evaluating clinical situations. Each recorded lecture lasts between 20 and 30 min.

TARGET AUDIENCE
This course is designed to meet the needs of individuals wanting to pursue a career in medicine, biomedical research, or in teaching topics related to physiology and medicine. For example, this course is designed to provide critical knowledge for individuals who wish to teach cardiovascular physiology at the secondary and post-secondary levels. However, this course will also provide a foundation for students who are wishing to attain or enhance knowledge of medical cardiovascular and muscle physiology.

PREREQUISITES
This course requires a BA or BS and a strong science foundation with at least 5 full semester courses related to Biology, chemistry and/or physics. A minimum undergraduate GPA = 2.0 is required for admission. Co-enrollment or prior passing grade in GMS 6440 required for enrollment in this class.

CONTACTS
Erin Bruce, Ph.D., Lecturer, Department of Physiology and Functional Genomics. Please use the email function within Canvas to contact Dr. Bruce.

SCHEDULE
This is a self-paced course that is offered in the fall, spring, and summer.

COURSE GOALS
Physiology is the science of how the body functions, and is the basis for understanding modern clinical medicine and the biomedical sciences. This course will provide: 1) a foundation understanding of the basic functions of the muscle and the human cardiovascular system; 2) integration of individual facts in order to understand how organ systems work independently and interdependently in the body. One example of this
integration is in the understanding of hypertension and heart failure. Other examples covered in this course are in the integrated responses to exercise as well as pathophysiologic responses to aging.

**LEARNING OUTCOMES**

Upon completion of this course, students will be able to:

1. Understand the normal functions of smooth, skeletal, and cardiac muscle at a level required for an understanding of clinical medicine.
2. Understand the normal function of the cardiovascular system at a level required for an understanding of clinical medicine.
3. Understand how these systems act in an integrated manner to regulate overall body functions.
4. Understand how failure of these normal physiologic functions and integrations are associated with some diseases.
5. Demonstrate the ability to apply physiological principles of clinical and basic science relevancy by multiple choice examinations, research assignments, and problem sets.

**LEARNING RESOURCES**

1. Recorded video lectures with PowerPoint presentations will be provided on the course website.
2. Recorded video clinical correlation(s) and/or case studies relating to the basic science material.
3. Lecture notes for each video lecture are available as PDF downloads enabled for direct note taking.

**COMMUNICATION WITH FACULTY**

If you have questions about the material or the course, please contact the course director (Dr. Erin Bruce) using the email function in Canvas.

**STRUCTURE OF CONTENT**

The course content is structured into sub-topical groups of lectures that are accompanied by Problem Sets. Problem Sets are designed to help the student master the course material. These problem sets completed as take-home assignments, but are graded. There are 3 Functional Genomics Research Assignments, which are designed to help the student integrate the concepts of physiology with functional genomics and human diseases of genetic origin. These Self-Guided Research Assignments are also completed as take-home assignments and are also graded.

**COURSE CALENDAR and RECOMMENDED TIME MANAGEMENT**

The videos and corresponding PDF notes are available throughout the entire time the course is open, from the first day through the end of the course on the day the grades are reported to the Registrar. However, the Exam is open ONLY during the window of time shown on the website. The course content lecture titles should be viewed in the order shown later in this syllabus.

**EXAMINATION AND GRADING**

There will be one multiple choice examination covering the material taught in the lectures. The exam will be monitored by ProctorU, a UF chosen service that allows the students to complete their exams at home while still ensuring academic integrity. Students will take the exam at a computer that meets the technical requirements of ProctorU, including a web cam and microphone. Students will make the arrangements for exam proctoring. The exam may be taken any time during the window of availability; however, it can only be taken once.
We recommend you make an appointment with ProctorU at least two weeks in advance of your preferred exam date. All costs of the exam are covered in the registration costs. Scores are reported as a percent. The points used to compute final grades will be determined after all assignments and the exam have been completed.

GRADING SCALE:

A numerical grade will be given at the end of the course and will be scored as follows, per University of Florida standards:

- 93-100% = A
- 90-92% = A-
- 87-89% = B+
- 83-86% = B
- 80-82% = B-
- 77-79% = C+
- 73-76% = C
- 70-72% = C-
- 67-69% = D+
- 63-66% = D
- <63% = E

The final examination accounts for 40% of the total grade, Functional Genomics Research Assignments 30% of the total grade, and Problem Sets 30% of the grade.

GRADING POLICY

There are no make-up exams unless otherwise granted by the course coordinator prior to an examination date. Failure to take an exam without prior permission from the course coordinator will be recorded as 0.

ACADEMIC HONESTY

Please review the complete policy of the University of Florida regarding academic dishonesty, found in the online student handbook at: http://graduateschool.ufl.edu/media/graduate-school/pdf-files/handbook.pdf.

Students are expected to abide by the University of Florida Academic Honesty Guidelines and to adhere to the following pledge:

“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied:

"On my honor, I have neither given nor received unauthorized aid in doing this assignment."
IMPORTANT NOTICE ABOUT PLAGIARISM

Plagiarism is not tolerated at the University of Florida. Plagiarism may be punishable by expulsion from the course or the certificate program. If the plagiarism is detected after the certificate has been awarded, the certificate may be rescinded.

The University of Florida has an honor code that defines plagiarism as follows:

Section 3a: Plagiarism.

A student shall not represent as the student’s own work all or any portion of the work of another. Plagiarism includes but is not limited to:

1. Quoting oral or written materials including but not limited to those found on the internet, whether published or unpublished, without proper attribution.
2. Submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student.

Please note that intent is not an element of this kind of violation so it is important to take great care to complete the written assignments in your own words.

For a good discussion about plagiarism and how to properly cite your sources, please visit: http://mediasite.video.ufl.edu/Mediasite/Play/adaa44500eaf460a84f238e6b9a558f9

For a complete description of the UF Honor Code and procedures, please visit: https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/
MEDICAL CARDIOVASCULAR AND MUSCLE PHYSIOLOGY (3 credit hours)

Lecture 1: Introduction to Muscle and Cardiovascular Physiology
Lecture 2: Structure of Muscle - Tissue structure
Lecture 3: Structure of Muscle - Molecular structure

Lecture 4: Muscle Function and Regulation - Activation
Lecture 5: Muscle Function and Regulation - Force Modulation I
Lecture 6: Muscle Function and Regulation - Force Modulation II

Problem Set 1: Muscle structure, function, and regulation

Lecture 7: Comparing Skeletal and Cardiac Muscle
Lecture 8: Comparing Skeletal, Cardiac, and Smooth Muscle
Lecture 9: Clinical Correlation: Muscular Dystrophy
Problem Set 2: Comparing muscle types.

Functional Genomics Research Assignment 1: Pompe Syndrome

Lecture 10: Introduction to Cardiovascular Physiology I
Lecture 11: Introduction to Cardiovascular Physiology II

Lecture 12: Cardiac Cycle
Problem Set 3: Cardiac Cycle

Lecture 13: Electrocardiogram I
Lecture 14: Electrocardiogram II
Lecture 15: Electrocardiogram III
Problem Set 4: Electrocardiogram

Lecture 16: Cardiac Ion Channels I
Lecture 17: Cardiac Ion Channels II
Lecture 18: Cardiac Output
Problem Set 5: Cardiac Ion Channels and Cardiac Output

Functional Genomics Research Assignment 2: Long Q-T Syndrome

Lecture 19: Hemodynamics- Arteries I
Lecture 20: Hemodynamics- Arteries II
Lecture 21: Hemodynamics- Venous Return
Problem Set 6: Hemodynamics

Lecture 22: Fetal Circulation
Lecture 23: Pulmonary Circulation I
Lecture 24: Pulmonary Circulation II
Problem Set 7: Special Circulations

Lecture 25: Control Mechanisms - Neural Control I
Lecture 26: Control Mechanisms - Neural Control II
Lecture 27: Control Mechanisms - Neural Control III
Problem Set 8: Neural Control Mechanisms

Lecture 28: Local Control of Blood Flow
Lecture 29: Microcirculation
Lecture 30: Regulation of Arterial Pressure
Lecture 31: Integrated Control of Cardiovascular System I
Lecture 32: Integrated Control of Cardiovascular System II
Problem Set 9: Vascular Control Mechanisms

Lecture 33: Clinical Correlation: Shock and Heart Failure
Lecture 34: Integration of Muscle and Cardiovascular Physiology
Lecture 35: Pregnancy: A View from the Fetus
Lecture 36: Aging and the Cardiovascular System
Lecture 37: Exercise and Cardiovascular Function I
Lecture 38: Exercise and Cardiovascular Function II
Problem Set 10: Integration and Special Circumstances

Functional Genomics Research Assignment 3: Hypertrophic Cardiomyopathy

Final Examination