

# Physiology of Circulation of Blood

## Course Syllabus

**Course Number:** GMS 6410

**Credit Hours:** 2 credit hours

**Course Format:** This online course is tailored for asynchronous distance learners.

### **COURSE DESCRIPTION**

This is an advanced graduate class, also suitable for postdoctoral students, which will expose students to in-depth discussion and understanding of several aspects of cardiovascular function, as follows: Control of cardiac development; vascular and microvascular function; baroreflex and chemoreflex control of the circulation; role of the kidney and central nervous systems in cardiovascular regulation; the maternal and fetal circulation in normal pregnancy; use of gene therapy tools in cardiovascular research.

The teaching faculty is drawn from a wide range of disciplines and all are actively involved in research in their areas of expertise.

The structure of this course involves 1) Lectures by research faculty on areas of their expertise; 2) assigned readings; 3) examinations on the lecture material; and 4) a term paper.

### **TARGET AUDIENCE**

This course is designed for individuals wishing for an in-depth understanding of current views on cardiovascular physiology. This course will be useful for students who have not met the entry requirements for medical school and who are interested in a career in cardiovascular medicine, and for those wishing to enhance their applications into Masters and PhD programs in the medical sciences in cardiovascular research.

### **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. In addition, Principles of Medical Physiology (GMS6400) is required.

To access the journal articles from off-campus, students must use UF's VPN (virtual private network).

Instructions and installers for various operating systems can be found at:

<https://net-services.ufl.edu/provided-services/vpn/clients/> (use your Gatorlink account to log in).

To view the online videos, a high-speed internet connection is required, as well as a web browser with the latest Microsoft Silverlight plugin installed.

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## **CONTACTS**

The course coordinator is Peter Sayeski, Ph.D., Professor of Physiology and Functional Genomics. Dr. Sayeski can be contacted using the email function in Canvas.

## **SCHEDULE**

This is a semester long course that is offered each semester. It is designed to be taken as part of the Medical Physiology Certificate course and should be preceded by GMS 6400C.

## **COURSE GOALS**

The cardiovascular system provides supplies the vital organs with blood and is under complex control. This course explores: 1) How the heart develops 2) Heterogeneity of structure and function in the vasculature. 3) The baroreflex and chemoreflex control of the circulation 4) How the kidney and the brain both exert long term influence on cardiovascular function. 5) The maternal and fetal cardiovascular adaptations during a normal pregnancy. 6) Use of gene therapy in cardiovascular research.

## **LEARNING OUTCOMES**

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

1. Understand the normal molecular mechanisms controlling cardiac development.
2. Understand the structure, function and regulation of the various levels of vasculature and microvasculature.
3. Understand both baroreflex and chemoreflex control of cardiovascular functions.
4. Understand the long term control of the circulation by the kidney and the brain.
5. Understand the physiological adaptations of maternal and fetal cardiovascular systems during normal pregnancy.
6. Appreciate the use of gene therapy techniques in cardiovascular research.
7. Develop an in depth understanding of some of the research contributions that are shaping our current views on cardiovascular physiology.
8. Present individual research papers in a critical manner and in the context of the material already discussed

## **LEARNING RESOURCES**

1. Recorded lectures with PowerPoint presentations and PDF handouts of the lectures (which may include additional explanatory material) is provided on the course website.
2. Required text: There is no required textbook although general background information can be obtained the online version of "*Berne & Levy Physiology, 7th Edition*" 2018. Author: Bruce M. Koeppen & Bruce A. Stanton. ISBN: 9780323393942. This is the required textbook for the preceding "Principles of Medical Physiology course (GMS 6400C)".
3. Links to original articles are provided which access through the UF library system linked to PUBMED. These original articles are supplemental to the lectures.

## EXAMINATIONS AND GRADING

There are 2 examinations. Both exams are open book. You will receive an MS Word document with questions and space for answers. This will be provided 2 ½ weeks before the exam is due.

You will be assigned a topic for an assigned essay. You will be expected to write a short essay (5-10 pages of text, double spaced; no more than 30 references). The topic will be assigned to you, but you will also be given the opportunity to choose your own topic with the approval of the course director.

A numerical grade will be given for each graded component of the course.

### Grading scale:

A numerical grade will be given at the end of the course and will be scored as follows:

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

## GRADING POLICY

The 2 open book exams will consist of “short note” questions, and each is worth 35% of the final grade. The assigned essay will be worth 30% of the final grade.

## ACADEMIC HONESTY

Please review the complete policy of the University of Florida regarding academic dishonesty, found in the online student handbook at:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

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, 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 complete description of the UF Honor Code and procedures, please visit:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

For a good discussion about plagiarism and how to properly cite your sources, please visit:

<http://mediasite.video.ufl.edu/Mediasite/Play/adaa44500eaf460a84f238e6b9a558f9>

## **GMS 6410 – Physiology of Circulation of Blood**

2 credits

### **LECTURES:**

1. How to Evaluate a Scientific Paper	Dr. Sayeski
2. Intro to Blood Pressure Regulation	Dr. Sayeski
3. The Chemo-reflex	Dr. Wood
4. Fetal Circulation	Dr. Wood
5. Tyrosine Kinases and Blood Pressure Control	Dr. Sayeski
6. CNS Pathways	Dr. Hayward
7. Baroreflex	Dr. Scheuer
8. Baroreflex in Pregnancy	Dr. Keller-Wood
9. Gene Therapy	Dr. Raizada
10. Cardiac Development	Dr. Kasahara
11. The Kidney and Blood Pressure Control	Dr. Baylis
12. Vascular Function	Dr. Delp

Examinations: There will be 2 short note examinations that will be take-home examinations based on the lectures. The first exam will cover lectures 1-7, and the second examination will cover lectures 8-12.

Term paper (assigned essay): Please use the following as a guide for your term paper. Remember that this is not an examination. It is a paper, in which you will search the appropriate literature and cite primary literature or reviews (not basic textbooks). You are limited to a total length (without references) of 5-10 pages double spaced, and you are limited to 30 references.

Assigned topic for term paper:

Heart failure is a life threatening condition with significant mortality.

Specific assignment: 1) define heart failure; 2) explain the treatment options for heart failure; and 3) use your knowledge of physiology to propose better methods of treatment for heart failure.