

Department of Biological Sciences  
 California State University, San Marcos  
**Red highlights additional graduate level requirements**  
**Biology 634: Advanced Human Cardiovascular Physiology**  
**Spring 2018 Syllabus**

**Class Times:** To be determined

**Instructor Information:**

Dr. John Eme  
 Office: SCI 1 Room 204  
 Telephone: To be determined  
 Email: [jeme@csusm.edu](mailto:jeme@csusm.edu)

**Office Hours:** To be determined, SCI 1 Room 204

**Required Texts and Additional Peer-reviewed Readings:**

Pappano, Achilles J., and Withrow Gil Wier. *Cardiovascular Physiology: The Mosby Physiology Monograph Series*. Elsevier Health Sciences, 2013. 10<sup>th</sup> edition, ISBN: 978-0-323-08697-4

Our course relies heavily on integrating your reading of the above text with in class lectures and online quizzes. Thorough reading and understanding of the textbook material is essential to pass this course.

You will be assigned 6 peer-reviewed papers on topics in cardiovascular physiology. The information contained in these papers will be included on your Exams and Final Exam.

**Course Description:**

Cardiovascular Physiology is the study of how the heart functions in the context of how the whole animal (human) functions. The heart is the first organ that works; even when the organism is an embryo, the heart must perform its central function (remove waste and provide nutrients/oxygen) while it continues to change shape at the same time! This course will focus on integrative cardiovascular physiology: that is, how the heart works in the context of how the whole organism maintains normal function (homeostasis). The course will focus on cardiac action potentials, the automaticity of heart cells, the heart as a pump, how the nervous system regulates heart rate (heart beats), hemodynamics, arterial function, lymphatics, peripheral circulation and blood pressure, control of cardiac output, coronary circulation, exercise and the cardiovascular system, and 'special circulations' including embryonic hearts and modern human cardiovascular physiology topics. The course will explore case studies of cardiovascular disease, and how the heart is central to overall health.

As a graduate-level course, you will also be required to write a 10-page paper (2500 words), provide a presentation to the class on this topic, and the Exams and Final Exam will include additional essay questions based on assigned peer-reviewed papers.

<b>PSLO Alignment</b>	<b>Course Learning Outcomes</b>
	<i>Students who successfully complete this course will be able to:</i>
<u>1, 3</u>	<u>1. Recognize and apply advanced principles of cardiovascular physiology</u>
<u>1, 3</u>	<u>2. Analyze the relationship of blood pressure and blood flow with the regulation of the central nervous system</u>
<u>1, 3</u>	<u>3. Explain how the cardiovascular system brings oxygen to cells and eliminates waste</u>
<u>1, 2</u>	<u>4. Compare and contrast cardiophysiological principles with different environmental scenarios</u>
<u>1, 4, 5</u>	<u>5. Synthesize peer-reviewed papers on a variety of topics related to cardiovascular physiological function</u>
<u>1, 2, 3, 4, 5</u>	<u>6. Research and communicate topics on cardiovascular physiology</u>

**Commented [JE1]:** Additional graduate-level requirements' are highlighted in **Red**

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**Commented [JE3]:** Additional graduate-level requirements' are highlighted in **Red**

**Commented [JE4R3]:**

### **PSLOs for Master of Science in Biological Sciences**

*Students who graduate with a Master of Science in Biological Sciences will:*

1. Actively participate in and lead discussions about current topics and selected research topics to become highly knowledgeable about specific areas in biology.
2. Locate, acquire and critically evaluate primary literature in the biological sciences.
3. Develop specific hypotheses/aims pertaining to a research problem and design and conduct a study or experiment to accomplish this goal.
4. Quantitatively analyze and interpret biological data (e.g., class project, original thesis research).
5. Critically evaluate, synthesize and report on biological data (e.g., class project, original thesis research) in oral and/or written formats based on their knowledge of biology.

**Course Learning Objectives:** Students who successfully complete this course should:

1. Understand basic principles of cardiovascular physiology
2. Understand how blood pressure and blood flow are regulated by the central nervous system
3. Appreciate how the cardiovascular system brings oxygen to cells and eliminates waste
4. Apply cardiophysiological principles to understand different environmental scenarios that animals may encounter
5. Read and synthesize knowledge from peer-reviewed papers on cardiovascular physiology
6. Be able to articulate their knowledge of heart physiology to others
7. Gain an appreciation for collaboration and discussion with fellow students

These course learning objectives, and those of the laboratory section, contribute to the overall **Biological Sciences Program Learning Objectives**, which include:

1. Use the scientific method to ask testable questions and to design and conduct laboratory, field, or theoretical investigations to address these questions.
2. Apply knowledge of the major principles from the fundamental areas of a) cellular and molecular biology, b) genetics, c) physiology, and d) and ecology and evolution to biological questions.
3. Employ mathematical and computational skills to organize, analyze, and evaluate biological data.
4. Locate, determine the reliability of, critically evaluate and summarize scientific literature and other sources of biological information.
5. Communicate biological information in an appropriate written and/or oral format to both scientific and general audiences.

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~~4. Locate, determine the reliability of, critically evaluate and summarize scientific literature and other sources of biological information.~~

~~5. Communicate biological information in an appropriate written and/or oral format to both scientific and general audiences.~~

**Prerequisites:** BIOL 353 with grade of C or better, or enrollment in Masters of Science in Biology Program.

**Credit Hour Policy:** Students are expected to spend at least **6 hours outside of the classroom, each week, for this 3-hour course** (2 hours **each week** for each credit hour of a course). That is minimum total of **96 hours** this semester that should be spent on this class.

**Course Components:**

*Lectures:* There are two, 75 min lectures each week. PowerPoint lecture files will be posted on Cougar Courses prior to class.

*Quizzes:* 10 Quizzes will be completed online using Cougar Courses throughout the semester. **Electronic monitoring by the instructor will assure that students who cheat will be notified and receive a 0 for the course and be reported to the Dean of Students.** You will have the opportunity to attempt each quiz only once. All quizzes are untimed, so they are open book quizzes. All quizzes will be multiple choice and based on your assigned textbook reading or lecture material, as described below in the Schedule.

*Cardiovascular Essay and Presentation Project:* This project will consist of a **2500-3000 word essay** detailing a specific type of 'heart disease' or another aspect of cardiovascular physiology. The word count **does not include references**, and your final written work **must be between 2500-3000 words**. **You will present a lecture to the class on this topic towards the end of the term, please see the schedule, below.** To encourage you to examine cardiovascular physiological function in the proper context, this project requires the following:

1. You will chose **one specific type of cardiovascular disease or function**
2. You will write an essay using **exactly 8 peer-reviewed** articles for **references** as support.
3. You will use **exactly 6 figures from at least 4 of your peer-reviewed** articles as support. You will copy+paste these figures from the peer-reviewed articles into your essay and reference them in your essay. The figures from the peer-reviewed articles do **not** count towards your work count.
4. You will submit **one** file to Cougar Courses as a part of this project – **1**. Integrated Word document that consists of your essay and data figures from your peer reviewed references.
5. **You will provide an interactive presentation to the class on your topic.**

Additional details are given on Cougar Courses in a PDF handout on this *Project*.

*Exams:* Two exams (besides the final) will occur during lecture times. These will consist of multiple choice, short answer and diagrammatic questions. Exams will cover material presented and discussed in lectures, on quizzes and in the textbook. Concepts build on each other, so familiarity with all of the material covered in the class is important for success on the exams, but each exam will emphasize material covered since the previous exam. The exams and Cardiovascular Essay Project contribute to the writing requirement of this course.

*Participation:* Collaborating on in class work and asking questions of your instructor and fellow students is important and will be noted. Late arrival to lecture will not be recorded on the attendance sheet. Active participation in class, making use of office hours, and attendance can contribute to your participation grade.

~~*Participation:* Lecture attendance is required and will be recorded at the beginning of lecture. Late arrival to lecture will not be recorded on the attendance sheet. Active participation in class, making use of office hours, and attendance can contribute to your participation grade.~~

**Assessment:**

The lecture will be graded based on 500 points, as follows:

	<b>Points</b>	<b>%</b>
Quizzes (n=10)	100 total, 10 pts each	14.8
Cardiovascular Essay Project	100	14.8
Exam 1	100	14.8
Exam 2	100	14.8
Final Exam	150	22.2
Participation	25	3.7
<b>Class Presentation</b>	<b>100</b>	<b>14.8</b>
	<b>675</b>	<b>100</b>

Grades will be assigned approximately as a percentage of total points with:

≥92%	A	72-77.9%	C
90-91.9%	A-	70-71.9%	C-
88-89.9%	B+	68-69.9%	D+
82-87.9%	B	62-67.9%	D
80-81.9%	B-	60-61.9%	D-
78-79.9%	C+	<60%	F

If you choose to Withdraw from this course during the semester, it is your responsibility to initiate a withdrawal with the proper college office (Cougar Central). Failure to do so will result in you receiving an “F” or “W” in this course.

**Cougar Courses:** You will access many course materials on the class Cougar Courses web site (<http://cc.csusm.edu>). Cougar Courses will be used to support student-instructor communication and provide access to lecture files and support materials. If you are unfamiliar with using Cougar Courses please contact the student help desk at IITS (760 750 6505).

**Class Policies:**

*Excused absences:* Students who know ahead of time that they will miss class, and have a legitimate and compelling reason for missing the class (this will be determined by Dr. Eme on a case by case basis), will be granted an excused absence if they notify Dr. Eme prior to the missed class and provide documentation. An excused absence from class will not excuse the student from missing a quiz/assignment deadline.

*Late turn-in of assessments:* Online quizzes will **not** be accepted late on Cougar Courses. To avoid loss of quiz points, always submit quizzes before the deadline. Quizzes will be conducted on Cougar Courses unless otherwise stated. Missed exams or quizzes will receive zeros, unless arrangements are made in advance, or unless documentation of a serious and compelling reason is presented for the absence. A late Cardiovascular Essay Project will receive a 30% deduction for the first 1 day, after which a grade of 0 will be received.

*Academic dishonesty:* Cheating will not be tolerated in any form. You have ample opportunity to get help in this class, from your instructor and from your classmates, and you are encouraged to make use of these resources. However, any work you submit for grading must represent your own thinking, and must be in your own words. Any cheating or plagiarism that is detected will be reported to the Dean of Students. You are expected to know what plagiarism is – refer to <https://microsites.csusm.edu/plagiarism-tutorial/> for a tutorial on plagiarism (including “unintentional” plagiarism) and how to avoid them. The instructor reserves the right to apply appropriate penalties for cases of academic dishonesty detected, up to and including assigning an F for the class.

*Talking in class:* All students are strongly encouraged to actively, and constructively, participate during class. Questions, discussions and opinions about the class material are always welcome during lectures. In contrast, conversations in class that otherwise disturb your classmates are disrespectful and will not be tolerated.

*Cell phone/laptops and other electronic devices:* Cell phone calls, texting, emailing and surfing the Internet to watch videos during class is not appropriate. I strongly suggest that you take written notes – **your exams will be written, so it is not very useful to use laptops to take notes.**

*Disability Support Services: Students with disabilities who require academic accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disability Support Services (DSS).* ~~*Disability Support Services: Students with disabilities who require academic accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS).*~~ This office is located in Craven Hall 4300, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive accommodations should meet with Dr. Eme during office hours or by making an appointment so that appropriate arrangements can be made.

*Writing Requirement:* Each student will write more than the University minimum of 2,500 words for courses of three units or more. This will come from exams and the Cardiovascular Essay Project.

#### **How to do well:**

This course covers a great deal of interrelated material. Understanding topics covered early in the course will be vital for comprehending information presented later in the course, and you will have to be able to integrate material that you learn throughout the course. You can take several steps to increase your ability to comprehend and remember material:

1. Read the relevant chapter in the textbook **before** you attend the lecture so you will get the most out of the lecture and be able to ask questions during class, then re-visit the lecture and relevant book chapter after lecture to reinforce your understanding. Students that read the textbook will do well on the exams and quizzes. Those that do not are not likely to pass the course.
2. After each lecture, summarize your lecture notes in your own hand and make study questions for yourself.
3. Come to office hours. You are also welcome to drop by my office if the door is open, though it is often a good idea to email me ahead of time to make an appointment.
4. Use the STEM Center Tutors. The STEM Center is a second source of peer tutoring from students with experience with the class.
5. Consistency and dedication are important right from the start in this and any class. Students often ask a very reasonable question 'What can I do to get an A?' There is only one Yoda answer – "An A on everything you must get, A+A+A+C≠A".

**Lecture Schedule (subject to change):**

Week	Date	Topic	Chapter(s)
1	Jan 22	Introduction to the course & Cardiovascular Physiology	
	Jan 24	Overview of Circulation and Blood	1
2	Jan 29	Cardiac Action Potential	2
	Jan 31	Automaticity: Natural Excitation of the Heart ( <b>Quiz 1 – chapters 1,2,3</b> )	3
3	Feb 5	The Heart as a Pump I	4
	Feb 7	The Heart as a Pump II ( <b>Quiz 2 – chapter 4</b> )	4
4	Feb 12	Regulation of Heartbeat	5
	Feb 14	Regulation of Heartbeat ( <b>Quiz 3 – chapter 5</b> )	5
5	Feb 19	<i>Review for Exam 1</i>	
	Feb 21	<i>Review for Exam 1</i>	
6	Feb 26	<b>Exam 1</b>	
	Feb 28	Hemodynamics	6
7	March 5	Arterial System	7
	March 7	Microcirculation ( <b>Quiz 4 due – chapters 6,7,8</b> )	8
8	March 12	Peripheral Circulation I	9
	March 14	Peripheral Circulation II ( <b>Quiz 5 due – chapter 9</b> )	9
9	March 19	<b>Spring Break!!</b>	
	March 21	<b>Spring Break!!</b>	
10	March 26	Control of Cardiac Output I	10
	March 28	Control of Cardiac Output II ( <b>Quiz 6 due – chapter 10</b> )	10
11	April 2	<i>Review for Exam 2</i>	
	April 4	<b>Exam 2</b>	
12	April 9	Coronary Circulation	11
	April 11	Special Circulations ( <b>Quiz 7 due – chapters 11,12</b> )	12
13	April 16	Central and Peripheral Control Factors, Exercise ( <b>Cardiovascular Essay Project due</b> )	13
	April 18	Topics in Cardiovascular Physiology – The Development of Animal Models ( <b>Quiz 8 due – chapter 13</b> )	Lecture, PDF readings on Cougar Courses
14	April 23	Topics in Cardiovascular Physiology – Modern Animal Models	Lecture, PDF readings on Cougar Courses
	April 25	Topics in Cardiovascular Physiology – Current Studies and Experiments I ( <b>Quiz 9 due – Lectures and readings 4/18,4/23</b> )	Lecture, PDF readings on Cougar Courses
15	April 30	Topics in Cardiovascular Physiology – Current Studies and Experiments II	Lecture, PDF readings on Cougar Courses
	May 2	Topics in Cardiovascular Physiology – The Future of Human Heart Health ( <b>Quiz 10 due – Lectures and readings 4/25,4/30</b> )	Lecture, PDF readings on Cougar Courses
16	May 7	<i>Review for Final Exam</i>	
	May 9	<i>Review for Final Exam</i>	
		<b>Final Exam (TBD May 12-18<sup>th</sup> ??pm – ??pm)</b>	