San José State University
College of Engineering, Department of Biomedical Engineering
BME/BIO 177, Physiology for Engineers, Fall 2020

Course and Contact Information

Instructor:	Yun Wang
Office Location:	E 233I
Telephone:	TBD
Email:	yun.wang@sjsu.edu
Office Hours:	Tuesdays 11:00 AM-12:00 PM Wednesdays 1:30-2:30 PM
Class Days/Time:	Mondays and Wednesdays 4:30-5:20 PM
Classroom:	Canvas Zoom (https://sjsu.zoom.us/j/96488268227?pwd=NldXTFR2TzJnTTZ0VGwwSk9XRFpvdz09 Password: 052844)
Prerequisites:	BIOL 30, CHEM 1B, PHYS 50

Course Format

Technology Intensive, Hybrid, and Online Courses

The course adopts online lecture format as a primary teaching method, both synchronous and asynchronous, combined with in-class discussions and problem-solving sessions. In class each student is required to have an internet-connected device (e.g. smartphone, tablet, laptop computer) to be used exclusively for learning-related activities. This course incorporates a required lab component (BME 177), the requirements for which will be discussed at the first meeting of each lab section.

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the Canvas learning management system course website. All communications relevant to the course will be sent out using the Canvas messaging system (Canvas email and announcement board). Students are responsible for regularly checking with the messaging system through Canvas to learn of any updates.

Course Description

Structure and function of physiological systems and discussion of topics of particular importance to the design, development, construction and clinical application of biomedical devices. Practical application of new technologies to monitor, repair, replace or augment those systems.

Course Learning Outcomes (CLO)

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

- Understand the basic structural and functional principles of human organ systems.

- Understand the concept of homeostasis, as well as the positive and negative feedback mechanisms involved in its maintenance.
- Understand the constraints placed upon the design of various biomedical devices by the physiological parameters of the tissues involved
- Successfully access the research literature related to the development of, and application of biomedical devices to the monitoring and treatment of disease and injury
- Gain skills in interacting with others in discussion and analysis of course topics
- Gain skills in analyzing and presenting the research literature for discussion
- Demonstrate the ability to deliver a professional presentation to their peers
- Apply common and standard medical tools, including simple instruments and computer applications to measure, analyze and interpret physiological signals that are relevant to assessing an individual's health

Required Texts/Readings

Textbook

Required: Ganong's Review of Medical Physiology, by Kim Barrett, Susan M. Barman, Jason Yuan, Heddwen L. Brooks. ISBN-13: 978-1260122404
Available online from multiple retailers.

Optional: Quantitative Human Physiology, Second Edition: An Introduction (Biomedical Engineering), by Joseph Feher. ISBN-13: 978-0128008836 (E-book version available from the SJSU library)

Other Readings

Additional reading materials (optional) will be listed on the Canvas site

Library Liaison

Megwalu, Anamika
Phone: 408-808-2089
Email: anamika.megwalu@sjsu.edu

Course Requirements and Assignments

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus.

Attainment of the learning objectives (as listed above) will be assessed via homework, laboratory activities, in-class design problems, quizzes, two mid-term examinations, one final examinations, and the term paper and presentation.

Homework assignments

Students are expected and encouraged to work together on assignments. However, submitted homework should be individual work. Homework must be submitted via Canvas by the deadline. Your homework should be uploaded as a single file, easily readable without zooming in or out or rotating the page. Homework submissions that do not comply with these requirements will be assessed a 20% penalty from the maximum score. The lowest homework score will be dropped.

Late submissions will be assessed 1.5%/hour off of the maximum possible score. *No homework will be accepted via email to the instructor or the grader.*

Class participation

You will be presented with in-class exercises in synchronous class sessions to be completed individually or in groups. These assignments will be due at the end of class, and participation credit will be granted for submissions completing the requirements. These exercises are intended to serve as a review to help you and the instructor assess learning in the class.

No make-up class participation credit will be offered.

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Laboratory assignments

Students will prepare laboratory reports, based on post-lab assignments, **working in groups**. The report must include an Acknowledgments section indicating the specific contributions of each student. Students with no contribution will receive no credit for the report.

Report deadlines will be indicated on Canvas and typically will be submitted through Canvas. **Late submissions** will be assessed 10%/day off of the maximum possible score.

Examinations

There will be two mid-semester examinations and one final examination. The midterm examination will cover the entire course material covered until the time of the examination (i.e. cumulative). The final examination will cover the entire course material covered during the entire semester (i.e. cumulative). Examinations may include multiple-choice questions, open-ended questions, and problems. Examinations will be in online format, administered through Canvas and Respondus LockDown Brower and Respondus Monitor. Allowed aids include class notes, video lectures, textbooks, and homework sets. Contact with any individual (in any format) and use of homework solving websites are not allowed during the exam time. The dates of the examinations are indicated in the Lecture Schedule.

Make-up exams will be granted only for extenuating circumstances. Contact the instructor as soon as possible during the semester if you have such a circumstance. Absence from examinations without prior approval will result in a score of 0.

Term project presentation

All students are required to write a complete a term research project on medical devices used to monitor or treat an abnormal physiological condition, and present it during a dedicated lab session. The evaluation criteria for the presentation will be posted on Canvas. Students will work in pairs, which they will form with members of their laboratory section. Each team will choose one physiological system, and an abnormal physiological situation associated with that system. The team will then research and critically compare existing state-of-the-art medical interventions to correct, augment, or enhance function of that physiological system or restore normal physiological function. The presentation must include an Acknowledgments section indicating the specific contributions of each student. Students with no contribution will receive no credit for the project. The presentation will be assessed by the instructor and students in your laboratory section, according to a rubric that will be made available on Canvas.

The deadline for submitting the project presentation slides to Canvas is December 10, at 11:59 p.m. A grade of 0 will be given for any submission containing plagiarism in the text of the slides. For more information on what constitutes plagiarism and tips for avoiding it in your submission, please see the detailed assignment description posted on Canvas. Presentations will be scheduled within your lab section meeting time.

No make-up presentation dates are available. If both members are unable to deliver the presentation on the scheduled date, both members will receive a grade of 0 for the assignment.

Grading Information

Letter Grades:

A+	> 97%
A	> 93% – 97%
A-	> 90% – 93%
B+	> 87% – 90%
B	> 83% – 87%
B-	> 80% – 83%
C+	> 77% – 80%
C	> 73% – 77%
C-	> 70% – 73%
D+	> 67% – 70%
D	> 63% – 67%
D-	> 60% – 63%
F	< 60%

Determination of Grades

Grades will be determined based on all the assignments and examinations, weighted as reported below:

Homework	5%
Class participation	5%
Midterm I	20%
Midterm II	20%
Project presentation	5%
Laboratory	15%
Final Exam	30%

Missing or late submission of examinations, without prior approval, will result in a zero. Prior approval will be given only under *exceptional* circumstances. Please contact the instructor as soon as possible if you have such a situation.

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Classroom Protocol

Attendance and arrival times

Students are expected to be set up for lecture by the time the class begins for synchronous sessions. Attendance in class is not mandatory and shall not be used per se as a criterion for grading. However, class attendance and participation are highly recommended.

Behavior

Students should remain respectful of each other at all times. Interruptive or disruptive attitudes are discouraged. During the online synchronous sessions, the use of electronic devices (laptops, tablets, smartphones) should be limited to activities closely related to the learning objectives. All cell phones must be silenced prior to entering the synchronous sessions.

Students will respect a diversity of opinions, ethnicities, cultures, and religious backgrounds. Students will treat online discussions with their peers as if they were in-class, face-to-face interactions.

Safety

Students should familiarize themselves with all emergency exits and evacuation plans.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

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Schedule is subject to change with fair notice (one week) in class or via notice on Canvas.

Course Schedule

Week	Date	Topics	Readings, *Deadlines*
1	8/19	Intro to Physiology. The Syllabus	
2	8/24	Immune System – Overview	
	8/26	Nervous System – Organization, basic anatomy	
3	8/31	Nervous System – Nernst equation, action potential	
	9/2	Nervous System – Signal conduction	
4	9/7	NO CLASS – Labor Day	
	9/9	Skeletal Muscle – Mechanics	
5	9/14	Skeletal Muscle – Excitation-Contraction Coupling	
	9/16	Smooth Muscle	3.8, *Term project progress report I due*
6	9/21	MIDTERM EXAM	
	9/23	Reflex System	Ch. 9
7	9/28	Reflex System	
	9/30	Autonomic Nervous System	
8	10/5	Autonomic Nervous System	7.2
	10/7	Renal System – Anatomy and Basic Function	7.3, 7.4
9	10/12	Renal System – Filtration, Reabsorption, Secretion	7.6, 7.7
	10/14	Renal System – Filtration, Reabsorption, Secretion	
10	10/19	Renal System – Regulation and Homeostasis, Midterm review	
	10/21	MIDTERM EXAM	5.1
11	10/26	Cardiovascular System – The Heart as a Pump	5.4
	10/28	Cardiovascular System – Cardiac action potentials	5.5
12	11/2	Cardiovascular System – ECG	5.6
	11/4	Cardiovascular System – Cellular basis of contractility	5.7
13	11/9	Cardiovascular System – Cardiac function curve	5.8
	11/11	NO CLASS – Veteran's Day	
14	11/16	Cardiovascular System – Vascular hemodynamics	5.9
	11/18	Cardiovascular System – Transport in capillaries	5.11, 5.13
15	11/23	Respiratory System/Transport Intro.	6.1
	11/25	NO CLASS – Non-Instruction Day	
16	11/30	Respiratory System – Lung anatomy and mechanics	6.2
	12/2	Respiratory System – Gas exchange and oxygen transport	6.3, 6.4
17	12/7	Respiratory System – Homeostasis & Final exam review	6.5, 6.6
	12/9	**FINAL EXAM (2:45 – 5:00 PM)**	