San José State University
College of Engineering, Department of Biomedical Engineering
BME/BIO 177, Physiology for Engineers, Fall 2022

Course and Contact Information

Instructor:	Yun Wang
Office Location:	E 233I
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Email:	yun.wang@sjsu.edu
Office Hours:	Mondays and Wednesdays 1:00 - 2:00 PM (Office or Zoom: https://sjsu.zoom.us/j/88526094690?pwd=ejdWbk1oOHBaYVRmbHlHeDliY0Fadz09 Password: 783303)
Class Days/Time:	Mondays and Wednesdays 12:00 - 12:50 PM
Classroom:	E 343
Prerequisites:	BIOL 30, CHEM 1B, PHYS 50

Course Format

Technology Intensive, Hybrid, and Online Courses

The course adopts a traditional lecture format as a primary teaching method, combined with in-class discussions and occasionally 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 177L), 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 (26the Ed.), by Kim Barrett, Susan M. Barman, Jason Yuan, Heddwen L. Brooks. ISBN-13: 978-1260122404
Available online from multiple retailers.

Optional: Quantitative Human Physiology: An Introduction (2nd Ed.), by Joseph Feher. ISBN-13: 978-0128008836 (E-book version available from the SJSU library: https://csu-sjsu.primo.exlibrisgroup.com/permalink/01CALS_SJO/tu4ck5/alma991013651419302919)

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

Other technology requirements

iClicker (formerly REEF Polling)

You will have several options available to participate in clicker sessions:

iClicker REEF app (iOS, Android, web app): Allows you to use your smartphone, tablet, or even laptop in class as a clicker to participate.

Clicker Remote: You can request to borrow a Clicker remote from eCampus (eCampus@sjsu.edu) for free. Remotes are to be returned to eCampus at the end of the semester.

How to set up an iClicker account and add a course

Follow the instructions available on the iClicker Reef (checklist) at
https://www.sjsu.edu/ecampus/software-tools/teaching-tools/collaboration/iclicker.php

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, discussions, quizzes, two mid-term examinations, one final examinations, and the term project 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.

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.*

Discussions and Quizzes

You will be presented with discussion topics in Canvas. Credit will be granted for submissions completing the requirements.

Quizzes covering main points of lectures will be presented in Canvas to be completed.

For both discussions and quizzes, late submission will not be accepted. These exercises are intended to serve as a review to help you and the instructor assess learning in the class.

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 1.5%/hour 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. comprehensive). The final examination will cover the entire course material covered during the entire semester (i.e. comprehensive). Examinations may include multiple-choice questions, open-ended questions, and problems. During the exam, students can have only a non-programmable scientific calculator. 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. *Missing or late submission of examinations, without prior approval, will result in a zero.*

Term project presentation

All students are required to 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 monitor, 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 5th, at 11:59 pm**. *Late submissions* will be assessed 1.5%/hour off of the maximum possible score. 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.

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."

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 Assignments	10%
Discussions	5%
Quizzes	5%
Midterm I	15%

Midterm II	15%
Term Project	10%
Laboratory	15%
Final Exam	25%
Extra Credit (iClicker)	up to 2%
Extra Credit (Seminar)	up to 1.5%

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.

Participation with iClicker will be extra credit assignments. You will receive 2% extra credit on your final grade for if you participate in 75% of iClicker polls.

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. 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. While in the classroom, the use of electronic devices (laptops, tablets, smartphones) should be limited to activities closely related to the learning objectives. While in the classroom, electronic devices should not be used for personal communication, included messaging and use of social media. All cell phones must be silenced prior to entering the classroom. 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/.

Instruction Policies and Expectations

Students are not allowed to record without instructor permission

Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity

through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.

Technology requirements

Students are required to have an electronic device (laptop, desktop or tablet) with a camera and microphone. SJSU has a free equipment loan program available for students. Students are responsible for ensuring that they have access to reliable Wi-Fi during tests. If students are unable to have reliable Wi-Fi, they must inform the instructor, as soon as possible or at the latest one week before the test date to determine an alternative. See Learn Anywhere website for current Wi-Fi options on campus.

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The Academic Integrity Policy F15-7 at https://www.sjsu.edu/senate/docs/F15-7.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at https://www.sjsu.edu/president/docs/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

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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*
2	8/22	Intro to Physiology. The Syllabus	1.1
	8/24	Immune System – Overview	Ch 3
3	8/29	Nervous System – Organization, basic anatomy	Ch 4
	8/31	Nervous System – Nernst equation, chord conductance	3.1
4	9/5	NO CLASS – Labor Day	
	9/7	Nervous System – Action potential	3.2
5	9/12	Nervous System – Signal conduction	3.3
	9/14	Skeletal Muscle – Anatomy, Mechanics	Ch 5
6	9/19	Skeletal Muscle – Muscle contraction	3.4
	9/21	Skeletal Muscle – Neuromuscular junction	3.6
7	9/26	Smooth Muscle, Midterm review	3.8
	9/28	MIDTERM EXAM	*Term project progress report due*
8	10/3	Reflex System	Ch 12, 4.4
	10/5	Reflex System	
9	10/10	Autonomic Nervous System	Ch 13
	10/12	Autonomic Nervous System	
10	10/17	Renal System – Anatomy and Basic Function	7.2, 7.3
	10/19	Renal System – Filtration, Reabsorption, Secretion	7.4, 7.5
11	10/24	Renal System – Regulation and Homeostasis, Midterm review	7.5
	10/26	MIDTERM EXAM	
12	10/31	Cardiovascular System – The Heart as a Pump	5.1
	11/2	Cardiovascular System – Cardiac action potentials	Ch 30, 5.4
13	11/7	Cardiovascular System – ECG	5.5
	11/9	Cardiovascular System – Cellular basis of contractility	5.6
14	11/14	Cardiovascular System – Cardiac function curve	5.8
	11/16	Cardiovascular System – Vascular hemodynamics	5.9
15	11/21	Cardiovascular System – Transport in capillaries	5.10
	11/23	NO CLASS – Non-Instructional Day	
16	11/28	Respiratory System – Lung anatomy and mechanics	Ch 34, 6.1
	11/30	Respiratory System – Gas exchange and oxygen transport	6.2, 6.4
17	12/5	Respiratory System – Homeostasis & Final exam review	*Term project slides due*
18	12/14	**FINAL EXAM (9:45 am - 12:00 pm)**	