

San José State University
College of Engineering
Department of Biomedical, Chemical and Materials Engineering

BME 177, Physiology for Engineers, Spring 2017

Course and Contact Information

Instructor:	Dr. Hamed Salehizadeh
Office Location:	BME Office- Conference Room
Telephone:	TBA
Email:	hamed.salehizadeh@sjsu.edu
Office Hours:	Wednesday: 2:00 - 3:00 PM
Class Days/Time:	Monday: 3:00 – 3:50 PM Wednesday: 3:00 – 3:50PM
Classroom:	ENG329
Prerequisites:	BIOL30, CHEM 1A, CHEM1B, Phys 50

Course Format

Technology Intensive, Hybrid, and Online Courses

The course adopts traditional lecturing as a primary teaching method, combined with in-class 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, including the iClicker technology available at SJSU. The use of cell phones and any wireless-enabled device for purposes not directly related to classroom activities is strictly prohibited. Students who violate this policy will be asked to leave the classroom for the rest of the day.

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). You are responsible for regularly checking with the messaging system through Canvas to learn of any updates.

Course Description

We will explore how structure relates to function in physiological systems and discuss topics of particular importance to the design, development, construction and clinical application of biomedical devices. In the lab component of this course student will apply new technologies to monitor, repair, replace or augment those systems.

Course Learning Outcomes

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

1. **Evaluate** how structure relates to function in human organ systems.
2. **Describe** basic concepts in human physiology including homeostasis, and the positive and negative feedback mechanisms involved in its maintenance.
3. **Explore** the constraints placed upon the design of various biomedical devices by the physiological parameters of the tissues involved
4. **Engage** actively and critically with peer-reviewed scientific literature related to biomedical devices
5. **Interact** with others in the analysis and discussion of course topics and scientific literature
6. **Craft** scientific information into clear, captivating, and compelling papers and presentations
7. **Acquire** an appreciation of the biomedical implications of physiological principles

Required Texts/Readings

Textbook

Review of Medical Physiology by W. Ganong (24th Edition)

<http://www.amazon.com/Ganongs-Medical-Physiology-Edition-Science/dp/0071780033>

The text can also be found online by searching through Google.

Other Readings

Introduction to Biomedical Engineering, [Enderle, John D.](#); [Bronzino, Joseph D.](#); 2012 (SJSU Library)

Library Liaison

Dinalo, Jennifer, Phone: (408) 808-2038, Email: jen.dinalo@sjsu.edu

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

Other technology requirements: REEF Polling

I will be using **iClicker/REEF Polling** as a student response system in class this term. This software helps you test your learning outcomes and gives everyone a chance to participate in class. Participation with iClicker/REEF Polling will account for 1-2 extra credit points on your final grade.

Device Options:

You will have several options available to you at NO COST:

1. iClicker/REEF Polling App for Smartphone or Tablet: Allows you to use your smart phone or tablet as a clicker to participate. On your smartphone or tablet go to Mac App Store or Google Play and download *Reef Polling by iClicker*
2. iClicker/REEF Polling Site for Laptop: If using a laptop, go to <https://app.reef-education.com/#/login>

3. Clicker Remote Handset: If you do not have a smart phone, tablet, or laptop, you can request to borrow a Clicker remote handset from eCampus (eCampus@sjsu.edu) for free. Remotes are to be returned to eCampus at the end of the semester.

Student Resources

[Student REEF Polling Request Form](#)

Please complete the request form if you would like to use your smart phone, tablet, or laptop to participate in REEF Polling sessions.

[REEF Polling Setup Guide](#)

Step-by-step guide on how to create and activate your REEF Polling account.

[REEF Polling Activation Guide](#)

Step-by-step guide on how to switch your 14-day trial account to the 180-day licensed account.

[REEF Polling Video Setup Guide \(Video\)](#) Two minute video guide on how to create your REEF Polling account and activate it using your Access Code.

How to Request a Clicker Remote Send an email to eCampus@sjsu.edu and request to loan a Clicker remote. Further instructions will be provided to you by eCampus on scheduling a pickup.

REEF Polling App (Free download): Allows you to use your smart phone, 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.

Please visit <http://www.sjsu.edu/at/ec/reef/> for a step-by-step guide on how to set up REEF Polling

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours during the semester for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in [University Policy S12-3](#) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

Attainment of the learning objectives (as listed above) will be assessed via homework, in-class quizzes (REEF Polling, formerly iClicker), two mid-term examinations, the final examination, and the term paper/project. Students are required to read book chapters that correspond with the topics listed in the course schedule. This will enable prepare them for answering questions based on specific topics in the text.

Homework Assignments

Homework assignments will include questions and problems related to the materials covered in the lectures. Students are expected and encouraged to work together on assignments. However, submitted homework should be individual work. Homework must be turned on Canvas BEFORE the **beginning of class** on the due date.

Late assignments will not be graded.

In-class quiz (REEF Polling)

At the beginning of each class we will have regular in-class quizzes based on multiple-answer questions. We will be using REEF Polling as a student response system in class. REEF Polling helps me understand what you

know and gives everyone a chance to participate in class. See below for details on grading of REEF polling assignments. I will not use REEF Polling to keep track of attendance. Refer to the Grading Policy and Student Technology Resources section for additional details on REEF Polling.

Term project

TERM PAPER

Each student will choose a topic regarding a specific medical device of personal interest for a 10-page term paper. Topics should be submitted for approval to the instructor by Feb 20th. The term paper should include a discussion of the design, development, construction and clinical application of this device. Students should also pay close attention to the constraints placed upon the design of the device by the tissue or tissues affected by its implantation and use. The point of this paper is to make a connection between the design, development and use of biomedical devices and the physiological systems they monitor, repair, replace or augment. The paper, due on the final day of class, will include reference to no less than 10 original peer-reviewed research articles. You might consider discussing such issues as: importance/scope of problem, special materials required to solve problem new technology that might contribute to the solution.

PRESENTATIONS

Students, working in pairs, will develop a 10 min **Video Presentation** on the same topic of the term paper. In alternative, students can work on a **Creative Project** such as a prototype of a biomedical device, a drawing book, or their own idea. Examples of creative projects from past courses will be shown in class.

Presentation/term paper outline for BME 177

The presentation should cover a biomedical technology related to physiology. The following points should be addressed in your presentation.

1. Area of Focus – E.g. Myocardial infarcts
 1. Discuss related physiology briefly
2. Select a problem – protecting the heart from damage after a heart attack
 1. Why does it occur?
 2. What are the medical implications?
 3. Who is affected by it?
 4. How many people are affected by it?
 5. How severe is the effect?
 6. In what setting does the problem occur?
3. Motivation (personal)
 1. Economical
 2. Personal
 3. Community
4. Background literature: (ex. Pubmed searches)
 1. Historic paper
 2. High impact papers
5. Motivation for technology
6. Standard Methods / This method (clinical applications)
 1. Benefit of technology you're discussing over other forms
 2. Discuss how physicians use/or would use the technology
 3. Discuss training requirements
7. Short video on the technology
8. Market Research
 1. Medicaid Data
 2. CDC Data

3. Industry revenue (\$DDD billions per year)
4. Would the technology qualify for reimbursement?
9. Patents Strategy (design and development of technology)
 1. Initial Development
 1. Schematics
 1. Explanation
 2. IP protected areas
 2. Subsequent Developments
 1. Schematics
 1. Explanation
 2. IP protected areas
 2. FDA Approval
 1. What branch of FDA is most likely to regulate the device (CDRH for medical devices)
 2. What is the classification of the device
<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPCD/classification.cfm>
 3. Competition
 1. Who are the competitors?
 2. What is the competitive advantage of the technology you're describing?
 4. Future
 1. How do you see this technology being improved in the future?
 5. Funding sources
 6. Conferences where you can learn more about the subject matter

You should have your topic approved by the Instructor by March 20th.

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) 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.”

Midterm examinations

There will be two mid-semester examinations. Each examination will cover the entire course material covered until the time of the examination. Examinations may include multiple-choice questions, open-ended questions, and problems. During the exam, students can have only a non-programmable scientific calculator. Internet-connected devices, books and notes are not allowed.

The dates of the mid-semester examinations are indicated in the Lecture Schedule.

Final Examination

The final examination will be held on the date and time stipulated by SJSU's Final Examination Schedule for the particular semester. The final examination may include multiple-choice questions, open-ended questions, and problems. During the exam, students can have only a non-programmable scientific calculator. Internet-connected devices, books and notes are not allowed.

Grading Information

Letter Grades:

- A+ > 95%
- A 93 ~ 94%

A-	90 ~ 92%
B+	87 ~ 89%
B	84 ~ 86%
B-	80 ~ 83%
C+	77 ~ 79%
C	74 ~ 76%
C-	70 ~ 73%
D+	67 ~ 69%
D	64 ~ 66%
D-	60 ~ 63%
F	< 59%

Determination of Grades

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

Homework and Quizzes	10%
Midterm 1	20%
Midterm 2	20%
Final Exam	35%
Term Presentation	15%

The total of your lecture will be normalized to 90% of your grade. The total from the lab will be normalized to 10% of your grade. These two sections will contribute to your total grade.

BME177 Lecture	90%
BME 177 Lab	10%
Total grade	100%

Classroom Participation Assignments will be posted on Canvas.

Participation with REEF Polling: Participating in at least 75% of the REEF Polling quizzes over the semester is necessary to obtain one extra credit. Choosing the right answer provides one additional point for each question.

Absence during 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](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

Classroom Protocol

Attendance and arrival times

Students should be in the classroom by the time the class begins. Students who arrive late disrupt the learning environment, and will not be admitted to class if this habit is recurring. In classroom concept problems, which

contribute extra credits to final grades, are held in the first 5-10 minutes of class. Class attendance is hence highly recommended, but not mandatory and shall not be used per se as a criterion for grading.

Behavior

While in the classroom, the use of electronic devices (laptops, tablets, smartphones) MUST be limited to activities closely related to the learning objectives, and should not be used for personal communication, included messaging and use of social media. All cell phones must be silenced and stored away prior to entering the classroom. Students who violate this policy will be asked to leave the classroom for the rest of the day.

Classroom community

Our classroom is meant to be a cooperative and mutually supportive space. Intellectual richness comes from our different views and the various experiences we bring to the conversation. When ideas and opinions are expressed respectfully and in the spirit of academic inquiry, they should likewise be met with respect and openness. I ask all of you to work with me to build a community in which everyone feels valued and safe. Please do not hesitate to tell me if you feel I could do more to foster our learning community.

Safety

Students should familiarize themselves with all emergency exits and evacuation plans. In particular, if the class meeting ends in the evening, students should be aware of their surroundings when exiting the building, and are encouraged to carry a cell phone for emergency communications.

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/>

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](#) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](#) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](#) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](#) at <http://www.sjsu.edu/advising/>.

Consent for Recording of Class and Public Sharing of Instructor Material

[University Policy S12-7](#), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course:

- Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.

- Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.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](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

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](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at

http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

Accommodation to Students' Religious Holidays

San José State University shall provide accommodation on any graded class work or activities for students wishing to observe religious holidays when such observances require students to be absent from class. It is the responsibility of the student to inform the instructor, in writing, about such holidays before the add deadline at the start of each semester. If such holidays occur before the add deadline, the student must notify the instructor, in writing, at least three days before the date that he/she will be absent. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up the work missed. See [University Policy S14-7](http://www.sjsu.edu/senate/docs/S14-7.pdf) at <http://www.sjsu.edu/senate/docs/S14-7.pdf>.

Student Technology Resources

Computer labs for student use are available in the [Academic Success Center](http://www.sjsu.edu/at/asc/) at <http://www.sjsu.edu/at/asc/> located on the 1st floor of Clark Hall and in the Associated Students Lab on the 2nd floor of the Student Union. Additional computer labs may be available in Eng 233 and 221. Computers are also available in the Martin Luther King Library. A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include DV and HD digital camcorders; digital still cameras; video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens and monitors.

SJSU Peer

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space is also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in

Campus Village Housing Building B. Visit [Peer Connections website](http://peerconnections.sjsu.edu) at <http://peerconnections.sjsu.edu> for more information.

SJSU Writing Center

The SJSU Writing Center is located in Clark Hall, Suite 126. All Writing Specialists have gone through a rigorous hiring process, and they are well trained to assist all students at all levels within all disciplines to become better writers. In addition to one-on-one tutoring services, the Writing Center also offers workshops every semester on a variety of writing topics. To make an appointment or to refer to the numerous online resources offered through the Writing Center, visit the [Writing Center website](http://www.sjsu.edu/writingcenter) at <http://www.sjsu.edu/writingcenter>. For additional resources and updated information, follow the Writing Center on Twitter and become a fan of the SJSU Writing Center on Facebook. (Note: You need to have a QR Reader to scan this code.)

SJSU Counseling Services

The SJSU Counseling Services is located on the corner of 7th Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit [Counseling Services website](http://www.sjsu.edu/counseling) at <http://www.sjsu.edu/counseling>.

BME 177 / Physiology for Engineers, Spring 2019

Course Schedule (Lecture)

Subject to change with fair notice: Students will receive an opportunity to help pace the course schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	January 28	Introduction to homeostatic mechanisms. The syllabus
1	January 30	Introduction to the Nervous System
2	February 4	Introduction to the Senses
2	February 6	Vision
3	February 11	Vision
3	February 13	Hearing
4	February 18	Hearing
4	February 20	Hearing
5	February 25	Midterm 1 review
5	February 27	Midterm 1 exam
6	March 4	The Somatic Nervous System
6	March 6	The Somatic Nervous System
7	March 11	The Somatic Nervous System
7	March 13	The Autonomic Nervous System
8	March 18	The Autonomic Nervous System
8	March 20	The Autonomic Nervous System
9	March 25	Concepts in Endocrinology
9	March 27	Fuel Homeostasis & the Endocrine Pancreas
10	April 1	No Class Spring Recess
10	April 3	No Class Spring Recess
11	April 8	Midterm 2 review
11	April 10	The Cardiovascular System
12	April 15	Midterm 2 exam
12	April 17	The Cardiovascular System
13	April 22	The Cardiovascular System
13	April 24	The Cardiovascular System
14	April 29	The Respiratory System
14	May 1	The Respiratory System
15	May 6	The Respiratory System
15	May 8	The Respiratory System
16	May 13	Final exam review Due date for final presentation and term project
	May 20	FINAL EXAM (12:15 - 14:30)

Course Schedule (Lab)

February 12	Lab 0	All Lab Groups
February 14 (1:30 Lab)		
February 14 (4:30 Lab)		
February 19	Lab 1- Vision	Lab Group 1
February 21 (1:30 Lab)		
February 21 (4:30 Lab)		
February 26	Lab 1- Vision	Lab Group 2
February 28 (1:30 Lab)		
February 28 (4:30 Lab)		
March 5	Lab 2- Reaction time	Lab Group 1
March 7 (1:30 Lab)		
March 7 (4:30 Lab)		
March 12	Lab 2- Reaction time	Lab Group 2
March 14 (1:30 Lab)		
March 14 (4:30 Lab)		
March 19	Lab 3- Spinal cord reflexes	Lab Group 1
March 21(1:30 Lab)		
March 21 (4:30 Lab)		
March 26	Lab 3- Spinal cord reflexes	Lab Group 2
March 28 (1:30 Lab)		
March 28 (4:30 Lab)		
April 9	Lab 4- Blood pressure	Lab Group 1
April 11 (1:30 Lab)		
April 11 (4:30 Lab)		
April 16	Lab 4- Blood pressure	Lab Group 2
April 18 (1:30 Lab)		
April 18 (4:30 Lab)		
April 23	Lab 5- EEG	Lab Group 1
April 25 (1:30 Lab)		
April 25 (4:30 Lab)		
April 30	Lab 5- EEG	Lab Group 2
April 2 (1:30 Lab)		
April 2 (4:30 Lab)		