

San José State University
College of Engineering
BME 025, Introduction to Biomedical Engineering Design, Fall 2020

Course and Contact Information

Instructor:	C. Travis Rappleye
Office Location:	Zoom
Email:	christopher.rappleye@sjsu.edu
Office Hours:	By appointment
Class Days/Time:	M 1800-1950
Classroom:	https://sjsu.zoom.us/j/96538720537?
Prerequisites:	Chem 1A & Engr 10, with grade of C- or better Co-requisites Math 31, Phys 50

Course Format

This course is intended to provide the student with an introduction to the broad field of biomedical engineering which requires not just engineering excellence. To be successful the biomedical engineer also needs to acquire the soft skills necessary for effective communications with a broad range of professions. Students will also identify and work on a biomedical engineering project throughout the semester to hone their design skills. The lab portion of this class addresses development of competency in three software packages: Solidworks, Matlab and Python.

Canvas

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.

Catalog Description

Introduction to the broader field of biomedical engineering, with emphasis on design of biomedical devices. Development of familiarity with standards and software tools relevant to the biomedical engineering industry, packages for design and analysis, FDA and EU guidelines.

Course Description

This course introduces students to the broader field of biomedical engineering, including the key aspects of the process of conceiving and designing a biomedical device, engineering problem solving and algorithms, and provides them with the technical fundamentals to perform design and analysis of medical devices. Students will be challenged with designing feasible solutions to real-world biomedical problems and perform engineering analyses to substantiate their proposed solutions.

The lecture component is dedicated to impart some general knowledge of: design principles, verification and validation; formulation of feasible design strategies based on model algorithms; FDA guidelines and industry standards for biomedical device design and manufacturing.

The laboratory components will integrate the theoretical contents with hands-on use of industry-standard software packages for design and analysis of real-world biomedical devices.

Course Learning Outcomes (CLO)

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

1. **explain** how a medical device product evolves through the developmental states of prototyping, testing, production, and marketing;
2. **define** the three classes of medical devices identified by FDA regulations;
3. **understand** the FDA requirements and how they compare with ISO requirements;
4. **formulate** feasible design strategies for biomedical devices, based on model algorithms;
5. **document** the problem identification and algorithmic design;
6. **translate** algorithms into computational tools;
7. **generate** a biomedical device part or assembly drawing;
8. **generate** 3D CAD models of biomedical devices;
9. **use** computational tools for virtual design, including development, validation, and optimization of prototypes;
10. **work** in teams to complete specified course assignments (exams must be individual work);

Required Texts/Readings

Textbook

N/A

Other technology requirements

The three major software packages that students will use in this course are Solidworks, Matlab, and Python.

Library Liaison

Anamika Megwalu

Phone: (408) 808-2089

Email: anamika.megwalu@sjsu.edu

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](http://www.sjsu.edu/senate/docs/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, one mid-term examination, the final examination, and the assignments for the lab component.

Homework

Homework assignments will include questions and problems related to the materials covered in the lectures, as well as assignments that require the use of Solidworks, Matlab, and Python. Students are expected and encouraged to work together on assignments. However, submitted homework should be individual work. Homework must be turned in at the beginning of class on the due date. Late assignments may be assessed a penalty via reduction in total points possible.

Laboratory assignments and reports

Students will complete laboratory assignments and prepare reports in teams of two. Reports must include an Acknowledgments section indicating the specific contributions of each student. Students with no contribution will receive no credit for the report. Assignments and reports must be turned in at the beginning of class on the due date. Late submissions will be assessed 10%/day off of the maximum possible score.

Midterm examination

There will be one mid-semester examination. The examination will cover the entire course material covered until the time of the examination. The examination may include multiple-choice questions, open-ended questions, and problems. Internet-connected devices, books and notes are not allowed unless specified by the instructor. The tentative date of the midterm is indicated in the Course Schedule.

Final Examination or Evaluation

The final examination will be held on the date and time stipulated by SJSU's Final Examination Schedule. The final examination will cover the entire course material covered during the 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 unless specified by the instructor.

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.”

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 in the table below:

Lecture assignments and presentations, quizzes	20%
Midterm	20%
Final Exam	35%
Lab assignments and reports	25%

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.

Grading Information for GE

This course must be passed with a C- or better as a CSU graduation requirement.

Classroom Protocol

Online classroom information

This course or portions of this course (i.e., lectures, discussions, student presentations) will be recorded for instructional or educational purposes. The recordings will only be shared with students enrolled in the class through Canvas. The recordings will be deleted at the end of the semester. If, however, you would prefer to remain anonymous during these recordings, then please speak with the instructor about possible accommodations (e.g., temporarily turning off identifying information from the Zoom session, including student name and picture, prior to recording).

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.

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](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>