San José State University
Department of Mechanical Engineering
ME 267 Engineering Biomechanics, Section 02, Fall 2021

Course and Contact Information

Class Days/Time:	MW 16:30 – 17:45 PM
Classroom:	Online
Registration Code:	50111, 3 Units
Prerequisites:	Graduate standing and CE 112 or equivalent.
Instructor:	Winncy Du
Telephone:	408-924-3866
Email:	winncy.du@sjsu.edu
Office Location	E310F
Office Hours:	MW: 12:50 – 13:20; MW 17:45 – 18:15

Course Format

This class is fully online and requires use of Zoom video conferencing https://sjsu.zoom.us/ and the Canvas learning management system (LMS) https://sjsu.instructure.com/.

Online meetings require a microphone and speakers. Cameras are optional during the lectures, but required during the exams for Zoom proctoring.

Successful completion of assignments requires accessing the course website frequently, typically at least twice a week on a regular basis. Technical support for Canvas is available at "Canvas Support" under one.sjsu.edu.

Important communications regarding this class may be sent via Canvas or to student email addresses listed in MySJSU, and thus each student is expected to maintain up-to-date contact information in both systems.

Course Description: https://catalog.sjsu.edu/preview_course_nopop.php?catoid=12&coid=60804

Application of engineering mechanics to human body structure and function, involving 3-D kinematics, deformable bodies, viscoelastic behavior, and non-Newtonian fluids. Modeling of hard and soft tissues and analysis of response to loading conditions. Design considerations for biomedical and orthopedic devices.

Course Learning Outcomes

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

1. Explain the components, functions, and properties of cells, cell matrices, and cellular biomechanics.
2. Apply engineering mechanics theory and modeling to cells and cell matrices.
3. Explain blood composition, rheology, and their relationship.
4. Apply Newton's second law to derive hemodynamics of arteries and vessels.
5. Explain human circulatory system, its anatomy, and functions.

6. Apply fluid mechanics theory and modeling to the circulatory system, including unique aspects of bloodrheology and its interaction with the vasculature.
7.

Required Textbook and Reading

Textbook

C. Ross Ethier and Craig A. Simmons, Introductory Biomechanics - from Cells to Organisms, New York: Cambridge University Press, 2007 (ISBN: 9780521841122). Also available in eBook format (ISBN 9780511271175).

Other Readings

This class will also depend heavily on published research articles. Each student must be familiar with engineering literature search tools and library access to full-text articles. Tutorials are available at http://library.sjsu.edu/ and help is available from library staff.

Course Requirements and Assignments

According to the Office of Graduate and Undergraduate Programs https://www.sjsu.edu/curriculum/courses/syllabus-info.php, "*Success in this course is based on the expectation that students will spend, for each unit of credit, a minimumof 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus.*"

In addition to textbook reading and class participation, course requirements and assignments are as follows:

Participation Tasks: There will be several participation tasks to promote active engagement throughout the semester. Possible examples include discussion posts, online quizzes or surveys, and peer review. Completed tasks will be tallied for credit according to deadlines and there are no make-up options. Tasks may be in-class or online, so it is important to attend class and to check Canvas regularly.

Team assignments may be used for some portions of the above tasks.

Homework: Homework problems will be assigned corresponding to lecture topics and assigned reading. Some of the homework may be software-based. Students are encouraged to discuss general strategies collaboratively, but each student is

Grading Information

The course grade is calculated from a weighted sum of all graded components as follows:

10% for Participation Tasks
20% for Homework
20% for Journal Review Paper
20% for Midterm Exam
30% for Final Exam

Percentage points for grades assignments and exams correspond to letter grade as follows:

93.0-100	A	90.0-92.9	A-		
87.0-89.9	B+	83.0-86.9	B	80.0-82.9	B-
77.0-79.9	C+	73.0-76.9	C	70.0-72.9	C-
67.0-69.9	D+	63.0-66.9	D	60.0-62.9	D-
0-59.9	F				

Late Policy: Unless otherwise specified for a particular assignment, work that is submitted late will be accepted with reduced credit accordingly:

Homework

- One day late: -10%
- Two days late: -25%
- Three days late: -50%
- Four days late: -100%

Midterm & Final Exam

- 1 ~ 5 minutes late: -10%
- 6 ~ 10 minutes late: -25%
- 11~15 minutes late: -50%
- Over 15 minutes late: -100%

Exceptions: Any grading appeals or petitions must be communicated promptly in writing (or email). Exceptions will normally be evaluated at the very end of the semester in context with overall semester track record and all other exceptions class-wide. Special consideration for truly unavoidable and extenuating circumstances will depend on timeliness and strength of supporting documentation (e.g., doctor's note, police report, military orders).

Classroom Protocol

Although University Policy F15-12 at http://www.sjsu.edu/senate/docs/F15-12.pdf states that "Attendance shall not be used as a criterion for grading", the policy also states, "Students are expected to attend all meetings for the courses in which they are enrolled as they are responsible for material discussed therein" and furthermore, "Participation may be used as a criterion for grading when the parameters and their evaluation are clearly defined in the course syllabus and the percentage of the overall grade is stated."

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/ .

Library Resources

The engineering librarian as listed at http://library.sjsu.edu/staff-directory/sjsu-library-subject-liaisons can provide faculty and students with research instruction and resources, as needed, in person and online through the library website http://library.sjsu.edu/. Research guides http://libguides.sjsu.edu/ are accessible for departments and subject areas, including a guide specific to mechanical engineering at http://libguides.sjsu.edu/me.

ME 267 Engineering Biomechanics Course Schedule

This schedule is subject to change with fair notice via announcement in class or notification via Canvas.

Week Dates	**Topics and Textbook Reading Sections**	**HW Assignments Journal paper due**
Week 1 8/23, 8/25	Introduction to course Ch.2 Cellular Biomechanics: 2.1-2.4: Cell & cell energy system	HW1: 2.2; 2.3
Week 2 8/30, 9/1	2.5-2.7: Cell-matrix; cell mechanical properties, measurement, modelling, and response to mechanical events.	HW2: 2.4; 2.5
Week 3 9/8	2.8-2.9: Cells' mechanical stimulation & mechanobiological effects	HW3: 2.13; 2.14
Week 4 9/13, 9/15	Ch. 3 Hemodynamics. Journal paper review guide. 3.1-3.3: blood rheology, large artery hemodynamics, blood flow in small vessels	HW4: 3.4; 3.5 Review paper proposal
Week 5 9/20, 9/22	Ch. 4 Circulatory System 4.1-4.3 Anatomy of the vasculature, hear; arterial pulse propagation	HW5: 4.1; 4.2
Week 6 9/27, 9/29	4.4 Capillaries (filtration, pressure, leakage) 4.5-4.6 Veins and scaling of hemodynamic variables	HW6: 4.3; 4.6