

**San José State University**  
**Mechanical Engineering Department**  
**ME 195B, Senior Design Project II, Spring 2023**

**Course and Contact Information**

Instructor(s):	Section 01 (22431): Prof. Raghu Agarwal Section 02 (29365): Prof. Burford Furman Section 03 (23390): Prof. Igor Tyukhov Section 04 (29366) Prof. Harry Quackenboss Section 05 (22434) Prof. James Mokri Section 06 (22980) Prof. Syed Zaidi Section 07 (27744) Prof. Hussam Kabbani Course coordinator: Prof. Vimal Viswanathan
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Office Hours:	Prof. Agarwal: T TH 4:30 - 5:30 (by appointment only) Prof. Furman: M 1315 – 1415 (in person); Tu 1330 – 1430 (by Zoom) or by appointment Prof. Tyukhov: TBD Prof. Quackenboss: TBD Prof. Cydzik: Mo and We 6:00 -7:00 via Zoom Prof. Mokri: W 1630 – 1730 (in person, Zoom or by appointment) Prof. Zaidi: Mondays: 2:00 pm to 4:00 pm (By appointment only) Prof. Kabbani: Wednesdays 4:00 pm to 6:00 pm
Class Days/Time:	Wednesday, 1:30-4:15 pm (for sections 1, 2, 3, 5, 6); Wednesday, 3:00 – 5:45 pm (for section 4); and Wednesday, 6:00 – 8:45 pm (for section 7)
Prerequisites:	ME 195A with a grade of C- or better (ME 195A&B sequence must be completed in the same academic year)
GE/SJSU Studies Category:	This course satisfies SJSU Studies areas S and V when taken in conjunction with Engr 195a/b and ME 195a/b. You must receive a “C” or better in all four courses to get GE credit.

## Course Description

*Second half of a one-year team project carried out under faculty supervision. Project will proceed from problem definition to analysis, design and validation, experimentation including possible construction and testing.*

## Course Format

### Technology Intensive, Hybrid, and Online Courses

This class requires the use of Canvas, so you will need access to the internet. Most, if not all, assignments during the semester will require the use of a computer for word processing, spreadsheets, computational analysis, CAD drawings, etc. Electronic communication with your instructor and teammates is also required.

### Recording Zoom Classes

This course or portions of this course (i.e., lectures, discussions, student presentations) may 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. Your instructor may require you to turn your camera/webcam on during the class hours and presentations.

### Instructor Materials

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.

## Faculty Web Page and MYSJSU Messaging

*Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the [ME195 webpage](#) and/or on [Canvas Learning Management System course login website](#) at <http://sjsu.instructure.com>. You are responsible for regularly checking with the messaging system through [MySJSU](#) on [Spartan App Portal](#) <http://one.sjsu.edu> to learn of any updates.*

## Course Goals

The overall goals for the course are to:

1. Provide senior students a capstone experience in design from concept to fabrication and validation of the final product.
2. Familiarize students with general industry practices, such as planning, budgeting, part procurement, fabrication, assembly, and functional tests.
3. Develop students' creative abilities in solving open-ended design problems.
4. Develop students' engineering judgment as well as their confidence in making and accepting responsibility for design decisions.
5. Develop students' oral and written communication skills necessary to describe the assumptions, methods, and results of engineering analysis, synthesis, and decision making associated with their design.
6. Make students aware of the importance of teamwork in the design of products and provide them with an opportunity to develop team and leadership skills.
7. Develop students' understanding of professional practices, engineering ethics, as well as global and societal issues.

### **GE Learning Outcomes (GELO)**

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

1. Describe how identities (i.e. religious, gender, ethnic, racial, class, sexual orientation, disability, and/or age) are shaped by cultural and societal influences within contexts of equality and inequality.
2. Describe historical, social, political, and economic processes producing diversity, equality, and structured inequalities in the U.S.
3. Describe social actions which have led to greater equality and social justice in the U.S. (i.e. religious, gender, ethnic, racial, class, sexual orientation, disability, and/or age).
4. Recognize and appreciate constructive interactions between people from different cultural, racial, and ethnic groups within the U.S.

### **Course Learning Outcomes (CLO)**

By the end of the course each student should be able to:

#### *Design Skills*

1. Apply the complete product development process including:
  - a) Defining the problem/societal need, carrying out market study/economic and budget analyses
  - b) Developing a complete set of functional specifications the design solution must meet
  - c) Generating solution concepts
  - d) Selecting the most promising design concept using structured methodologies
  - e) Developing design models and/or drawings for prototype and final design components
  - f) Procuring, fabricating, and assembling prototype and final design hardware
  - g) Evaluating, testing, and analyzing prototype and final design components and systems
  - h) Identifying future modifications and improvements that could be made to the design based on test data
  - i) Writing a project report and making presentations
2. Develop a schedule, and meet schedule and budget constraints.
3. Interact effectively with vendors, suppliers, and shop personnel.

#### *Communication Skills*

4. Write high quality design reports (i.e., using correct language and terminology, correct technical information, and professionally prepared graphs and tables).

5. Give clear, informative, technically correct oral presentations using professionally prepared visual aids.

### *Team Skills*

6. Work harmoniously and effectively on a team to complete a design project.

### *Self, Society, and Equality in the US*

7. Describe how his or her identity and social interactions have been shaped by mobile technology (GELO 1)
8. Analyze how his or her engineering projects can produce diversity, equality, and structured inequalities in the U.S. (GELO 2)
9. Discuss how technology helps to promote greater equality and social justice in the U.S. among the disabled. (GELO 3)
10. Describe how mobile technology can promote constructive interactions between people from different cultural, racial, and ethnic groups within the U.S., OR how mobile technology widens the divide between from different cultural, racial, and ethnic groups within the U.S (GELO 4)

## **Required Texts/Readings**

### **Textbook**

*None*

### **Other Readings**

*Links to additional online readings will be posted online.*

## **Course Requirements and Assignments**

ME 195B involves extensive work in teams. You'll be working with your team to define your project and its specifications and go through the phases of design. Scheduling and spreading out your work evenly throughout the semester are very important. You must attend all Wednesday sessions. Assignments are described below.

### **Progress Reports**

Progress reports may be required by individual instructors, and they will provide you with information about required format and due dates.

### **Presentations**

Three group presentations are scheduled throughout the semester. All team members must present and be prepared to answer questions. Guidelines are shown on the [ME 195 website](#).

### **Individual Writing Assignments**

These assignments relate to both ME and Engr 195B. They are required of all students in ME 195B. There will be three assignments (see below), each worth 5% of your final grade, so put good effort into these papers. Assignment details will be posted on Canvas. Students are encouraged to take a look at good example papers from last year as well as the grading rubric before beginning writing. Assignments must be submitted via Canvas. NOTE: "Turnitin.com" will be used to check for plagiarism. **Completion of all three writing assignments is required to complete this course.** Late submissions are strongly discouraged. Late submissions will receive a scoring deduction of 5% per week late. So, for example, if you miss the Canvas submission

deadline, you will immediately lose 5% of the maximum score. If it takes you more than one week later to turn in your assignment, then you will lose another 5%, and so on. Word to the wise... turn your assignments in before the deadline!

Assignment 1 covers GE learning outcome 2 for area V: "Students shall be able to identify the historical context of ideas and cultural traditions outside the U.S. and how they have influenced American culture."

**Individual Writing Assignment 1:** Consider a technology in the Mechanical Engineering field invented outside of the U.S within the last 300 years. (a) Describe the cultural and social factors in that country that led to this technology's invention. (b) Describe how this invention has evolved and influenced the culture of the U.S. You must include at least two references. Word count must be in the range of 300 to 600 words.

Writing Assignment 2 addresses GE learning outcome 1 for area V: "Students shall be able to systematically compare the ideas, values, images, cultural artifacts, economic structures, technological developments, or attitudes of people from more than one culture outside the U.S."

**Individual Writing Assignment 2:** Assume that your senior design project (or choose a project related to your senior design project) is going to be manufactured in another country. Using the studies provided in Engr 195a/b as a background, write about **one** of the topics below, and compare it for **two countries** outside of the United States with very different cultures. Back up your claims with research, and cite at least two sources. Word count must be in the range of 800 to 1000 words.

1. How would you recommend changing your design, if your project were to be implemented in these countries? For example, if you implemented your design in China, would the different social and cultural norms necessitate changes to the final design?
2. What human, social, and cultural barriers may result in difficulties implementing your project?
3. How would these different cultures change the manufacturing process and cost? Discuss multiple effects. For example, different countries have different costs of living, union involvement, safety regulations, management styles, etc. Discuss the cultural effects that result in these differences.

Writing Assignment 3 addresses GE learning outcome #3 for V: "Students shall be able to explain how a culture outside the U.S. has changed in response to internal and external pressures."

**Individual Writing Assignment 3:** Research one of the renewable energy projects listed below.

- 1) Describe the cultural and social factors that led to these projects, both internal and external to the country. Describe how these projects have evolved and influenced the culture of the country where they are located.
- 2) If you were working on one of these projects and were a member of the National Society of Professional Engineers, what aspects of their codes of ethics would affect your work? In what way? Make sure that you address each of these topics separately in your paper, and cite the NSPE codes that apply (<https://www.nspe.org/resources/ethics/code-ethics>). Word count must be in the range of 400 to 800 words.

- Narmada Valley Dam Project (India)
- 3 Gorges Dam Project (China)
- Nam Theun-Hinboun Hydropower Project (Laos)

*Note: Any paper that contains significant spelling and/or grammar errors will be returned to you and not graded. Correct use of English is a fundamental requirement for your papers to be graded. If errors in English makes it difficult for a grader to understand your sentences, or excessively slow down the grader to mark your technical errors, your paper will be returned to you for further work on its English, and your grade for the paper will be deferred until it is resubmitted with corrected English. If your assignment is returned for an excessive number of grammatical errors, you will be allowed to rewrite and resubmit it within two weeks of the original return date. If not resubmitted by the end of two weeks, you will receive a zero (0) for the writing assignment. If your grade for an assignment is lower than 70%, as an*

option you will be allowed to rewrite it. You must resubmit it within two weeks of the original return date. In that case, the max grade you will be able to get for your particular rewrite is 87%.

### **Final report (Final Evaluation) and Prototype Evaluation**

Start your final report early (Week 6). Unless otherwise noted by your instructor, the final report should follow the format included in the “ME 195B Final Report Evaluation Rubric” shown on the course website. Your final report should incorporate and discuss appropriate engineering standards/codes for your project. Consult your instructor to see which sections he or she wants you to complete. The final report serves as your final evaluation for the course, per university policy.

### **Individual Performance/Participation Evaluation**

Your instructor will give you a score for your individual team contributions. Items that factor into this score may include team meeting participation, performance in presentations, individual contributions to the final report, and an individual performance evaluation form that each team member must complete. Your instructor will let you know which form to complete.

### **Expected time commitment**

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 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.

### **Grading Information**

A letter grade will be assigned to each student by the section instructor at the end of the semester and will be based on evaluation of the following course requirements:

- (5%) Progress reports or special assignments
- (25%) Delivery of at least three presentations on achievements and timely progress
- (15%) Individual writing assignments (three total)
- (40%) Final report and semester achievements
- (15%) Individual performance/participation evaluation

### **Grade Distribution Guideline**

<i>Grade</i>	<i>Percentage</i>
<i>A</i>	<i>93 to 100%</i>
<i>A minus</i>	<i>90 to 92.9 %</i>
<i>B plus</i>	<i>87 to 89.9%</i>
<i>B</i>	<i>83 to 86.9%</i>
<i>B minus</i>	<i>80 to 82.9%</i>
<i>C plus</i>	<i>77 to 79.9%</i>
<i>C</i>	<i>73 to 76.9%</i>
<i>C minus</i>	<i>70 to 72.9%</i>
<i>D plus</i>	<i>67 to 69.9%</i>
<i>D</i>	<i>63 to 66.9%</i>
<i>D minus</i>	<i>60 to 62.9%</i>

## Notes about Grading:

1. No extra credit will be made available.
2. Assignments must be turned in by the set deadlines. Late work will likely result in lowered grades according to the instructor's discretion.

## Classroom Protocol

It is expected that each team member will be present in class each week, working with his or her team. Missing or coming late to team meetings without an approved excuse will result in lower grades on the individual performance/participation evaluation. Each team member must participate in each oral presentation or else he/she will receive a grade of "0" for that presentation. The only exceptions are university-authorized excuses, such as being ill with a note from a doctor, or if arrangements were made in advance with the instructor.

## Work Area

- **Do NOT** leave trash in the area. Hazardous materials are to be kept in safe containers.
- **Do NOT** leave equipment running unattended.
- At the end of the semester, each team is responsible for clearing the lab area they have occupied by their project unless otherwise specified by your instructor. **Your team's grade will not be released until the cleanup is complete.**

## Safety

- 1) **NO STUDENT IS PERMITTED TO WORK ALONE IN A WORK AREA WITH EQUIPMENT OR HAZARDOUS MATERIAL PRESENT.** Refer to safety materials posted in each Laboratory. Do not use dangerous equipment or hazardous materials for your project at home, either. Anyone caught working in the machine shop alone, even if they are just using a screwdriver, will lose their shop code permanently.
- 2) **Check your design with your instructor before hooking up and/or applying power if there are large batteries or electrical circuits that you designed yourself. This is especially important for electric vehicles.**
- 3) **Use proper protective equipment (safety glasses or goggles, earplugs, gloves, etc.) when operating lab equipment. If you are even just in the same room as someone machining (using a lathe, drill press, etc.) use goggles since materials may fly out of the vicinity of that equipment.**
- 4) **Wear appropriate attire when operating equipment. Secure long hair and loose clothing around rotating equipment or open heat sources, proper shoes where drop hazards exist, etc.**
- 5) **Report any accident to your instructor, Roger Jue, or the ME office immediately.**
- 6) **Report any unsafe or hazardous condition in the lab, such as spills or electrical hazards, immediately. Do not attempt to clean up spills of hazardous materials, such as oils, unless you have permission and receive instruction from Roger Jue. Never pour chemicals (oils, glycol, etc.) down the drain.**
- 7) **If you use any chemical that was in secondary containment or in a fire locker, put it back immediately after use. Do you leave chemicals, including oils, sitting in a lab.**
- 8) **In case of emergency, call 911!**

## Safety during the Pandemic

To ensure the safety and protection of all parties, it is critical to follow the university guidelines related to the campus access that include but not limited to the following:

- Do not come to the campus if you have COVID-19 symptoms
- Face coverings are NOT required but strongly encouraged
- Follow the posted guidelines when entering labs and constrained spaces
- Do not enter any labs without the prior approval from your instructor or the lab director

## E123 Shop Access

The shop in E123 will be made available for students for fabrication purposes. There is a limitation to the maximum number of students who can access the machine shop at any point; hence the scheduling should be followed to gain access. You are not allowed to use the machine shop without the presence of a technician or a trained TA in the shop..

### **University Policies**

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo) (<http://www.sjsu.edu/gup/syllabusinfo>), which is hosted by the Office of Undergraduate Education. Make sure to visit this page to review and be aware of these university policies and resources.



## ME 195B Senior Design Project II Course Schedule, Spring 2023

*Schedule is subject to change with fair notice via email. Assignments are due by 11:59 pm unless otherwise noted.*

Week	Date	Topics, Readings, Assignments, Deadlines	Assignments Due
1	Jan 25	<b>Recorded video on the overview of ME 195B (Dr. Viswanathan)</b> – watch the video in your individual sections; follow-up discussions led by your instructor	
2	Feb 01	Individual sessions	
3	Feb 08	Individual sessions	
4	Feb 15	<b>Watch recorded video on engineering ethics; follow-up discussion in your section led by your instructor</b>	Writing assignment #1 due on 02/19, Sunday
5	Feb 22	Individual sessions	
6	March 01	<b>Progress presentation #1</b>	
7	March 08	<b>Recorded video on Global Economy and Social Impacts, Speaker TBD; follow-up meetings in your section</b>	
8	March 15	Individual sessions	
9	March 22	Individual sessions	Writing assignment #2 due on 03/19, Sunday
10	March 29	No class – Spring Break	
11	Apr 05	<b>Progress presentation #2</b>	
12	Apr 12	<b>Watch recorded video on report writing</b> <b>Instructor's Meeting (no individual sessions)</b>	
13	Apr 19	Individual sessions	Writing assignment #3 due on 04/16, Sunday
14	Apr 26	Individual sessions	
15	May 03	Individual sessions – preparations for the conference day	
16	May 10	Individual sessions – prototype evaluation day	
	May 12	Senior project conference day (FRIDAY)	
17	May 15	FINAL REPORT & INDI. PERF EVAL DUE AT 2:30 PM	Portfolio due on 05/23 at 2:30 pm

### Important Notes

- Each project team will make at least two oral presentations during the scheduled individual section meetings at times to be arranged by the section instructor. The conference day presentation will count as a third one.
- Students' participation in ALL scheduled individual and general sessions is mandatory unless they have a university-authorized excuse. Absence from these sessions without the Section Instructor's permission will affect a student's individual performance evaluation.
- Note that **Conference Day is on a Friday**. You are expected to attend your entire session, which typically will run most of the morning or afternoon. If you have an unavoidable conflict, discuss with your instructor at the beginning of the semester.