SAN JOSÉ STATE UNIVERSITY
Department of Mechanical Engineering

Spring 2020 ME 195B Senior Design Project II

Prerequisites	ME 195A with Grade C- or better
Credit Units	3 units
Class Hours	Wednesdays, 13:30 – 16:15
Instructors/Meeting Room	Section 1 (24743): Prof. Raghu Agarwal, Room E135 Section 2 (24744): Prof. Raymond Yee, Room E113 / E125A(lab) Section 3 (24745): Prof. Winncy Du, Room 192 Section 4 (29032): Prof. Furman, 115 Terraine St. (https://goo.gl/maps/VayYRWqwrtoQdXbM6) Section 5 (24747) Prof. Viswanathan, Room E114 & E215 (presentation) Section 6 (24748) Prof. Mokri, Room E141 Section 7 (27127) Prof. Zaidi, Room E133
Course Coordinator	Professor Raymond Yee; 408-924-3935; Raymond.yee@sjsu.edu
Contact Information:	Dr. Agarwal: office Engr 310D, raghu.agarwal@sjsu.edu, (408) 924-3845 Dr. Yee: office Engr 310B, raymond.yee@sjsu.edu, (408) 924-3935 Dr. Du: office Engr 310F, winncy.du@sjsu.edu, (408) 924-3866 Dr. Furman: office Engr 310G, burford.furman@sjsu.edu, (408) 924-3817 Dr. Viswanathan: office Engr 310E, vimal.viswanathan@sjsu.edu, (408) 924-3941 Prof. Mokri: james.mokri@sjsu.edu Dr. Zaidi: sohailhzaidi@gmail.com
Office Hours	Prof. Raghu Agarwal: TR 16:30 – 17:30 in E310D Prof. Raymond Yee: M 13:30 – 14:30; Wed 16:00 – 17:00 in E310B Prof. Winncy Du: MW 17:45 – 18:30 (in E192), M 15-15:30 (in E310F) Prof. Buff Furman: MTR 13:30 – 14:30 in E310G Prof. Vimal Viswanathan: T, W, TR 09:00 am – 10:00 am in E310E Prof. James Mokri: MW 12:00 – 13:00 in room E141 Prof. Syed Zaidi: MW 18:00 – 19:00 in room E133

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.

Course Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the ME 195 web page at: http://www.sjsu.edu/me/bsme/bsme_seniorproject/index.html

and/or on Canvas Leaning Management System course login website at "http://sjsu.instructure.com". You are responsible for regularly checking your email to learn of any updates.

Grading

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:

- (25%) Delivery of at least three oral presentations on achievements and timely progress – see your section instructor for presentation guidelines.
- (15%) Individual writing assignments
- (45%) End-of-semester report and accomplishments (including completion of prototype and demonstration of its performance) – See Final Report guidelines on senior project website
- (15%) Individual performance evaluation – See Evaluation Rubrics on senior project website.

Grade Distribution

A	93-100	A-	90-92.9		
B+	87-89.9	B	83-86.9	B-	80-82.9
C+	77-79.9	C	73-76.9	C-	70-72.9
D+	67-69.9	D	63-69.9	D-	60-62.9

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.**

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. (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. Minimum word count: 300

Assignment 2 addresses GE learning outcome 1 for area V: "Students shall be able to compare systematically 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. Minimum word count: 800

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.

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 project 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 (Links to an external site.)). Minimum word count: 400

- 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

Unless otherwise noted by your instructor, the final report should follow the format included in the "ME 195B Final Report Evaluation Rubric" and "Report Writing Outline and Timeline" shown on the course website. The final report serves as your final evaluation for the course, per university policy. The evaluation for the prototype rubric is given on the webpage for the class.

Individual Performance 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.

Work Area

- **Do NOT** leave trash in the area. Hazardous materials are to be kept in safe containers.
- **Do NOT** leave equipment running unattended.

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 googles, 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 googles 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!**

E123 Shop Access and Makerspace lab

The shop in E123 will be made available for students for fabrication purposes during the hours posted on the door. Makerspace in room E184 would also be available for 3D printing upon request, see website: https://www.sjsu.edu/epics/makerspace/. Access beyond those hours for assembly purposes only (no machining) will be granted on a case-by-case basis by petition. Access to the shop will be given under two circumstances: 1) you have taken ME/Tech 41 and received a B- or better, or 2) you can demonstrate the ability to run the machinery safely. Please see the department office for forms to request access.

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/"

Expected Time Commitment

According to university rules: "Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five 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."

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.

Student Learning Objectives (SLOs)

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

Design Skills

1. Apply the complete product development process including:
    - Defining the problem/societal need, carrying out market study/economic and budget analyses

- Developing a complete set of functional specifications the design solution must meet
- Generating solution concepts
- Selecting the most promising design concept using structured methodologies
- Developing design models and/or drawings for prototype and final design components
- Procuring, fabricating, and assembling prototype and final design hardware
- Evaluating, testing, and analyzing prototype and final design components and systems
- Identifying future modifications and improvements that could be made to the design based on test data
- 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.

Contemporary Issues

7. List several examples of contemporary issues related to their project, and articulate a problem statement *or* position statement for each.
8. Identify possible solutions to these contemporary problems, as well as any limitations of such strategies.

Environmental, Economic, and Safety Issues

9. Evaluate and describe accurately the environmental impact of your product.
10. Evaluate and describe accurately any environmental and economic tradeoffs of your product.
11. Evaluate and describe accurately the health, safety, and economic tradeoffs of your product.

GE Learning Objectives

12. Area V SLO #1: Students shall be able to compare systematically the ideas, values, images, cultural artifacts, economic structures, technological developments, or attitudes of people from more than one culture outside the U.S.
13. Area V SLO #2: 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.
14. Area V SLO #3: Students shall be able to explain how a culture outside the U.S. has changed in response to internal and external pressures.

COURSE SCHEDULE (subject to change)

Wk. No.	Date	Activities
1	1/29	**General Session on Overview of ME 195B. Location: E189 (Dr. Yee in charge) at 1:30PM.**
2	2/5	Individual sessions
3	2/12	Individual sessions
4	2/19	**In-class Session: How to Do an Effective Presentation. [Show Video In class] Speaker: Dr. Buff Furman (thru video)**
5	2/23	**Individual Writing Assignment #1 is due Sunday 2/23 via Canvas**
	2/26	Student Project presentation No. 1
6	3/4	**General Session: Global Economy and Social Impacts [Location: E189] at 1:30PM. Speaker: Dr. Tai Ran Hsu (in person)**
7	3/11	Individual sessions
8	3/18	Individual sessions
9	3/22	**Individual Writing Assignment #2 is due Sunday 3/22 via Canvas**
	3/25	Individual sessions
10	4/1	Spring Break – No classes
11	4/8	Student Project Presentation No. 2
12	4/15	**General Session: Engineering Ethics Case Studies coordinated by Drs. Furman & Viswanathan at 1:30PM [Location: E189], Format TBD. Instructor's Meeting (Room TBD) to follow.**
13	4/22	Individual sessions
14	4/26	**Individual Writing Assignment #3 is due Sunday 4/26 via Canvas**
	4/29	Preparation for Student Conference Day and Prototype Evaluation
15	5/6	Prototype Evaluation Day
	5/8	Conference Day -- Final Presentations (Whole day - Rooms TBD, Afternoon only - TBD)
16	5/11	Final Report Due Date (on Monday 5/11 by 5PM)

Important Notes

1. Each project team will make at least three oral presentations during the scheduled individual section meetings at times to be arranged by the section instructor
2. 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.
3. 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.