MAE 189 - Senior Project - Special Topics

(also includes MAE93 and MAE193 connected courses)

2018-2019 Academic Year

ENGRMAE 189. Senior Project - Special Topics. 1-4 Units.
Group or individual senior project of theoretical or applied nature involving design. Materials fee. (Design units: 1-4)
Repeatability: May be taken for credit for 12 units as topics vary.
Restriction: Seniors only.

ENGRMAE 93. Topics in Design Project. 1-2 Units.
Early-stage design/hands-on experience for lower-division students through participation alongside seniors in the design project. (Design units: 1)
Repeatability: Unlimited as topics vary.
Restriction: Mechanical Engineering Majors have first consideration for enrollment. Aerospace Engineering Majors have first consideration for enrollment.

ENGRMAE 193. Topics in MAE Design. 1-4 Units.
Provides early-stage design/hands-on experience for upper-division students through participation in senior design projects course ENGRMAE 189. (Design units: 1)
Repeatability: May be taken for credit for 12 units as topics vary.
Restriction: Aerospace Engineering Majors have first consideration for enrollment. Mechanical Engineering Majors have first consideration for enrollment.

Instructional Team

- Prof. Mark Walter (m.walter@uci.edu)
- Prof. Natascha Buswell (nbuswell@uci.edu)
- Prof. Edwin Peraza Hernandez (eperazah@uci.edu)
- Project Advisors - see available projects at www.ucimaeprojects.com
- TAs

Course Objectives:

Provide students with an opportunity to participate in an open-ended design experience which ultimately includes:

- Developing a full understanding and demonstration of the engineering design process
- Integration of course knowledge and analytical skills into the engineering design process
- Developing and using teaming skills
- Employing professional communication skills

Course Communication

- Announcements in Canvas will be our main avenue of communication regarding events, due dates, opportunities, etc.
- Canvas will be used for document submission and grading
- Each student is responsible for reading all announcements and, when requested, responding to requests

- Each team is responsible for maintaining an up-to-date roster both on Canvas and on Google Drive documents
- The program will also maintain a ucimaeprojects website to provide external visibility; Each team is responsible for providing some of the content for the ucimaeprojects portal

Activities and Assessment:

Individual Activities	**Grade**	**Design Process**	**Analytical Skills**	**Teaming**	**Communication**
Weekly Check-Ins	30%	X	X		X
Lab Notebook	10%	X	X		X
Peer and Course Evaluations	10%			X	

Team Activities	**Grade**	**Design Process**	**Analytical Skills**	**Teaming**	**Communication**
Team Contract	5%			X	
Schedule and Overarching Goals	5%	X			X
Progress Reviews	2%	X			
Website and Blogging	3%				X
Participation in Design Reviews	5%	X	X	X	X
Documentation	25%	X	X	X	X
Peer Presentations	5%	X	X	X	X

Fall 2018 Schedule: (excludes self-scheduled documentation)

Week Number	Dates	Weekly check in	Other due dates (tentative)
1	October 1 - 5	None	
2	October 8 - 12	Introduction / Expectations	
3	October 15 - 20	Check in 1	Team Formation & Contract and Team Schedule & Milestones
4	October 22 - 26	Check in 2	Progress Reviews
5	October 29 - Nov 2	None	
6	Nov 5 - 9	Check in 3	
7	Nov 12 - 16	Check in 4	Peer Reviews
8	Nov 19 - 23	Thanksgiving Week - None	
9	Nov 26 - Nov 30	Check in 5	Posters Due
10	Dec 3 - Dec 7	Check in 6	Fall Design Review

Descriptions of Activities:

Weekly Check-In Meetings

- 10-person groups meet for 50 minutes each week (see schedule below) with a member of the instructional team. Times TBA
- For the check-in meetings, you must prepare one PowerPoint slide and post it to Canvas 1 hour before the start of your check-in meeting time. A template for the slide(s) is provided on Canvas. Your slide must address the following and you will also be asked to speak about these items during the meeting:
    - What were the engineering REQUIREMENTS that you wanted to meet? Give S.M.A.R.T. (Specific Measurable Achievable Results-Focused Time-bound) requirements. Be quantitative.
    - What did you DO to accomplish your goals? What technical/engineering knowledge and analysis did you employ?
    - PROVE that your method worked and that you accomplished your goals. Show your measurements and other physical results.
    - What requirements will you address NEXT week?
- You will be graded out of 10 points: 8 points for the technical content (4 items above) of your presentation and 2 points for the quality of the slide and oral presentation

Lab/Design Notebook

- You are expected to have a lab/design notebook for all design activities and meetings. A book will be provided. You are expected to maintain this lab/design notebook and utilize it to enter and track your design ideas, progress in design activities, reminders, meeting notes, etc.
- The Instructional Team will examine these notebooks throughout the quarter and assess them based on the value of their contents

Peer and Course Evaluations

- Peer evaluations will be conducted near the middle of the term and at the end of the term. You will be required to answer questions about your and your teammates' contributions to your project
- Points will also be given for completing course evaluations completely and on time

Team Formation and Contract

A Team Formation and Contract is a document prepared by every team before starting work in group projects. This document is the first document in the engineering design process documentation package. However, it is unique in that it is graded separately and it has a fixed due date in Week 3. A template is available on Canvas. All items in the template must be addressed your Team's actual document. We would like to call special attention to the following:

- A code of ethics to which all members on the team agree to adhere to.
- Specification of preferred methods of team communication, meeting schedules, and goals.
- Consequences and follow-up procedures of particular actions or inactions of group members
- The contract must be signed by every team member for it to be valid.
- The contract will be kept on file by the coordination team. It must be referred to in any instances of conflict.

Schedule and Goals

- Each team will need to submit engineering documentation for their project. The documentation is listed in the next section. Templates are available on Canvas.
- A Team Schedule for documentation submission must be provided when the Team Formation and Contract is submitted. A copy of the Schedule will be posted on the website. As described in the previous section, the one exception is the Team Formation and Contract document which must be turned in by the end of Week 3.
- Any deviation from the deadlines originally listed on your team's Schedule will need to be requested in a formal memo to the team advisor and the Course Instructors. The team advisor has the authority to approve schedule changes.
- Also required with the Schedule are overarching goals. A Gantt-style template will be provided on Canvas.

Progress Reviews

- At the beginning of each quarter, the course coordination team will meet with each team to review progress and direct teams to necessary resources
- Templates for these meetings will be provided on Canvas

Website and Blogging

- Your team is responsible for posting a weekly update on the ucimaeprojects blog-site about your team's progress. The first week should include your overarching goals for the quarter. The level of detail in the remaining updates is up to your team but needs to demonstrate that your team is moving towards the goals you identified in the Schedule, and/or describe how your goals are being adjusted and why. Your team should consider using *some* of the content from member check-in slides

Participation in Design Reviews

- Participation in quarterly design reviews is required.
- Your team must prepare a poster for each design review.
- Sample posters will be posted on Canvas.
- The Course Instructors will assist by holding a poster workshop.

Documentation

- Documentation is an essential part of the engineering design process.
- All projects must have due dates on the team's Schedule (see above) for submission of each of the following documents:
    - Team Formation and Contract (Due Q1 end of Week 3)
    - Project Discovery
    - Project Design for Safety
    - Project Specifications
    - Project Realization: Manufacturing and Assembly
    - Project Safety Plan
    - Project Testing and Validation
    - Project Closure
- Templates for all documents are provided on Canvas.
- Submissions will be graded by advisors and Course Instructors.

Student Participation and Behavior

- All students are expected to participate in the project for which they are registered in an active and engaged manner. This means attending team meetings, completing assignments on time and as expected and/or explaining why things went differently than planned, and letting your teammates know ahead of time if you will be unable to attend a meeting.
- All students are expected to behave in a professional manner. The college environment allows for you to practice your engineering skills, which are both technical and social. This means everyone is expected to treat their teammates, support staff, and coordination team in a respectful manner at all times. Emails and communication should be formal.
- Safety is a critical aspect of the engineering design process that must also carry through to all actions and behaviors of individuals. All individuals will be **required to take several on-line basic lab safety courses** through http://www.uclc.uci.edu/. The assignment to complete these on-line trainings will be posted on Canvas. Individual safety behavior will be monitored through spot checks. Project/tool specific safety training will also be required in many instances. More details will be provided on the class canvas site.

How to Succeed in This Course

Success in this course means (1) gaining a thorough understanding of the design process in action, (2) integrating analytical skills from other engineering core and technical elective course, (3) contributing to a team in a meaningful way, and (4) practicing and gaining confidence in your engineering communication skills. In order to succeed, you should take these course objectives seriously.

(1) Design is an open-ended and iterative process - there is no “one correct” design, which means you will need to creatively apply your knowledge to new contexts and produce and evaluate *multiple* concepts.
(2) In this course, you will be building upon much of your prior knowledge from other courses and experiences. Make sure to use the knowledge you learned in other courses by thinking through connections of technical content to the application on which you are working.
(3) In order to have a meaningful teaming experience, you need to agree to team norms and then stick to them. You will get out what you put into a teaming experience - make sure you treat it as something that needs special care and attention. Your teammates cannot read your mind and you cannot read others’ minds - speak up if you have something to say, and invite others to the conversation if you are dominating the conversation.
(4) The weekly check-in meetings and lab notebook activities are meant to prepare you for engineering practice. As an engineer, much of your time will be spent writing about and presenting what you are working on. By practicing these communication skills in the context of a design project, you will be preparing for future job interviews and gain confidence in talking about engineering and communicating the value of your work.

Academic Dishonesty

- All students are expected to adhere to the UCI Academic Dishonesty Policies (for more information, please visit http://senate.uci.edu/files/2015/12/Appendix-VIII-UCI-Academic-Senate-Policy-on-Academic-Honesty.pdf)

ABET Student Outcomes

As this course is a senior design course, you will be expected to demonstrate that you have achieved the following outcomes as part of your course experience.

SO 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
SO 2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
SO 3: an ability to communicate effectively with a range of audiences
SO 4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
SO 5: an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
SO 6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
SO 7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies