

**Capstone Electrical Engineering Design Projects**  
Electrical and Computer Engineering Department  
University of California, Santa Barbara

**Course Description and Objectives:**

In this course, students work in teams under the direction of a faculty advisor to tackle a challenging engineering design project. Engineering communication, such as reports and oral presentations are covered. The course emphasizes practical, hands-on experience, and integrates analytical and design skills. Students will develop skills in design problem solving, creative thinking, project planning, and teamwork, as well as developing technical and practical skills in the particular area(s) of research covered by their project.

**Topics Covered:**

- Development of a Project Plan
- Development of Concepts and Designs
- Design Research and Development
- Prototyping
- Design Testing, Analysis, and Evaluation
- Engineering Reporting: Design Reviews, Presentations, and Technical Reports
- Engineering Project Management
- Intellectual Property

**Course Format:**

In ECE 188, students design, build, and present a challenging engineering design project. ECE 188A primarily focuses on the initial design and development stage. After choosing a project, each group will begin researching the critical elements of their project, develop a preliminary project plan with a set of preliminary design specifications, and give a short preliminary presentation to the class describing their projects. Students then continue to refine their plan and begin prototyping and design testing. At the end of the quarter, each group will finalize their project plan and product design specifications, and give a 30 minute presentation detailing the (1) Project Plan, (2) Product Design Specifications, (3) Budget, (4) Prototyping and Testing, and (5) Division of Labor (individual responsibilities).

In ECE 188B, the second quarter of the sequence, the focus of the projects shifts from the ‘initial design’ phase to ‘project execution’ phase. Groups continue building the products, with the goal of having an initial working prototype completed by the end of the quarter. Each group also undergoes a mid-project review with the instructor and their sponsors/mentors half way through the quarter. Other activities include periodic update meetings with the instructor and product branding/marketing exercises.

In ECE 188C, the final quarter of the sequence, students finalize their designs and product specifications, complete the assembly, and present and demo their products. Final products will be evaluated based on the final specifications that were set out for the product.

## Instructor Info:

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## TA Info:

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Grades in ECE 188A will be assigned approximately as follows:

- Preliminary Project Plan / Design Specifications: 20% of grade
- Initial Prototype: 20% of grade
- Final Presentation: 40% of grade
- Lab Notebook / Record Keeping: 10% of grade
- Individual Contribution: 10% of grade

Grades in ECE 188B will be assigned approximately as follows:

- Winter Quarter Updates/Demos: 30% of grade
- Mid-Project Review: 40% of grade
- Other Assignments (branding/logo, etc): 20% of grade
- Individual Contribution: 10% of grade

Grades in ECE 188C will be assigned approximately as follows:

- Final Project Design/Specs: 30% of grade
- Final Presentations/Demonstrations/Reports: 60% of grade
- Individual Contribution: 10% of grade

Class Web Page: [http://www.ece.ucsb.edu/courses/ECE188/188\\_F15Ilan/](http://www.ece.ucsb.edu/courses/ECE188/188_F15Ilan/)

<b>DAY / DATE</b>	<b>TOPIC / ACTIVITY</b>	<b>TASK / ASSIGNMENT</b>
<b>Week 1</b>		
Thurs 9/24	Project Introductions	Review projects
Tues 9/29	Project Introductions	Review projects
Thurs 10/1	Project Requests	Form teams
<b>Week 2</b>		
Tues 10/6	Course Objectives	Projects/teams finalized
<b>Week 3</b>		
Tues 10/13	Project Planning Design Requirements/Specifications	Group meetings with instructor and faculty advisers
<b>Week 4</b>		
Tues 10/20	Prototyping Prelim Project Plan / Design Specs	Begin establishing design and specs
<b>Week 5</b>		
Tues 10/27	PCB Design	Continue establishing design and specs
<b>Week 6</b>		
Tues 11/3	PCB Design	
<b>Week 7</b>		
Tues 11/10 Thurs 11/12	<b>PRELIMINARY PRESENTATIONS</b>	<b>Preliminary Project Plan and Preliminary Design Specs</b> due Nov 13 by 5pm
<b>Week 8</b>		
Tues 11/17	Meetings with TA / instructor	
<b>Week 9</b>		
Tues 11/24	Work on final presentation / prototype	Finalize initial prototype
<b>Week 10</b>		
Tues 12/1 Thurs 12/3	<b>PROJECT PRESENTATIONS TO SPONSORS / PROTOTYPE DEMO.</b>	<b>Updated Project Plan, Design Specs, and Group/Individual Evaluations</b> due Dec 9 by 5pm

<b>DAY / DATE</b>	<b>TOPIC / ACTIVITY</b>	<b>TASK / ASSIGNMENT</b>
<b>Week 11</b> 1/4-1/8	Winter quarter kick-off	Work on project
<b>Week 12</b> 1/11-1/15	3D Printing	Work on project
<b>Week 13</b> 1/18-1/22	<b>ELEVATOR PITCHES</b>	Work on project
<b>Week 14</b> 1/25-1/29	Progress report meetings	
<b>Week 15</b> 2/1-2/5	Patents and Intellectual Property	Prepare for design review
<b>Week 16</b> 2/8-2/12	Branding / Trademarks	Finalize product brand name
<b>Week 17</b> 2/15-2/19	Present brand names / logos	
<b>Week 18</b> 2/22-2/26	<b>MID PROJECT DESIGN REVIEW</b>	
<b>Week 19</b> 2/29-3/4	<b>PROTOTYPE DEMO</b>	
<b>Week 20</b> 3/7-3/11	<b>DETAILED PROGRESS REPORT / PLAN FOR COMPLETING PROJECT</b>	<b>Group/Individual Evaluations</b> due March 11 by 5pm.

<b>DAY / DATE</b>	<b>TOPIC / ACTIVITY</b>	<b>TASK / ASSIGNMENT</b>
<b>Week 21</b> 3/28-4/1	Spring kick-off, abstracts	Prepare final product design and specs
<b>Week 22</b> 4/4-4/8	Sponsor/mentor meetings	Prepare final product design and specs
<b>Week 23</b> 4/11-4/15	Sponsor/mentor meetings	<b>FINAL PRODUCT DESIGN / SPECS</b> due 5pm on 4/15
<b>Week 24</b> 4/18-4/22	<b>GROUP PRESENTATIONS</b>	<b>Abstracts due by 5pm on 4/20</b>
<b>Week 25</b> 4/25-4/29	Poster info session	Work on projects!
<b>Week 26</b> 5/2-5/6	<b>PROTOTYPE DEMO</b>	Group meetings with instructor
<b>Week 27</b> 5/9-5/13	Group Meetings (no class)	Work on projects!
<b>Week 28</b> 5/16-5/20	Progress updates	Group meetings with instructor
<b>Week 29</b> 5/23-5/27	<b>FINAL PRESENTATIONS</b>	Complete poster
<b>Week 30</b> 5/30-6/3 Fri 6/3	Practice presentations / set-up <b>CAPSTONE PRESENTATION DAY!</b>	Poster Presentations / Demos. Individual/group evaluations due 6/6 by 5pm.