

**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 begins researching the critical elements of their project, develops a preliminary project and prototype plan, and gives 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 finalizes their project plan and product design specifications, completes and demos an initial prototype, and gives a 45 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 at the 2020 UCSB Engineering Design Expo. Final products will be evaluated based on the final specifications that were set out for the product.

## Instructor Info:

Dr. Ilan Ben-Yaacov  
Office: HFH Room 5111  
Email: [ilan@ece.ucsb.edu](mailto:ilan@ece.ucsb.edu)

Dr. Reza Abdolee  
Office: HFH Room 3165  
Email: [rabdolee@ucsb.edu](mailto:rabdolee@ucsb.edu)

## TA Info:

Evan Blasband <[evanblasband@umail.ucsb.edu](mailto:evanblasband@umail.ucsb.edu)>  
Blake Diamond <[diamond@umail.ucsb.edu](mailto:diamond@umail.ucsb.edu)>  
Erik Rosten <[erosten@umail.ucsb.edu](mailto:erosten@umail.ucsb.edu)>

## Lab Info:

Students will have access to the Naples Design Lab and conference area in Phelps 1163.

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

- Preliminary Presentation / Project Plan / Design Specs: 30% of grade
- Final Presentation / Prototype Demo / Overall Progress: 60% of grade
- Attendance / 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 / Overall Progress: 40% of grade
- Other Assignments (branding/logo, etc): 20% of grade
- Attendance / Individual Contribution: 10% of grade

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

- Work / Progress Towards Project Completion: 30% of grade
- Final Presentations / Demonstrations / Reports: 60% of grade
- Attendance / Individual Contribution: 10% of grade

Class Web Page: [http://www.ece.ucsb.edu/courses/ECE188/188\\_F19Ilan/](http://www.ece.ucsb.edu/courses/ECE188/188_F19Ilan/)

<b>DAY / DATE</b>	<b>TOPIC / ACTIVITY</b>	<b>TASK / ASSIGNMENT</b>
<b>Week 1</b>		
Fri 9/27	Project Intros	<b>Projects Fair 10/1 from 5-7:30pm</b> Submit project requests by 12pm on 10/2 Projects / teams finalized 10/4
Mon 9/30	Faculty Project Pitches	
Wed 10/2	Course Objectives	
<b>Week 2</b>		
Mon 10/7	Project Planning Design Requirements / Specifications	Group meetings with instructor and sponsors/mentors
<b>Week 3</b>		
Mon 10/14	Project Management. Prototyping. Prelim Project Plan / Design Specs	Group meetings with instructor and sponsors/mentors.
<b>Week 4</b>		
Mon 10/21	PCB Design, purchase orders	Establish design and specs
<b>Week 5</b>		
Mon 10/28	PCB Design	Continue establishing design and specs
<b>Week 6</b>		
11/4-11/8	<b>PRELIMINARY PRESENTATIONS</b>	
<b>Week 7</b>		
11/11-11/15	11/13-11/15: Feedback – Project Plan / Specs	<b>Preliminary Project Plan and Preliminary Design Specs</b> due Nov 13 by 9:00am
<b>Week 8</b>		
11/18-11/22	Jason Spievak Presentation (11/18)	Work on project / prototype
<b>Week 9</b>		
11/25-11/27	Thanksgiving week	Work on project / prototype
<b>Week 10 / Finals</b>		
12/2-12/12	<b>PROJECT PRESENTATIONS TO SPONSORS 12/2-12/10</b>  <b>PROTOTYPE DEMOS 12/10 and 12/11</b>	<b>Group/Individual Evals and Updated Project Plan / Specs</b> due Dec 11 by noon

<b>DAY / DATE</b>	<b>TOPIC / ACTIVITY</b>	<b>TASK / ASSIGNMENT</b>
<b>Week 11</b> 1/6-1/10	Winter quarter kick-off	Work on project
<b>Week 12</b> 1/13-1/17	<b>ELEVATOR PITCHES</b>	Work on project
<b>Week 13</b> 1/21-1/24	No class (MLK day)	Work on project
<b>Week 14</b> 1/27-1/31	<b>ELEVATOR PITCHES</b>	Work on project
<b>Week 15</b> 2/3-2/7	Branding / Trademarks	<b>Submit brand / logo 2/7 by 11:59pm</b>
<b>Week 16</b> 2/10-2/14	Present brand names / logos	Work on project
<b>Week 17</b> 2/18-2/21	<b>MID PROJECT DESIGN REVIEWS</b>	
<b>Week 18</b> 2/24-2/28	Progress update meetings	Work on project
<b>Week 19</b> 3/2-3/6	Patents and Intellectual Property	Design Packet due 3/5 by 11:59pm
<b>Week 20</b> 3/9-3/13	Finance for Engineers	Work on project
<b>Finals Week</b> 3/16-3/18	<b>PROTOTYPE DEMOS</b>	<b>Group/Individual Evaluations</b> due March 17 by 11:59pm.

<b>DAY / DATE</b>	<b>TOPIC / ACTIVITY</b>	<b>TASK / ASSIGNMENT</b>
<b>Week 21</b> 3/30-4/3	Spring kick-off	Work on projects!
<b>Week 22</b> 4/6-4/10	Sponsor/mentor meetings	Work on projects!
<b>Week 23</b> 4/13-4/17	Sponsor/mentor meetings	Work on projects!
<b>Week 24</b> 4/20-4/24	<b>GROUP PRESENTATIONS</b>	<b>Website material due by 5pm on 4/24</b>
<b>Week 25</b> 4/27-5/1	Poster info session	Work on projects!
<b>Week 26</b> 5/4-5/8	Group Meetings (no class)	Group meetings with instructor
<b>Week 27</b> 5/11-5/15	Group Meetings (no class)	Work on projects!
<b>Week 28</b> 5/18-5/22	Progress updates	Group meetings with instructor
<b>Week 29</b> 5/26-5/29	<b>FINAL PRESENTATIONS</b>	Complete poster
<b>Week 30</b> 6/1-6/5 Fri 6/5	Practice presentations / set-up <b>ENGINEERING DESIGN EXPO!</b>	Poster Presentations / Demos Final Design Packets, evals, and lab cleanup due 6/9