

Stony Brook University
Department of Electrical and Computer Engineering
ESE 440-441 Engineering Design I & II

Instructors:**Professor Harbans Dhadwal**

All Sections – office hours
 Tu & Th 9:00 am to 11:00 am
 213 Light Engineering Building
 631-632-8396

Harbans.Dhadwal@StonyBrook.edu

Technical staff:**Mr. Tony Olivo**

283B Light Engineering Building
 631-632-8390

Anthony.Olivo@stonybrook.edu

(Senior Design and 3D Printing Lab)

Mr. Scott Campbell

281 Light Engineering Building
 631-632-8390

Scott.Campbell@stonybrook.edu

(CAD Lab)

Classroom (s):

Javits 101

Tuesday 4:00 pm to 6:50 pm

Senior design web page: <https://sites.google.com/a/stonybrook.edu/seniordesignportal/>

	ESE440	ESE441
Prerequisites:	ESE or ECE major, U4 standing; two ESE technical electives (excluding ESE 390 and 499); ESE 300. Students may need additional prerequisites depending on the design project undertaken.	ESE440
Co-requisites:	Students may be required to take additional courses depending on the design project undertaken.	

Textbook

No textbook is required.

Reference book

“Design for Electrical and Computer Engineers: Theory, Concepts, and Practice.” Ralph M. Ford, Chris S. Coulston, McGraw-Hill (2008)

Course sequence description

This two-semester capstone design project sequence provides senior electrical engineering undergraduate students with significant design experience to practice knowledge, motivate learning, prepare for their careers, collaborate, develop innovative techniques and serve the community. Students work in groups, designing and implementing their projects based on the total design methodology.

The design process consists of the following major steps:

- 1) Teaming and project selection
- 2) Market and user needs analysis
- 3) Product design specification (PDS) initialization and updating
- 4) Conceptual design
- 5) Detail design
- 6) Prototyping
- 7) Testing
- 8) Final prototype presentation
- 9) Final project documentation

The design process spans two semesters. The first semester will emphasize design and analysis. Students will go through the major design steps. By the end of the first semester, each team should generate a complete set of design details of the project, including results of simulation and schematics. The second semester will emphasize implementation (fabrication and packaging) and testing. Students will fabricate and refine their prototypes, based on testing, to realize proposed functions.

To fulfill the course requirement, each design team needs to submit a project proposal after choosing the project, two progress reports for each semester, an end of the semester report for ESE440 and a final comprehensive project report for ESE441. At the end of the first semester, each team needs to give an oral presentation of their design steps and results; and at the end of the second semester, each team needs to give an oral presentation of their design and implementation process, demonstrate their prototype, and submit a poster.

Course topics

1. ESE440
 - 1) Forming design teams
 - 2) Developing design proposals
 - 3) Project management
 - 4) Market and user needs analysis
 - 5) Development of product design specifications
 - 6) Conceptual design
 - 7) Preliminary detail design
 - 8) Writing technical reports
 - 9) Project presentations

2. ESE441

- 1) Detail design
- 2) Design Review
- 3) Prototyping
- 4) Testing
- 5) Writing technical reports
- 6) Project presentations and demonstrations

Course learning outcomes

1. ESE440
 - 1) Form a design team and select a project from the posted list or propose a project with real-world constraints.
 - 2) Present project research on how engineering solutions can have impact on the society and people's lives.
 - 3) Define and delineate individual professional responsibility for each team member.
 - 4) Learn contemporary issues related to the project through background search.
 - 5) Identify the desired needs and multiple realistic constraints.
 - 6) Generate and evaluate conceptual designs according to product design specifications.
 - 7) Conduct detail design and analysis incorporating engineering standards and manufacturing constraints.
 - 8) Acquire independently information and knowledge specific for the project.
 - 9) Prepare design reports, posters and give effective oral presentations.
2. ESE441
 - 1) Conduct detail design and analysis incorporating engineering standards and manufacturing constraints.
 - 2) Identify and acquire new knowledge/information that are required for the project but not taught in classroom.
 - 3) Use modern engineering tools to implement the project.
 - 4) Conduct experiments and analyze the data based on the requirements of the specific project.
 - 5) Gain a better appreciation of how engineering solutions can have impact on the society and people's lives.
 - 6) Prepare design reports and give oral presentations with visualized materials.
 - 7) Develop an ability to function on project teams.
 - 8) Learn how to prepare and make a poster presentation.

Grading policy

See "Senior design grading policy" in the "Documents" folder on Blackboard.

Team and project selection

- 1) Form your project design team comprising of two or three members, with diverse abilities.
- 2) Each team should consist of two to three persons, **NO** one person team is allowed and teams with four or more persons needs approval from the course instructor.
- 3) Pick a name and a logo for your team.
- 4) Identify a team leader, who will interact with the faculty advisor and course instructor regarding project activities and transmission of all course related documents. However, as a team member, it is your responsibility to be aware of your project related responsibilities, as well as, all the rules and submission dates.
- 5) Project selection requires connecting with a faculty advisor posting the project description. You may have to talk with several faculty before finding the perfect match. Project descriptions are posted on Blackboard under “Assignments” folder and are also accessible through the senior design web-portal. Project selection must be completed by **September 9**. Students who are not able to achieve project selection by the due date will be assigned randomly to projects and project teams.
- 6) The team leader must use the senior design project selection form, located in the “Assignments” folder on Blackboard, inform the course instructor by email at harbans.dhadwal@stonybrook.edu, by the due date of **September 9**.
- 7) Student initiated design projects are permitted, but students need to find a sponsoring faculty willing to be the advisor. The above due dates still apply.

Meetings with faculty advisor

Students are required to meet, collectively, with the faculty advisor at regular intervals. See the grading guidelines for further information on incurred penalties if these meetings do not take place.

Team meetings

Team members are required to meet regularly, at least once a week. The team leader is required to keep a record of these meetings, the record should include, approval of minutes from the previous meeting, attendance and agenda for the current meeting. Significant absences or lack of progress by individual members is to be reported to the course instructor. See the grading guidelines for further information on incurred penalties.

Scheduled lecture attendance

Students are reminded that most of the project work is performed outside the scheduled class lectures, which are primarily used for presentations by external speakers, for oral presentations and team meetings with the course instructor. A schedule of mandatory attendance is posted on Blackboard and will updated as needed. See the grading guidelines for further information on incurred penalties for absences.

Reports

All written submissions must adhere to specific guidelines posted in “Documents” folder in Blackboard. Refer to the grading guideline for additional information regarding grading penalties for reports not adhering to the required guidelines.

Laboratory space

Typically, students might work in the faculty advisor's research laboratory, however, when this is not possible, Room 283B in the Light Engineering building is the designated space for the senior design class. While most Computer Aided Design (CAD) programs can be used on your personal computers, the CAD facility in Room 281 is available to you. The Modern Circuit Board Design and Prototyping Laboratory, in Room 283A, may also be utilized in the latter stages of the project, during fabrication and prototyping. However, to access this facility contact Mr. Tony Olivo or Prof David Westerfeld.

When using common laboratory space, you are responsible for cleaning your work area after every use and for returning all test equipment, including probe leads, to their original location.

Project budget and reimbursement policy

- 1) The budget limit per student is \$115.
- 2) The reimbursement of project related purchase covers only materials and components.
- 3) Sales tax cannot be reimbursed.
- 4) Detailed instructions and policy statements are shown in the document "Senior Design Reimbursement Packet 2017-18.pdf", which is in the "Documents" folder in Blackboard.

Additional Opportunities

- IEEE LISAT conference (call for paper will be posted in the "Documents" folder in Blackboard) <https://ieee.li/event/lisat-2018-conference/>
- URECA competition (College-wide competition, more details to follow), <https://www.stonybrook.edu/commcms/ureca/>
- DARE competition (University-wide business plan competition, work with MBA students to develop a business plan, etc). <https://research.stonybrook.edu/business>

Senior Design Grading Guidelines (ESE440/441) Harbans Dhadwal

1. Course letter grade

At the end of the Fall semester a letter grade of **R** will be assigned for successful completion of the requirements for ESE440. This final grade for ESE440 will convert the letter grade obtained for ESE441 at the end of the spring semester. The course letter grade, assigned by the ESE440/441 instructor, will be based on the aggregate score using the following table.

Score range	Above 85	84-80	79-75	74-70	69-65	64-60	59-55	54-50	49-45	44-40	40 or below
Letter grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F

NOTE: For both ESE440 and ESE441, a grade of C or better is required for graduation.

2. Aggregate score

The aggregate score comprises of a faculty advisor assessment (90% for ESE440 and 80% for ESE441), the remaining being assigned by the course instructor. Advisor is responsible for grading the reports, and project deliverables. The course instructor grades the oral and poster presentations. The aggregate score is subject to a grade penalty as described below.

2.1. Breakdown of the aggregate score

The following table shows the breakdown of the aggregated course score and submission deadlines, indicated by week number, for each of the mandatory milestones for continuous assessment.

ESE440			ESE441		
Topic	Due by end of	Score (%)	Topic	Due by end of	Score (%)
Project/Team selection	week #2	x	Progress report 1	week #3	10
Project proposal	week #4	15	Progress report 2	week #8	10
Progress report 1	week #7	15	Project demo	week #13	10
Progress report 2	week # 10	10	Poster presentation	week #14	10
Final report	week #14	50	Final report	week #14	50
Oral presentation	TBA	10	Oral presentation	TBA	10

A time stamp of the aggregate score, computed at the critical milestones indicated above, is available to students on Blackboard.

3. Grade penalty

The grade penalty, computed by the course instructor, has three components, leading to reduction in the aggregate score.

3.1. Missed deadlines for reports

Each report will be submitted and graded on a team basis. A 5% penalty will be assessed for each calendar day, past the due date. Report will not be accepted after a delay of three or more calendar days and a score of zero will be recorded for the assignment. This penalty applies to all team members.

3.2. Non-compliance instruction penalty

This is also a team grade penalty and is assessed on the lack of compliance with written instructions for submission of reports, posters and oral presentations.

3.3. Non-participation penalty

This penalty has three components: 1) faculty/team meetings; 2) Team meetings; 3) class lecture attendance. If a student misses 40% or more of the scheduled meetings in any one of these categories, he/she will obtain a letter grade of **F** for the course, otherwise the following numeric penalty will be applied:

10% of scheduled meetings missed, aggregate score reduced by 5 points

20% of scheduled meetings missed, aggregate score reduced by 10 points

30% of scheduled meetings missed, aggregate score reduced by 15 points

- Faculty should keep a record of meetings with student teams.
- Students should keep a record of their project team meetings. This record should be shared with the course instructor at least three times during the semester, or upon request.
- The course instructor will keep a record of lecture attendance.

Americans with Disabilities Act

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services [<https://www.stonybrook.edu/dss/>], ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>

Statement on Academic Dishonesty

Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work that is not originally yours. Examples include, *but are not limited to*, copying or plagiarizing class assignments including homework, reports, designs, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids, either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted to the fullest via the CEAS CASA committee. For you, the honest student, academic dishonesty results in lower class curves, hence a depression in your GPA and class standing, while cheapening the degree you earn.

For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical incident management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.