

**Department of Electrical and Computer Engineering
Syllabus for Senior Design Project - ESE440 and ESE441
Fall 2022 and Spring 2023**

Instructors**Professor Harbans Dhadwal**

All Sections – office hours
 Tu & Th 3 :00 pm – 5:00 pm
 213 Light Engineering Building
 631-632-8396
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Technical staff

Mr. Daniel Vuoso
 283B Light Engineering Building
 631-632-8390
Daniel.vuoso@stonybrook.edu
 (Senior Design and 3D Printing Lab)

CAD services
 281 Light Engineering Building
 631-632-8390

Classroom (s)

TBD
 Mon & Wed, 4:00 pm to 5:20 pm

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

[Note: You must be logged into the SBU network for access]

Catalog descriptions

The senior design sequence (ESE440 and ESE441) is a two-semester, team based and independent capstone project with deliverables. The primary objective of the senior design course sequence is to provide a vehicle for students to transition from an academic environment to that of a commercial/professional engineering environment. Students learn to work in teams to complete an engineering project from concept, through practical design based on multiple constraints, to creating a deliverable product meeting the design specifications. Students present written, oral and poster presentations of the project. While most of the project work is done outside the classroom, guest speakers provide insight into other related topics from resume preparation, to program management, to team dynamics and to design methodologies used in industry. The project incorporates appropriate engineering standards and multiple realistic constraints.

Cannot be used to satisfy technical elective requirement.

Laboratory fee required.

Fall prerequisites (ESE440)

1. ESE or ECE major and U4 standing
2. ESE300
3. Other:
 - i) EE majors: ESE324 and two ESE technical electives
 - ii) CE majors: Two CE technical electives

Spring prerequisites (ESE441)

1. ESE440

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 and computer 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

Course Overview:

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, one progress report for each semester, an end of the semester design report for ESE440 and a final comprehensive project report for ESE441. At the end of the first semester, each team will give an oral presentation of their design steps

and results; and at the end of the second semester, each team will give an oral presentation of the completed project, will demonstrate the working prototype, and will make a poster presentation.

Course learning outcomes (ABET)

Student Outcomes	% contribution
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	25
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.	15
3. an ability to communicate effectively with a range of audiences.	10
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	5
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.	10
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.	25
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	10

Major deliverables

All team assignments are due to your Faculty Advisor one week before the class due date. This will allow the advisor to give you feedback and allow you to make the recommended changes. Deliverables and events at the end of each semester are sequenced so that teams concentrate on their presentation content and oral delivery in the last week.

Fall semester (ESE440)

1. Project Proposal is due soon after the teams are
 - 1- assigned their projects. Specifications can be revised later only with Faculty Advisor,
 - 2- Industry Mentor (if applicable)
2. A conceptual design presentation is due in mid-semester.
3. The project design report is due by the last day of classes.
4. A twenty-minute project Design Presentation to an open audience, comprising of peers, faculty and other interested individuals.

Spring semester (ESE441)

1. Progress report #2 comprising of an integration and test plan is due in early in the semester, system verification procedures.
2. The project report is due by last day of classes.
3. A twenty-minute Project Presentation is given at semester end.
4. Each team's final prototype is due by the end of the semester. It should be a fully functioning system, a scale model, a software program, etc., as appropriate for each project.
5. A team poster presentation during the last week of the semester.

Grading policy

ESE 440 letter grade of **R** will be assigned to each student provided they complete the EE440 requirements. The **R** grade will be converted to the earned grade for the completed senior design project at the end of the Spring semester. You receive the same grade for ESE440 and ESE441.

ESE 441 letter grade **A through F**

Score range	Above 90	89-85	84-80	79-75	74-70	69-65	64-60	59-55	54-50	49-45	Below 45
Letter grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F

Notes:

- 1- All interim grades will be assigned by the faculty advisor, except for the poster grade, which will be assigned by the class instructor.
- 2- Attendance penalty for missed scheduled lectures: 0% for 2 lectures; 2% for 3 to 5; and 5% for 5 or more.
- 3- Final course grade (ESE440 and ESE441) to be reviewed by Senior Design Project Committee before posting on Solar by course instructor.
- 4- Individual grades within a team may vary in exceptional circumstances.
- 5- Default late penalty: 5% per day

ESE440		ESE441	
Topic	Score (%)	Topic	Score (%)
Project/Team selection	x	Progress report 2	5
Project proposal	5	Project Delivery	10
Progress report 1	5	Project report	50
ESE440 Report	10	Poster presentation	5
ESE440 Oral presentation	5	Oral presentation	5

Work effort

For 3-credit courses, students are expected to do at least 9.5 hours of course-related work or activity each week during the semester. This includes scheduled meetings as well as time spent doing technology research, project development, preparing written assignments, lecture attendance and other project-related tasks.

Project teams

Student 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 will be posted on Blackboard under “Assignments” folder and will be accessible through the Senior Design Web Portal, by the first day of classes. Project selection must be completed by **September 6**. Students who are not able to achieve project selection by the due date will be assigned randomly to projects and project teams. The team leader must use the senior design project selection form, located in the “Assignments” folder on Blackboard, to inform the course instructor by email at harbans.dhadwal@stonybrook.edu, by the due date.

- 1) Form your project design team comprising of three to six students per team, with diverse abilities as required by the project.
- 2) Pick a name and a logo for your team.
- 3) 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.
- 4) 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 will be posted on Blackboard under “Assignments” folder and will be accessible through the Senior Design Web Portal. Project selection must be completed by **September 6**. Students who are not able to achieve project selection by the due date will be assigned randomly to projects and project teams.
- 5) The team leader must use the senior design project selection form, located in the “Assignments” folder on Blackboard, to inform the course instructor by email at harbans.dhadwal@stonybrook.edu, by the due date of **September 6**.
- 6) 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, at least every other week. Each member should take part in the oral briefing to their faculty advisor.

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 faculty advisor.

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 will be posted on Blackboard and updated as needed.

Reports

All written submissions must adhere to specific guidelines posted in the “Documents” folder on Blackboard.

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. Daniel Vuoso 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/semester.
- 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.pdf”, which is in the “Documents” folder in Blackboard.
- 5) Reimbursement requests will be accepted only during last two weeks of the Spring semester or the Fall semester for students enrolled in ESE441 in the Fall semester.

Additional opportunities

- IEEE LISAT conference (call for paper will posted in the “Documents” folder in Blackboard) <https://iee.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>
- <http://lemelson.mit.edu/studentprize> - The competition recognizes students at any U.S. college or university who have tested prototypes of technology-based inventions in **healthcare, food/water and agriculture, transportation and mobility, and consumer devices**. Teams of undergraduate students must apply with *one invention* and individual graduate students must apply with *two or more inventions*. Inventions are not limited to class projects or thesis work, and any side/personal projects could also be considered. Patents are encouraged but not required. In each of the four categories, undergraduate team winners are awarded \$10k and graduate student winners are awarded \$15k

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 are 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.