

NORTHEASTERN UNIVERSITY
Department of Electrical and Computer Engineering

Syllabus of Capstone Design Course I: EECE 4790 and 4791

Term: Summer 1 or Summer 2, 2024

Course Title: Electrical and Computer Engineering Capstone I (Capstone Design I)

Course Number: EECE 4790 and EECE 4791

Instructors: Capstone Advisors

Meeting Time: Arranged with Advisors

- 1. Prof. Bahram Shafai (Capstone Advisor and Coordinator): Summer 1 and Summer 2**
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- 5. Prof. Masoud Salehi: Summer 2**
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- 6. Prof. Charles DiMarzio, Summer 2**
ECE Department, 302 Stearns, Phone: (617) 373-2034, E-mail: dimarzio@ece.neu.edu

Office Hours: TBD by capstone advisors

Prerequisites: See Prerequisite Courses from Catalogue. The following list is essential:
Circuits and Electronics, Computer Engineering (hardware and software) with Expertise on
Microprocessor, Sensors Integration, Signal Processing, Communications and Control Systems

Restriction: Senior Standing

Course Description and Objectives:

EECE 4790/4791 is the first of a two-course sequence that aims to give undergraduate engineering students significant experience in dealing with a large design project from the beginning to the end. In EECE 4790/4791 students form teams and select their capstone advisors. Each team will select a project and prepare a detailed proposal describing the required work to be completed. The students are required to propose a design project involving an electrical, electronic, and/or software system, including evaluation of multiple constraints and use of appropriate engineering standards in the design, to carry out the project, analyze the project, feasibility study, and prepare weekly reports and attending the meetings with their capstone advisor. Finally, students must specify the materials needed for their project, provide a cost analysis, prepare, and deliver written and oral presentations.

on the design proposal. Subsequently, they need to prepare themselves to take capstone 2 EECE 4792 in the following semester for final implementation of their project.

Project Selection and Weekly Meetings:

Students form teams and associate with faculty advisors. Projects can be industrially sponsored, departmentally through research projects proposed by faculty, or student ideas. Students are expected to communicate with their faculty advisor in person through meetings or virtual meetings using the Internet, teleconferencing, and other electronic methods.

Credit Hours: The semester credit hour for Capstone 1 (EECE 4790) is 4 credits, (EECE 4791) is one credit, and for Capstone 2 (EECE 4792) is 4 credits. Note that EECE 4790 will be replaced by EECE 4791 starting 2025.

Mandatory Requirement: Both capstone courses are required to be taken by all senior students.

Textbook: No Textbook

However, necessary documents and sample past project proposals will be provided.

Topics to be covered: Brainstorming, Analysis of the Project, Feasibility Study. Division of Tasks and Project Management, Intellectual Property, Materials Selection, Effective Written and Oral Communication.

Facilities:

Students will have a workspace with equipment and a storage locker in the ECE Capstone Lab.

Tentative Schedule

Date In Class Deliverables

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|------------------|---|
| May 06 Summer 1 | July 01 Summer 2: Introduction to Capstone |
| May 07 Summer 1 | July 08 Summer 2: Form project teams |
| May 16 Summer 1 | July 11 Summer 2: Propose project ideas and brainstorming. |
| May 18 Summer 1 | July 15 Summer 2: Discuss proposal ideas. |
| May 23 Summer 1 | July 18 Summer 2: Identify Project, prepare a White Paper describing the project. |
| May 31 Summer 1 | July 22 Summer 2: Present tasks breakdown, Discuss approach for each task. |
| June 06 Summer 1 | July 25 Summer 2: Discuss responsibilities and time plan. |
| June 12 Summer 1 | July 29 Summer 2: Final Technical Discussion of Study Phase. |
| June 14 Summer 1 | Aug 01 Summer 2: Preparing Proposal draft and presentation. |
| June 19 Summer 1 | Aug 05 Summer 2: Identify equipment need, Cost Analysis. |
| June 20 Summer 1 | Aug 08 Summer 2: Final Progress Report, Dry-Run. |
| June 24 Summer 1 | Aug 14 Summer 2: Final Proposal Presentation, Final Proposal due |
| June 25 Summer 1 | Aug 15 Summer 2: Final Proposal Presentation, Final Proposal due |

Grading:

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|-------------------------------------|------------|
| Weekly Progress Report: | 20 Points |
| Notebook and Proposal Draft | 10 Points |
| Project Analysis & Design Strategy | 10 Points |
| Final Written Proposal: | 20 Points |
| Final Oral Presentation: | 20 Points |
| Meeting Participation and Teamwork: | 20 Points |
| TOTAL | 100 points |

Grading Remarks: Grading in Capstone 1 is based on weekly meetings, progress report, analysis and feasibility study, written reports, oral presentation, and the final proposal. However, the advisor may have specific strategy to give the above grade distribution which is determined based on the metrics for success developed by the team and his own evaluation criteria.

ACE Objectives:

EECE 4790/4791 considers the following University-wide Academic Common Experience (ACE). Goals: the **skills** of effective thinking and communication, information literacy, and interpersonal skills, the **awareness** of the contexts of the natural world and the social and cultural world, and **connections** across disciplines, between theory and application, and between college and work. In addition, many projects will incorporate the ACE Goals of **awareness** of historical, ethical, aesthetic, and personal perspectives and **connections** between individuals and society and between college study and lifelong learning.

ABET Requirement:

The students are required to propose a design project following the course description and objectives as described in this syllabus. *A separate paragraph should be included in the proposal to evaluate multiple expected constraints and the use of appropriate engineering standards in the design.*

Rules for Remote Capstone Students:

We allow students to take capstone 1 remotely with valid reasoning. However, all students must be on-campus for capstone 2. There is a policy for remote students, which can be found through the link provided below. After the first week of summer 1 or summer 2, in which an assembly meeting will take place for organizing sections, teams are assigned to advisors. Each team is required to meet with the capstone advisor every week for one hour. The advisor meets with each team at a mutually agreeable time once a week. The remote student should arrange to be available during the weekly meeting with the capstone advisor by zoom, phone, or any other electronic devices. The remote student must attend the final proposal presentation in person at the end of the summer session. If the remote student is not available on-campus for final proposal presentation, then the student can remotely present or integrate the presentation with a short video-clip in the PowerPoint slides of the team.

Sample Projects from Previous Years:

The students can see general information about the capstone courses and the list of some recent projects including few video clips from the following link,
<https://ece.northeastern.edu/academics/undergraduate-studies/ece-capstone/>

Prepared by Professor Bahram Shafai
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