University of New Hampshire, Mechanical Engineering Department
ME755 Senior Design
Fall 2016

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Office: W135 Kingsbury Hall
Class Hours: M W F 12:10 pm - 1:00 pm; Location: Kingsbury N101
Office Hours: Monday and Wednesdays 10:00 – 11:30 AM (by appointment; you must make an appointment for office hour meetings)

Course Description:

In this course, students select a project to work on for the entire academic year as a member of a project team. During the fall semester, the design process will be used to finalize a design for the project. Particular emphasis on the analysis stage will be expected, which will use the knowledge and skills that were developed throughout the Mechanical Engineering undergraduate curriculum.

Course Goals:

- For the fall semester, to complete the design process so building/testing/revisions can be performed in the spring semester
- Use modeling and engineering tools for design analysis and optimization of a complex device or system
- Realize the importance of correct assumptions and analysis techniques when analyzing components and systems
- Reinforce knowledge of basic engineering principles by performing analyses of the product

ABET outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
c. the ability to design a system, component, or process to meet desired needs
d. an ability to function in multidisciplinary teams
e. the ability to identify, formulate and solve engineering problems
f. an understanding of professional and ethical responsibility
g. the ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global and societal context.
i. a recognition of the need for and an ability to engage in life-long learning
k. the ability to use the techniques, skills and modern engineering tools necessary for engineering practice

Recommended Text

- Engineering Design, 3rd Ed. by George E. Dieter, McGraw-Hill, ISBN 0-07-366136-8.
- A Guide to Writing as an Engineer by David Beer and David McMurrey, Wiley 1997, ISBN 0-471-11715-3.

Grading: ***Teams can work with their advisors to come up with an alternative grading scheme if desired. Your faculty advisor will determine the weighting for each assessment area.***

Project Statement/Design Criteria	3%
Gantt Chart	2%
Decision Matrix	10%

Analyses	20%
Project Design Review	10%
Project Report	50%
Class Participation	5%

Your faculty advisor determines your final grade with input from Project Coordinators.

Note that students can also select Tech 797 Ocean Engineering Projects to fulfill the senior design requirement. Projects for this course will be presented in September in the Chase Ocean Engineering building (Room 115).

Over the course of the semester, the Senior Capstone Project Coordinator, John Gianforte, will meet periodically with the project teams to answer questions, provide assistance, and ensure all deliverables are being met.

Full Year Capstone Project Course Overview

In Class Discussions:

We will typically have class on average twice per week for lectures and special guest presentations on engineering-related topics such as: project management, professional expectations, effective written communication, effective presentations, legal issues, professional ethics, among other pertinent topics. A course schedule that includes lecture topics, which lectures are mandatory, when course deliverables are due, and outside speaker presentation dates will be posted and updated on myCourses as the semester progresses.

Project Selection:
Potential Projects will be submitted by:

- Consulting Firms
- College Faculty
- Students

Students may originate their own projects. In order to submit your project proposal, you must follow the link below to enter your project proposal into the database where it will be reviewed by CIE/ENE faculty. Project Proposals must be submitted electronically by Wednesday, September 7, 2016. Project Proposal pitches will be made during class by outside firms, faculty, and students by Friday, September 9, 2016.

2016/17 UNH Capstone Senior Design for Civil, Environmental, and Mechanical Engineering

Project Overview:

- Capstone design provides students with an opportunity to work as part of a team to apply engineering, communication and management skills to an interdisciplinary project.
- Projects that include multiple engineering disciplines, i.e., structural, geotechnical, mechanical, electrical, environmental, water resources, are encouraged.
- Projects that your firm has completed or are under construction are encouraged.

Timeline for projects

- July & August:

- Consultants submit their project proposal(s) and the project coordinator evaluates and processes project proposals
- Students who have project ideas are encouraged to submit well thought out project ideas through this link: https://www.events.unh.edu/RegistrationForm.pm?event_id=21732
- Class sessions will be scheduled to showcase the various potential projects

- September:
  - Project Presentation during class
    - Faculty/Consultants/students will pitch the projects to the UNH seniors via a 5-minute presentation, either live or virtually.
  - Complete Project Selection Survey
  - Participate in a project kick-off meeting once project teams are formed.
    - Students will be assigned projects based on their submitted preference after the Project Presentations in class
    - The students are responsible for scheduling regular meetings with their faculty advisor and/or with the project coordinator if they require assistance
- November – March:
  - Complete assignments as they become due through myCourses as set up by the project coordinator
  - Attend periodic meetings with your faculty advisor, project coordinator and your company contact, either in person or electronically, as appropriate
  - Submit course deliverables on time through myCourses or as directed by the project coordinator
- April:
  - Prepare your team's URC/ISE poster and 5-minute pitch
  - Attend capstone final presentation at UNH, your office or via web conference
  - Provide feedback to faculty technical advisor on the project final report and presentation for grade assignment.
- May/June:
- Submit Final Report
- Attend a debriefing luncheon with UNH faculty to discuss the capstone course (optional)

There is no Final Exam for this course.

Academic Honesty: Ethical behavior is essential for the engineering professionals due to the nature of the work and is expected during your academic training as well. You are required to comply with all University policies regarding Academic Honesty(https://www.unh.edu/student-life/handbook/academic-honesty) and to familiarize yourself with those policies. Suspected violations of academic honesty are handled following Section 9.7, Procedures for Dealing with Academic Misconduct in the Student Rights, Rules, and Responsibilities Handbook, and may result in failure of an assignment, a failing grade in the course, expulsion, suspension, or dismissal from the university.

Collaboration is of course required on a senior design project. All students on the team must contribute to the project. There will be opportunities for peer as well as mentor evaluations of each team member's contribution. When writing reports, reference all sources and of course do not plagiarizing material (i.e., directly copy verbatim text) without designating the material in quotation marks.

For projects that are a continuation of efforts from previous years, care must be taken to not to plagiarize material from past reports. Let me or your faculty advisor know if you have any questions about what constitutes academic dishonesty in this course.

Course Deliverables:

Your faculty advisor will provide your assessment and grade in this class with input from the project coordinator. Most assignments will be submitted electronically through myCourses and advisors have access to all of your work.

Gantt Chart
Project Statement and Design Criteria
Decision Matrix
Analysis
Design Review
Mid-year Report
Attendance at a minimum of 6 key Engineering Discipline Lectures

Dates for these deliverables can be found on the Course schedule, which is located in the Schedule folder in myCourses online. These dates may change, so please be sure to check announcements of course schedule changes in myCourses.

Project Characteristics:
Projects need to have the following characteristics:

• Multidisciplinary – more than one area of specialization in Mechanical Engineering or another engineering or science disciplines – other fields, such as business, sociology etc., are acceptable

• Utilize current knowledge within the different sub-fields of Mechanical Engineering

• Projects may include: design, analysis, feasibility studies or assessment of technologies that are currently not cost effective. Students may be asked to rework old projects utilizing new tools, analysis techniques, codes and environmental standards.

Project Structure:
Each project will share the same characteristics:
• Ideal team size will be 3-5 people
• Teams will have a faculty technical advisor
• Teams will report to John Gianforte for status updates and required submissions
Consultant driven projects will also have a relationship with the sponsoring firm. A professional mentor from the firm is assigned to each project to assist with technical questions and provide a moderate amount of guidance.

Project Selection:

A list of projects will be posted in myCourses. Each student will choose his or her top 3 project preferences in a selection survey. Then students will then be placed into a project team based on the project's needs and faculty advisor availability.

Semester Expectations:

• Designate a project manager and communications point person for your team

• Take and keep a record of all team meetings and meetings with your faculty advisors. The Kick-Off meeting minutes will detail the selection of a project manager and communications point person.

• Develop a Project Statement and Design Criteria with guidance from the team's professional mentor, your faculty advisor, or John Gianforte

• Perform preliminary investigations into the site and background of the project

• Develop a schedule of work to include breakdown of the scope of work into individual tasks and benchmarks

• Create and submit the Mid-Year Report. This is your major deliverable for this semester

Design Review (mid-November)

Present a short (10 minute) summary of your project, including concepts, a decision matrix, analyses, calculations, sketches or drawings, and an explanation of your next steps to faculty, peers, and potentially, outside firms that may attend the design review. These will take place during the week of November 16. Scheduling of the design reviews will utilize Sign-up Genius. **You must check with your faculty advisor and at least one other faculty member to ensure that they are available before you sign up for a date and time for your Project Design Review.**

Mid-Year Report Submission Guidelines:

Your Mid-Year Report submission will be expected to contain:

- Cover Page
- Executive Summary
- Table of Contents
- List of Figures
- List of Tables
- Project Introduction/Description
- Scope of Work
- Analysis
- Calculations
- Test results
- Project Schedule
- Problems encountered and steps taken to resolve them
- Next Steps to be taken at the beginning of the spring semester
- References

- Individual Peer Evaluations (turned in separately)

A format document and short example will be posted in myCourses. You must your Mid-Year Report through myCourses. A rubric for the Mid-Year Report will be posted on myCourses during the semester.

Peer Evaluations:
Individual peer evaluations will be due with the Project Proposal submission. These forms will be available through Blackboard. The purpose of these forms is to assess your own contributions to the team, as well as the contributions of each of the team members. You will not be assessing each person's academic contributions, but rather their availability and communication with the team, their preparedness, and the ability to complete their work on deadline. These forms will be private between the instructor, faculty adviser, and the student. The goal is to identify problem areas within the team before they become debilitating.

Grading & Attendance:
This class is Pass/Fail. Completion of the required elements will determine whether you pass this class or not. Grades for the course deliverables will be utilized in the calculation of your final ME 755 and 756 grades next spring. Attendance will be taken to ensure that you meet the minimum of attending at least 6 mandatory Lectures/Presentations and will be used in the calculation of your grade. If you have a conflict, you must notify John Gianforte in writing before class.