

MECH 4381 – Senior Design Project 1

Instructor Contact Information

Name:	Robert Hart
Office:	ECSN 2.514
Office Hours:	Monday 3:00-4:30 pm; or by appointment
Phone:	(972) 883-4225
Email:	robert.hart@utdallas.edu

Course Pre-requisites, Co-requisites and/or Other Restrictions

Pre-requisite:	MECH 2320, MECH 3310, MECH 3315, MECH 3350, MECH 4310, and ECS 3390
Co-requisite:	None
Other Restrictions:	MECH 4381 and 4382 must be taken in successive semesters

Course Description

Project-based capstone course. Student groups design, build, and test a device that solves an open-ended mechanical engineering design problem. MECH 4381 focuses on background research and engineering analysis. (A subsequent course, MECH 4382, focuses on prototype construction and testing.) As a designated MECH Writing-Intensive Course, MECH 4381 also focuses on the refinement of students' engineering communications skills and their use of writing as a critical-thinking and learning tool.

Student Learning Objectives/Outcomes

This class will address the following learning outcomes:

- Recognize design needs, gather relevant information, formulate the problem, and conceptualize various solutions.
- Develop project management skills: work breakdown structure, manufacturing plan, cost estimation, resource allocation and scheduling.
- Carry out detailed component /system-level design, and make decisions using evaluation and analysis tools.
- Function in disciplinary or multi-disciplinary teams.
- Document, report, present project progress and final results.

Course Topics

Approximately the first half of the semester will consist of regular class meetings with lectures focused on professional skills and other topics relevant to planning and executing an engineering project. A detailed course schedule will be distributed in class. The following is a tentative list of the topics that will be covered in this course.

- Project Management
- Engineering Design
- Teamwork
- Communication and Professionalism
- Codes and Standards
- Legal Issues

Textbooks and Materials

No textbook is required for this course. In most cases, students will need to research and collect information from sources relevant to their particular project. Textbooks and notes from previous courses will likely be useful additional resources.

The course material will come from presentations and documents that will be distributed throughout the semester. The following books are recommended as useful references:

1. Ulrich, K. T., & Eppinger, S. D. (2012). Product design and development. New York: McGraw-Hill/Irwin.
2. Rosenau, M. D., & Githens, G. D. (2011). Successful Project Management: A Step-by-Step Approach with Practical Examples. Hoboken: John Wiley & Sons.
3. Ruskin, A. M., & Estes, W. E. (1995). What every engineer should know about project management. New York: M. Dekker.
4. Bowen, H.K. (2002). Project Management Manual. Harvard Business Publishing.

The latest available edition of items 1-3 are on reserve in the UTD library. Item 4 can be ordered online at hbsp.harvard.edu.

Grading Policy

Each student's final grade will be composed of a team and an individual score. Within each of these two categories, deliverables and other items are separately weighted to determine the overall score. Since the team score makes a larger contribution to the final grade, effective teamwork is essential to receiving a good course grade.

The team score is based mostly on the project deliverables that are prepared as a team. All members of a team are typically assigned the same project score unless there is evidence of unequal member contributions. The individual score is derived from assessments of a student's performance by others involved in the project and some individual assignments. The contribution of each item to the overall course grade is summarized in the following two tables:

Team Deliverables & Evaluations	% of Final Grade
Problem definition and specifications	5
Preliminary design report & detail design proposal	15
Detail design report & fabrication/test proposal	15
Presentations	10
Weekly reports	5
Industry mentor team evaluation	10
Other team deliverables	5
Total	65

Individual Performance	% of Final Grade
Individual writing assignments	10
Peer evaluations	10
Faculty advisor evaluation	10
Attendance & other individual assignments	5
Total	35

The course instructor, in consultation with the faculty and industry mentors, will have the option to award **team bonus points** equal to 0%-10% of the final grade. This bonus is intended to reward teams that produce outstanding work relative to the difficulty level and expectations of their particular project.

Course Policies

Course Sequence Requirement

Since a single project will be completed over the two courses, MECH 4381 and 4382 must be taken in successive semesters. For example, if you are enrolled in this course in Fall 2012, you must take MECH 4382 in Spring 2013. If something occurs that you believe might prevent you from taking MECH 4382 next semester, contact the course instructor immediately.

Teams

Projects will be completed by students working in groups (teams). Each team will work with an industry mentor (if applicable) and a faculty advisor. The roles of the industry mentor and faculty advisor are strictly advisory. These individuals will not lead the project effort nor will they solve technical problems. It is ultimately the team's responsibility to complete the project and provide the requested deliverables. Teams will be assigned by the instructor based on input provided in the project bid process. It is each student's responsibility to initialize communication with fellow team members and work with his/her assigned group.

Communication

You must use your official UTD email account for all email related to this course. Email will also be used by those involved in the course to communicate with you. It is expected that messages sent to the email address on record with the university will be received and read. You should check this email account at least daily so that information from sponsors and the course instructor are received and acted upon in a timely manner.

All key course documents and other materials will be available on the UTD course management system (eLearning) website. Most assignments will also be submitted through this system as well.

Confidentiality & Intellectual Property

Confidentiality is a key requirement in many of the projects in this course. When required by the sponsor, students will be asked to sign non-disclosure agreements (NDA). Additionally, some projects may require any publically presented materials (presentations, posters, etc.) to be cleared by the sponsor first. Students must always make confidentiality requirements a priority when using computer resources (email, file storage, social media, etc.). If you have any doubts, consult the faculty advisor or course instructor first.

Most projects will require that all students on a team sign an intellectual property (IP) agreement. This agreement will assign the rights to any IP generated during the project to the sponsor.

NDA and IP agreements are legal forms that will be provided to individual students when required. If you are unable or unwilling to comply with the terms of these agreements, please notify the course instructor as soon as possible.

Course Assignments & Deliverables

The graded work in this course includes both team deliverables and individual assignments. In addition, there will be evaluations of team and individual performance conducted by the faculty advisor, industry mentor, and your fellow team members (i.e., peer evaluation).

The course assignments along with their requirements and due dates will be discussed in class or publicized via email well in advance of the submission deadline. Individual assignments (as identified in the table above in the Grading Policy section) must be completed independently by each student. No late assignments will be accepted without prior agreement of the course instructor. ***A penalty equal to 25% of the assignment grade will be deducted for each day a deliverable is late.***

Although there will be no formal examinations in this course, there may be occasional unannounced short quizzes (either in class or via e-Learning) covering the lecture material. There will be no makeup for missed quizzes. At the time scheduled for the final exam, a Final Design Review will be held in which each team will make a presentation.

Due to diversity of projects and activities in this course, students are expected to communicate to their faculty advisor any issues which they feel may affect their performance in this course. Examples of such issues include difficulties with team members, unresponsiveness of industry mentors, lack of needed resources, etc. If your team feels that circumstances beyond your control will affect your ability to meet a deliverable date, you should consult with your faculty mentor and the course instructor well in advance of the submission deadline to discuss the situation. Extensions will only be considered in rare circumstances and with proper justification.

Workload

This course will require students to work on realistic and challenging engineering design projects. Consequently, students should expect to spend a considerable amount of time outside of class working on the project and attending meetings. Students should be aware of this requirement and should plan their schedules accordingly. Students with significant extra-curricular obligations (especially jobs) should be aware that they will need to be available to fully participate in all course activities.

Attendance

Attendance at all scheduled class meetings is mandatory. Classroom attendance will be randomly checked. Additionally, you are expected to attend and participate in all meetings with your industry mentor, faculty advisor, and project team. Poor attendance will impact your individual performance evaluation.

Cell Phones, Laptops, etc.

Any type of cell phone/smart phone use is not permitted during class. Phones must be turned off or silenced during class to avoid creating a disruption. Please leave the classroom if you have an urgent need to use a cell phone. Laptop computers, tablets, and similar devices may not be used during class.

Off-campus Course Activities

Projects in this course will likely involve an occasional need to travel to a sponsor's office or other location for meetings, presentations, site visits, etc. Students are expected to comply with all university policies related to off-campus travel. A link to these policies can be found in the following section. Travel reimbursements will be provided in accordance with the policies established by UTDesign.

Students are expected to conduct themselves with professionalism and comply with all university regulations when traveling or participating in activities at a sponsor's site. Additionally, students are expected to comply with all standard visitor policies and procedures when visiting a sponsor's site. Prior to a visit, students should discuss any special requirements with their company mentor. In particular, students will need to determine if they will be required to provide personal protective equipment (PPE) for the visit.

Under no circumstances is a student obligated to participate in any off-campus activity which, in their judgment, is unsafe or violates their moral or ethical beliefs. In such circumstances, the student should politely state their preference to not participate. Additionally, sponsors are expected to treat all students equally and respectfully. Students should feel free to report any concerns to the faculty advisor or course instructor.

University Policies

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to <http://go.utdallas.edu/syllabus-policies> for these policies. These policies and procedures are incorporated in this syllabus by reference.

These topics addressed by these policies include the following:

- Technical Support
- Field Trips and Off-Campus Instruction and Course Activities
- Student Conduct and Discipline
- Academic Integrity
- Copyright Information
- Email Use
- Class Attendance
- Withdrawal from Class
- Student Grievance Procedures
- Incomplete Grade Policy
- Disability Services
- Religious Holy Days
- Avoiding Plagiarism
- Resources for Success

These descriptions and timelines are subject to change at the discretion of the instructor.