MECH 4382 – Senior Design Project II

Summer 2016
ECSS 2.311, M 1:00 – 5:00 pm

Instructor Contact Information

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

Pre-requisite:	MECH 4381
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 4382, focuses on prototype construction and testing. (A prior course, MECH 4381 focuses on background research and engineering analysis.) As a designated MECH Writing-Intensive Course, MECH 4382 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.
- Build and test a working prototype and perform design iterations.

Course Topics

This course is a continuation of MECH 4381 and focuses on building and testing a proof-of-concept prototype that demonstrates a solution to an engineering design problem. This course will emphasize many of the same concepts and skills introduced in MECH 4381. Most of the work in the course will be

completed outside of the classroom under the direction of the Corporate Mentor and Faculty Advisor. The instructor may occasionally meet with the class as a whole to cover selected topics.

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 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.

Items 1-3 are available 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. 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 score for a deliverable. 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
Test Plan	10
Formal Design Presentation	5
Project Readiness Review	5
Mandatory First Prototype	10
Expo	15
Final Project Report & documentation	10
Weekly reports & other team assignments	10
Corporate Mentor team evaluation	10
Total	**75**

Individual Performance	% of Final Grade
Peer evaluations (2)	10
Individual Reflection & other individual assignments	5
Faculty Advisor evaluation	10
Total	**25**

Overall Performance Multiplier: Each student's individual final numerical score from the above items will be multiplied by an overall performance multiplier to determine the final course grade. The multiplier will be determined based on the course instructor's judgment. Normally, this multiplier will be 1.0 and will have no effect on the final grade.

The overall performance multiplier will not be used to quantify fine distinctions in performance. Rather it is intended to allow for a fair grade to be assigned in cases where individual performance is far above or below expectations. For example, in cases where an individual makes extraordinary contributions to the team or produces outstanding work relative to the difficulty level and expectations of their particular project, a multiplier greater than 1.0 may be assigned. On the other hand, poor team member performance will result in a multiplier less than 1.0. Note that in extreme cases this could result in failing or incomplete (I) final grades, regardless of the overall numerical score. Examples of detrimental team member behaviors include, but are not limited to, the following:

- Lack of meaningful participation in team activities
- Lack of meaningful contributions to the team's work
- Substantially unequal team member contributions
- Insubordination toward anyone involved in the project
- Unprofessional or unethical conduct (including actions while on project-related travel)
- Misuse of sponsor provided data or equipment
- Poor peer evaluations
- Actions which jeopardize the progress of the project team

The overall performance multiplier for a team or individual may also be reduced (including possible failing or incomplete (I) final grades) in situations that include, but are not limited to, the following:

- Substantially unfinished projects
- Incomplete on non-functional prototypes that resulted from a lack of effort
- Unacceptable or incomplete final documentation
- Failure to return sponsor supplied equipment

Course Policies

Teams

Projects will be completed by students working in groups (teams). Each team will work with a Corporate Mentor (if applicable) and a Faculty Advisor. The roles of the Corporate 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. The assignment of students to teams will remain the same as in MECH 4381.

UTDesign Expo

At the end of the semester, a time will be scheduled for the public presentation and demonstration of projects during an event called Senior Design Expo. All team members are required to attend and participate in all the events scheduled during this day. Students should plan to be present for the entire duration of the event (approximately 11:00 am – 5:00 pm). **Senior Design Expo is scheduled for Wednesday August 10, 2016.**

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
Non-disclosure agreements (NDA) and intellectual property (IP) agreements with sponsoring companies signed during MECH 4381 remain in effect for MECH 4382.

Confidentiality is a key requirement in most of the projects in this course. Students should always treat sponsor information with care, regardless of the existence of an NDA. In particular, students must always make confidentiality requirements a priority when using computer resources (email, file storage, social media, etc.). Additionally, publically presented materials (presentations, posters, etc.) must be cleared by the sponsor first. If you have any doubts about these matters, consult your faculty advisor or the course instructor first.

Teams may request a dedicated directory (i.e., folder) on a UTD file server for secure storage of electronic documents and files related to this course. These directories will be configured so that team members will only be able to access their assigned directory. Web-based storage services such as Google Drive, Dropbox, etc. should not be used without sponsor approval. It is strongly recommend that teams discuss their document storage plans with their sponsor at the beginning of the project.

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, Corporate Mentor, and your fellow team members (i.e., peer evaluation). The course assignments along with their requirements and due dates will be posted on eLearning or publicized via email well in advance of the submission deadlines. There will be no formal examinations in this course.

No late assignments will be accepted without prior agreement of the course instructor. This policy is strictly enforced because it is an integral part of developing the skills expected in the professional community. Teams are advised to have a procedure in place to make sure that team deliverables are submitted on time. A late team deliverable will result in no credit for all team members. Note that computer problems, lack of network access, and extended upload times for large documents are not acceptable excuses for late submissions. Submitting deliverables well ahead of deadlines is a good way to avoid complications due to unexpected, last-minute problems. If you encounter any difficulties submitting a deliverable through eLearning, you may email it to the course instructor before the submission deadline.

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 Corporate 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 advisor and the course instructor 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. 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.

Important Note: Because the summer session is significantly shorter than the fall and spring semesters (11 vs. 15 weeks), a higher level of effort is required to complete projects in this compressed timeframe. Students are urged to pay particular attention to the unique schedule constraints imposed by the length of the summer term. As a guideline, at least 15 hours of project work per week from each student is typically required for successful project completion.

Attendance
Attendance at all scheduled class meetings is mandatory. Additionally, you are expected to attend and participate in all meetings with your Corporate Mentor, Faculty advisor, and project team.

Survey
Students will be expected to complete a survey as part of a course assignment. The results of the survey will be used to help improve the UTDesign Capstone Program. Once data is collected, student names will be disassociated from the results.

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. In general, travel reimbursements will not be provided.

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 address 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

The descriptions and timelines contained in this document are subject to change at the discretion of the instructor.