Department of Mechanical Engineering
ME EN 4010 – Engineering Design II – Fall 2017

Syllabus

Instructor:	**Prof. B. Raeymaekers**, MEK 2676, bart.raeymaekers@utah.edu
Office Hours:	M/W 11:35-12:00 pm, (MEK 2676) + when my office door is open
Units:	3
Meeting Times:	M, W, F: 10:45 am -11:35 am, WEB 1250 (see detailed schedule underneath in table)
Engineering Lab:	CADE Lab and Engman Lab
Text:	Product Design and Development, Karl Ulrich and Steven Eppinger, McGraw-Hill, 5th Edition (or can use 4rd Edition)
Course Website:	Hosted on CANVAS
Pre-requisites:	**ME EN 3000, 4000, and Upper Division ME Status**
Course TA:	Milo Prisbrey (milo.prisbrey@utah.edu)

Course summary:

ME EN 4010 is the final course in the Senior Design Sequence - ME EN 3000, 4000, 4010. The course is a team project-based course, in which teams of engineering students complete an engineering design project from start to finish.

Course objectives:

At the end of this course the student will be able to apply design methodology to define, design, analyze, manufacture, evaluate, and document an engineered product. To do this the student will:

1. Learn the design process and apply it to team projects.
2. Learn to effectively define, plan, and document a project and communicate its outcomes.
3. Work closely with a team advisor to develop an engineered product.
4. Learn to effectively manage project resources (budget, project schedule, man power).

Grading:

Grades will be based on the standard >90% = A, 80-90% = B, 70-80% = C, 60-70% = D, and <60% = E.

- Team Homework 5%
- 3 Design Reviews (each) 10% (30% total)
- Design Day Demonstration and Poster 25%
- Design Project / Final Report 40%

Each item must be completed to pass the course.

Deliverables:

Team Homework (5%)
You will have four team homework assignments.

- **Project Milestones Document (100 pts): Due on Fri August 25 at 5 pm on Canvas**
  Your first assignment of the semester will be to produce a document outlining your project plan. This document should clearly list all milestones that need to be reached, with dates, to accomplish a successful project by Design Day on December 5. Each milestone need to be quantifiable (not yes or no), and you need to define the "metric of success".

  Example milestone overview:

Date	Milestone	Metric of success	Measurement	Pass?
09/02	Electrical motor control circuit design	Motor must accelerate to 1,500 RPM under full load in less than 3 seconds	Time measurement	
10/02	Mechanical frame design	Frame must withstand 5,000 N static load in location *xyz* without plastic deformation of steel with σ_y = 300 MPa	Maximum stress from FEM simulation	

  At each design review you will be expected to report on your status in meeting these milestones. You will be expected to have met milestones that have passed at the time of the design review and have clear plans to reach the upcoming milestones.

- **Design Day Information Form and Images (50 pts): Due on Mo October 2 at 5 pm on Canvas**
  You will need to fill out the online Design Day information form and upload project images to be used for promotional material.
- **Project Poster Pre-submission: Due on Mo November 17 at 5 pm on Canvas**
- **Project Poster: Due on Mo November 27 at 5 pm on Canvas**

Design Reviews (10% each)
There will be three design reviews. See Table at the end of this document for the schedule. The design reviews are limited to 8 minutes per team + 3 minutes for questions. The design review needs to provide a brief update on the status of the project in 5 slides.

Slide 1: Project description, goals, and milestones. Status of the project.
Slide 2, 3, 4: Discussion of status of specific milestones that the team has worked on/problems/solutions.
Slide 5: Plan for next design review + 10 second budget update.

All team members are required to be present and answer questions in a professional and competent manner about all aspects of the project. Each team member is required to present in at least one design review. If problems in the planned design arise, team members are expected to

provide approaches to solve the problems in their designs. Students that miss design reviews will receive a failing grade (0/10) for that Design Review.

Design Day (25%)
The final design project demonstration will take place on Design Day in the Union Ballroom. It is envisioned that this presentation will involve a live demonstration of the project (where applicable) or involve use of multimedia (videos, simulations, etc.). I will come by each team poster and demonstration at which time you should present your project to me. You will have 5 minutes to provide an overview of the project and highlight achievements. Specific demonstration of the critical functions of the device will be required. Design Day is open to the public.

Final Report (40%)
The final report will include all deliverables developed in ME EN 4000 and 4010. A summary of the requirements for the final report are found in the Introductory Lecture Notes.

Team Peer Evaluations
At the end of the semester you will fill out peer evaluation forms. As all assignments are team assignments, your individual grade will be scaled based on your individual contributions, which will be determined by the peer evaluations. Your individual grade can be increased or decreased up to one full letter grade (10 percentage points) based on individual contributions. The instructor can adjust individual grades more in special circumstances.

Schedule
The schedule **is preliminary and subject to change.** Changes to the published schedule will be announced on Canvas and emailed to affected teams. Lectures are highlighted in purple, Design Reviews in blue.

Week	Mon (10:45 - 11:35 AM) WEB L120	Wed (10:45 - 11:35 AM) WEB L120	Fri (10:45 - 11:35 AM) WEB L120
1	August 21 Class Introduction	August 23 No Class	August 25 No Class
2	August 28 No Class	August 30 No Class	September 1 DR 1: Teams 1, 2, 3, 4
3	September 4 Labor Day	September 6 DR 1: Teams 5, 6, 7, 8	September 8 No Class
4	September 11 DR 1: Teams 9, 10, 11, 12	September 13 DR 1: Team 13, 14, 15, 16	September 15 DR 1: Team 17, 18
5	September 18 No Class	September 20 No Class	September 22 DR 2: Teams 1, 2, 3, 4
6	September 25 DR 2: Teams 5, 6, 7, 8	September 27 DR 2: Teams 9, 10, 11, 12	September 29 No Class
7	October 2 DR 2: Teams 13, 14, 15, 16	October 4 DR 2: Team 17, 18	October 6 No Class
8	October 9 Fall Break	October 11 Fall Break	October 13 Fall Break
9	October 16 No Class	October 18 No Class	October 20 No Class

10	October 23 No Class	October 25 No Class	October 27 No Class
11	October 30 Design Day Posters	November 1 DR 3: Teams Teams 1, 2, 3, 4	November 3 DR 3: Teams 5, 6, 7, 8
12	November 6 DR 3: Teams 9, 10, 11, 12	November 8 DR 3: Teams 13, 14, 15, 16	November 10 DR 3: Team 17, 18
13	November 13 No Class	November 15 No Class	November 17 No Class
14	November 20 No Class	November 22 No Class	November 24 Thanksgiving Break
15	**Design Day Tue December 5, 2017 from 9:00AM - 3:00PM**		
16	**Final report is due Wed December 6 by 11:59 PM. Turn it in to Canvas and to advisor.**		

Team 1: Advanced navigation for PAD (Advisors: Dr. Merryweather)
Team 2: Compost heat capture (Advisor: Dr. Calaf)
Team 3: Counter steering tricycle (Advisor: Dr. Brannon)
Team 4: Face tracking robot screen mount (Advisor: Dr. Merryweather)
Team 5: Hogle zoo I (Advisor: Dr. Raeymaekers)
Team 6: Hogle zoo II (Advisor: Dr. Chang)
Team 7: Hogle zoo III (Advisors: Dr. Tan)
Team 8: Ice screw optimization (Advisor: Dr. Kingstedt)
Team 9: Landlocked see table (Advisor: Dr. Naleway)
Team 10: Miniature supersonic flow device (Advisors: Dr. Chen)
Team 11: Move like a microbe (Advisor: Dr. Fu)
Team 12: Randomized trap and skeet thrower (Advisor: Dr. Naleway)
Team 13: Seaforce surf-wave actuator (Advisor: Dr. Minor)
Team 14: Steady flow vane turbine (Advisor: Dr. Calaf)
Team 15: Synthetic ocular hydration and simulation system (Advisor: Dr. Coats)
Team 16: Telerobotic eye surgery (Advisors: Dr. Abbott)
Team 17: Water energy machine (Advisor: Dr. Ameel)
Team 18: Wave energy machine (Advisor: Dr. Metzger)

General Class Policies

1. Attendance: Failure to attend a Design Review will result in a score of zero for that Design Review. Failure to be present at Design Day will result in failing the class.
2. If the Instructor or Project Advisor determines that you have not significantly contributed to your team's project, the Instructor reserves the right to give a failing grade for the class.

Academic dishonesty policy: ME EN 4010 will strictly follow the standard academic policy outlined by the University and the College of Engineering.

Faculty and student responsibilities:

No laptops, cellular/smart phones are allowed during class meeting times. These can be disruptive and distracting to your class mates.

All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct

(Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.

"Faculty…must strive in the classroom to maintain a climate conducive to thinking and learning." PPM 8-12.3, B.

"Students have a right to support and assistance from the University in maintaining a climate conducive to thinking and learning." PPM 8-10, II. A.

ADA statement: "The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations." (www.hr.utah.edu/oeo/ada/guide/faculty/)