Syllabus

ME452 --- Senior Capstone: Design Synthesis
Spring 2015
WRB 2003
Mon & Wed & Fri 11:00--11:50 PM
Lab Friday 12:00--2:30 PM

Instructor: Emil J. Geiger, Palmer Engineering 212A, eug@unr.edu
Office Hours: TBA and by appointment.
Teaching Assistants: TBA
Writing Fellow: TBA
Prerequisites: ME 451, ENGR 301, ENGR 100
Corequisites: ME 322R

Catalog Course Description and Course Objectives: Creation and optimization of mechanical systems. Topics: Economics, Ethics, Intellectual Property, Manufacturing, Reliability, Safety, Sustainability, and Testing. Team projects will be continued from ME 451. By the end of this course sequence (ME451 and ME452) you should have:

1. Learned the engineering design process and have implemented it for your design project,
2. Learned effective project, team, and time management techniques as applied to design, and
3. Developed and refined technical communication skills through both written and verbal means.

Student Learning Objectives: This course sequence addresses and accesses the following ABET Mechanical Engineering Student Learning Outcomes

   a. Ability to apply mathematics, science and engineering principles.
   b. Ability to design and conduct experiments, analyze and interpret data.
   c. Ability to design a system, component, or process to meet desired needs.
   d. Ability to function on multidisciplinary teams.
   e. Ability to identify, formulate and solve engineering problems.
   f. Understanding of professional and ethical responsibility.
   g. Ability to communicate effectively.
   k. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Silver Core Curriculum Learning Objectives: This course sequence satisfies:

CO12 Ethics This course builds on Ethics related material covered in ENGR 100 (1 week) and ENGR 301 (2 weeks). Two weeks of instruction will be devoted to Ethics related content to satisfy the 5 week requirement. In the context of Mechanical Engineering, this includes the topics of National Standards, Safety, and Liability.

CO14 Application This course is the second Senior Design Project course that follows ME 451. The projects are designed in ME451 and physically built and tested in ME452. Projects are completed by a team of students and are sourced from local industry, faculty, and student suggestions.
**Course Structure:** You will continue to work in teams of 5 students on your team project from ME 451 this semester. *Significant amounts of work outside of the normal class times will be required to complete the this course sequence.*

Engineering Design is best learned by doing. Therefore, the structure of the course is designed to use the “lecture” time to support your work on your design project to the maximum extent. The semester is broken into roughly three-week “modules” and you will be submitting work at the end of each module. Most weeks within a module will focus on a single Engineering Design topic. A online video lecture will be posted for you watch on your own time. The class will be split into two “sections” (A and B) and you will only be required to attend lecture on one day a week (either Monday or Wednesday), where you will work on your project and get feedback from me and your peers. The other lecture meeting is available for you to meet with your team, and complete assignments related to the weeks topic in the context of your specific project.

**Typical Weekly Schedule:** A list of the upcoming week’s activities will be posted by Friday proceeding the week. For the purposes of this class a week runs from Monday through Sunday.

**Readings:** Most weeks will have assigned readings.

**Online Lecture(s):** Each week a lecture or two will be posted to cover the most important aspects of that weeks topic.

**Pre-class Activity:** Before you come to your assigned lecture day (Monday or Wednesday), you will have to complete some preliminary work and be required to bring that to class for a grade.

**Lecture Activity:** In lecture, I will address any questions and then have teams partner up to give feedback on the week’s topic. I will also be available to discuss your projects. You will be graded on the quality of the feedback you provide to the other teams.

**Out-of-class Activity:** For the day you are not required to come to class, you will have a team assignment to complete so that you can incorporate the feedback from your peers and myself.

**Guest Lectures:** On most Fridays, we will have a guest lecture to discuss various engineering topics. You are required to attend these lectures and there will be a short assignment related to each speaker.

**Class Attendance:** Classroom attendance is expected. You are responsible for all material presented in class.

**Team Meetings with the Instructor:** There will be weeks where you will be required to meet with me as a team. You will sign up for these meetings via a doodle poll.

**Team Organization and Management:** You will continue to work on the same team from ME 451. Every team will select a new team leader this semester which will be my goto contact for team related communication. You should meet with your team at least once a week and will be required to submit meeting minutes (see assignment details) every three weeks. You will evaluate your teammates efforts in the meeting minutes and via CATME [www.catme.org](http://www.catme.org).

Everyone on the team will receive the same score for each group assignment with one exception. If a team member does not contribute satisfactorily to the project, the team may vote to give the “slacking” team member a yellow card (i.e a warning), and must inform me of the issue. If the team member, continues to underperform after given a warning, the team can vote to give a red card and the underperforming team member may, at the instructors discretion, receive a 0 for each of the assignments he or she did not contribute to.

**Team Mentor:** Every team will be required to have a team mentor. This person will in most cases be a practicing engineer, faculty member, or qualified graduate student. You will meet with your mentor every three weeks to get feedback on your design, address management issues, and review your documentation. The mentor will NOT be asked to grade any of your work directly, but will be required to fill out an assessment form at the end of each semester which will be considered as part of your grade.
**Team Sponsor:** Teams with externally sponsored projects will also have a Team Sponsor. This person is your “customer” and will provide feedback on whether your design meets their expectations and solves their problem or need. In some cases, the sponsor may also be your mentor, but not all sponsors will have an engineering background and thus would not be an appropriate mentor. If you are working on an externally sponsored project, remember that you are representing the department and the university. Furthermore, the employer may also be considering you for employment. Therefore, professionalism is of utmost importance in all communication with external sponsors. Additionally, In order to keep me “in the loop”, please CC me on all email communication.

**Writing Fellow:** This course uses a writing fellow for you to receive detailed feedback on your written assignments. You will be required to meet with the writing fellow at least 2 times. More details will be given in lecture.

**WebCampus:** WebCampus will be used for posting grades, announcements, and other material. You (the student) must use e-mail and you should check your e-mail daily. Be sure that your email address is correct in both WebCampus and MyNevada. I will frequently post announcements on Webcampus, which you should also receive via email. These announcements will also remain on Webcampus for your benefit. You are responsible for all material presented in class, via e-mail, or on Webcampus. All assignments are to be submitted via WebCampus. If WebCampus is down or otherwise not working, you must email your assignment to me before the deadline in order to receive credit. Since the majority of the work will be submitted as a team, one team member (does not have to be the team leader) must submit to the online assignment for me to be able to grade the assignment. Some assignments will only require you to submit a picture or a statement of “work complete”, etc. You will still have to submit this, or I will not be able to assign a grade due to the way Webcampus handles group assignments.

**Grading:** Grades will be determined with the follow rating systems.

For work (or portions of work) that requires a qualitative assessment:

- **Excellent** The work is high quality in all aspects including engineering content and analysis and communicated very clearly and professionally. To receive an excellent, the work must truly be exceptional.
- **Satisfactory** The work addresses all aspects of the assignment and is communicated sufficiently.
- **Needs Minor Improvement** The work mostly addresses the assignment, but may have gaps in the engineering content or marginally communicated.
- **Needs Major Improvement** The work is complete, but has gross engineering mistakes or poorly communicated.
- **Incomplete** The work misses major portions of the assignment.

For work (or portions of work) that only requires completions (i.e. Did you do it or not?)

- **Complete** Work is complete and receives full credit.
- **Partially Complete** Work is marginally to mostly complete and receives partial credit. May also be assigned to sloppy, unprofessional work.
- **Incomplete** Work is not complete or no serious attempt was made.

These systems will form the basis for the rubrics used for grading on Webcampus and may be adjusted to fit the nature of the assignment. Feedback will be given via the Webcampus grading tools.
Grade scale: Below is the grade scale for this class.

A range (A, A-) 90%--100%
B range (B+, B, B-) 80%--89%
C range (C+, C, C-) 70%--79%
D range (D+, D) 60%--69%
F below 60%

Grading Criteria: There are 1000 points available as follows:

Group Assignments 800
- Presentation 1 - Proof of Concept 25
- Presentation 2 - Detailed Design 50
- Presentation 3 - Business Proposal 50
- Presentation 4 - Status Update 50
- Poster 75
- Website Assignment 1 - Detailed Design 10
- Website Assignment 2 - Fabrication 10
- Final Website with Video 20
- Detailed Design Report 100
- Final Design Report 100
- Final Meeting Minutes 10
- Writing Fellow 20
- Final Prototype 250

Individual Assignments 200
- Ethics Paper 100
- Individual Grade (can earn up to 200) 100

Total 1000

Assignment Descriptions:

Presentations: Your design work will be split into a series of design tasks. Tasks will be due approximately every three weeks and have two components. The first part of the Task will be a 10 min presentation concerning the material covered in that 3 week module as applied to your project. The second part of the Task will be a record of all of the material generated during that three weeks including meeting minutes, pre-class activity, lecture activity, out-of-class activity, etc. The report must be turned on Webcampus by 11:59 PM on the day it is due.

Website: Your team will be building a website to share your project with the public and have a on-line record or our projects. This activity is broken into discrete assignments due roughly at the end of each month. The final website must have a video of your project.

Writing Fellow Meeting: You are required to make two team meetings with the writing fellow over the course of the semester.

Final Prototype: This is the final device that you build in the class. You will be graded on its functionality, being on time and on budget, ability to meet the engineering specs, aesthetics, etc.

Design Reports: Two design reports are required which are revisions of your Conceptual Design Report. In February, you will submit a Detailed Design Report. In May, you will submit a Final Design Report.

Ethics Paper: Each individual student will write a two page paper regarding ethical issues. Specific standards must be identified in the paper that are applicable to their design project. Safety issues must be discussed as well as other ethical considerations.
Individual Grade: Each student will receive an individual grade based on the meeting minutes as well as feedback received from their team via CATME and their mentor. Team members that perform satisfactorily (i.e. average for their team) will receive full credit (100 pts) Team members that go above and beyond (i.e. above average for their team) may receive a bonus of up to 100 additional points (full letter grade). Team members that under perform will not receive full credit. To receive any credit you must complete the reflective essay assignment at the end of the semester.

Late Submission Policy: All assignment are due at 11:59:00 pm on the day they are due. Submissions that are late by 1 second up to 24 hours will be penalized 10%. Submissions that are over 24 hours late must still be submitted, but will receive no credit.

Class Calendar: A google calendar has been created and can be accessed from WebCampus or at http://tiny.cc/MECapstoneCalendar. If you have a smart phone or a calendar application you should be able to subscribe to this calendar. This calendar will list all meeting dates, assignments, and other important dates and deadlines.

Schedule: A comprehensive course schedule can be found at http://tiny.cc/MECapstoneSchedule. While the course schedule has been carefully planned, I reserve the right to make adjustments as needed. Any changes to due dates within the course schedule will be announced via WebCampus. Changes to topics may occur without notice.

Purchasing: Please see the Purchasing document on WebCampus.

Statement on Academic Dishonesty: Cheating, plagiarism or otherwise obtaining grades under false pre-tenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student’s enrollment without a grade, giving an F for the course or for the assignment. For more details, see the UNR General Catalog.

Statement on Video or Audio Recording: Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Statement for Academic Success Services: Do not hesitate to come to my office during office hours or by appointment to discuss any aspect of the course. Your student fees cover usage of the Math Center (784-443 or www.unr.edu/mathcenter/), Tutoring Center (784-6801 or www.unr.edu/tutoring/), and University Writing Center (784-6030 or www.unr.edu/writing_center). These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

Statement of Disability Services: Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Thompson Building, Suite 101) as soon as possible to arrange for appropriate accommodations.
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