FALL 2021

AME 410: ENGINEERING DESIGN THEORY AND METHODOLOGY

Department of Aerospace & Mechanical Engineering

University of Southern California

COURSE SYLLABUS

Instructor: James Humann, PhD, PE

Mechanical Engineer, US CCDC Army Research Laboratory

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Virtual office hours: 5:00-6:30 PM Thursdays (make appointment)

Class Hours:	Wednesdays 6:30pm – 9:10pm
Class Location:	GFS 101
Teaching Assistant:	TBD

This syllabus may be updated as covid protocols are determined by USC. This is the preliminary version from August 14 2021.

Course Description and Objectives:

To compete in today's competitive market, an engineer must be able to identify market needs, generate creative product ideas that meet the needs, and develop innovative products that realize the ideas. During this process, systematic thinking and creativity play key roles for success. In this course, engineering design is treated in a holistic process of product development, starting from market analysis and product definition to conceptual design and product design. Developing systematic thinking and fostering creativity are the two general goals of this class.

Course Work:

The course work includes class lectures, homework, mid-term exam, mini-projects and term project.

Classroom Lectures:

Weekly lectures will be offered on Wednesdays. Students are required to complete reading assignments, indicated in the schedule page, before each lecture. The weekly 3-hour lecture time will often include discussion and group work. Active participation in classroom discussion is required for all students.

Attendance will be graded. During each class period, students should check in on Blackboard.

Homework:

Homework and Group Work are graded assignments meant to assess the students' ability to apply concepts from the readings and lectures. Many tasks and questions are open-ended with more than one correct answer. Thoughtfulness, clarity, conciseness and incisiveness are required.

Mid-term Exam:

There will be a mid-term exam. The exam will be open-book and open-note. The textbook (or another edition), and a student's homework and notes from this class may be referenced during the exam.

Collaboration, any online resources beyond the Blackboard, and homework/exams from previous semesters are not allowed.

Term Design Project:

This course is Project-Based. The term project will be carried out throughout the course by student teams of 5-6 members. Each team will propose a design project, or bid for one, and develop a specific design solution for their design project problem. By doing the project, students will digest and apply the theory and methods learned from the class, enhance their

creativity, and develop the experience of solving close-to-real engineering design problems. Students should form project teams after the very first lecture. Project Teams will give multiple *Project Briefings* to the whole class, and will submit two *Project Progress Reports* and a *Final Project Report*.

Course Materials:

There are required and optional textbooks for this course. Additional handouts and reading materials will be provided on the Course Blackboard Website when needed.

Required Textbook:

- *David Ullman," The Mechanical Design Process", 6th Edition*

Another edition may be used, but students are responsible for all the information assigned from the 6th Edition.

Optional Textbooks:

- *Pahl, G. & Beitz, W.: "Engineering Design - A Systematic Approach", 2nd Ed. Springer*

- *Suh, N.P.: "Axiomatic Design - Advances and Applications", Oxford University Press*

- *Terninko, J. "Step-by-Step QFD – Customer-Driven Product Design", 2nd Ed., St. Lucie Press, A CRC Press Company.*

Grading Requirements:

Students will be graded according to the following grading scheme:

Attendance and Participation: 5%

This class involves classroom group discussion every week. Therefore, attendance is very important. Attendance will be taken every week. Students need to check in on Blackboard every week. The check-in window will be open from 6:25 – 9:35 PM.

Homework and Group Work: 40%

HW and GW assignments will constitute 40% of the overall grade. Thoughtfulness, creativity, professionalism, and clarity will all factor into students' grades.

HW will be graded more strictly than GW, and each HW assignment counts for double the weight of GW. This is because the group project already counts for a large portion of your grade.

Midterm exam: 25%

Midterm exam is open-book and open-note, limited to the materials that have been discussed in classroom lectures, quizzes, homework assignments, and design team projects *this semester*. Accessing other resources online, collaborating with other students, or using class material from previous semesters constitutes academic misconduct.

Term project: 30%

Note that 30% of your semester grade is based on the results of your design project, which is a team effort. All project work done by a team is first given a team grade. This team grade is then weighted for each student, based on confidential peer-evaluations by all team members.

Your project briefings and progress reports will factor into your final project grade with a low weight. They are primarily meant to keep teams on track and elicit feedback to improve the final report.

Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, (www.usc.edu/scampus or http://scampus.usc.edu) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A. Academic integrity will be strongly enforced.

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards:

 https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriatesanctions/.

Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct:

http://policy.usc.edu/scientific-misconduct/.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu/ or to the Department of Public Safety:

http://capsnet.usc.edu/department/department-publicsafety/online-forms/contact-us.

This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report or can initiate the report on behalf of another person. *The Relationship and Sexual Violence Prevention & Services* https://studenthealth.usc.edu/rsvp/ provides 24/7 confidential support, and the sexual assault resource center webpage https://sarc.usc.edu/reporting-options/ describes reporting options and other resources.

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to the instructor as early in the semester as possible. Website and contact information for DSP:

http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html, ability@usc.edu.