Sample Syllabus

ME340: Mechanical Engineering Design Methodology Fall 2023 Syllabus

Catalog Description: The product design process; Development of design problem definitions by evaluating customer inputs, technology, and competitive products; Generation of conceptual design using structured and unstructured approaches; Evaluation of concepts using engineering modeling and decision matrices; Product detail design including design for manufacturability and profitability; Effective communication: oral, written, and graphical.

Credits: 3, nominally taken in 5th semester
Prerequisites: EDSGN 100, ME360 concurrent, ME320 concurrent, prerequisite for ME440/441W
Location: Lecture: 111 Wartik Lab
Labs: 239 Reber
Time: 3:35-4 25 Mondays and Wednesdays *[Friday only first week]* + Lab Session (3 hrs – see schedule)
Instructor: Dr. Jason Moore, Professor of Mechanical Engineering, jzm14@psu.edu (814) 865-1749, Office 318 Leonhard Building

Lab Instructors:

Sam Splendido, Graduate Student, Mechanical Engineering, sds5690@psu.edu → Section 1
Avez Shaikh, Graduate Student, Mechanical Engineering, aas6636@psu.edu → Section 2
Mike Fair, Graduate Student, Mechanical Engineering, mjf6207@psu.edu → Section 3
Sam Splendido, Graduate Student, Mechanical Engineering, sds5690@psu.edu Section 4
Jinming Wu, Graduate Student, Mechanical Engineering, juw554@psu.edu→ Section 5
YeonJoon Ko, Graduate Student, Mechanical Engineering, yqk5286@psu.edu→ Section 6

Writing Support: Michael Alley, Professor of Engineering Communications, mpa13@psu.edu → all sections
Office Hours: Planned (See schedule) and on demand. Can make a request to the instructor for on demand office hour.
Required Text: None

Course Objectives:

- Explain best practices in design methodologies to 1st year engineering student.
- Design solution to 'real', open-ended multidisciplinary design project.
- Work effectively and professionally in a team while executing a design project
- Evaluate design performance utilizing engineering analysis tools.
- Specify which of several design choices would be better for addressing societal, ethical, economic, and environmental concerns while meeting specified performance objectives.
- Communicate to engineering manager detailed design and reasoning for design choices.

Course Outcomes: After completing this course, each student should be able to:

1. Formulate a design problem by translating customer needs into design objectives and constraints
2. Construct and modify a Gantt chart and use it to plan, manage, and execute a project
3. Function effectively in a team environment and identify, assess and resolve team problems
4. Generate multiple design concepts and select and refine the best design concept using appropriate qualitative and quantitative techniques (including brainstorming, decision matrix, and economic analysis)
5. Use a solid modeling CAD package to represent the geometry of a part or an assembly of parts
6. Produce professional-quality reports, oral presentations, web pages, and graphical illustrations for design communication and documentation purposes
7. Access multiple sources of design information, including patents, previous courses, catalog data, reverse engineering, web search, consumer focus groups, empirical tests, etc.
8. Demonstrate professionalism and ethical conduct
9. Assess the ergonomics and aesthetics of a design
10. Identify the environmental, safety and societal implications of a design
11. Assess the manufacturability and assembly of a product and suggest improvements
12. Model and analyze design solutions and correlate to actual performance
13. Produce physical prototypes

Course Requirements:

Academic Integrity: Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

A good rule of thumb: if you have to ask yourself "Could this be considered a violation of academic integrity?" DON'T DO IT! Feel free to reach out to me with any questions or concerns about the academic integrity policy.

Artificial Intelligence: Although you may use artificial intelligence (AI) to help you revise documents, you are expected to draft and proofread those documents. Given that, you are responsible for any errors or gaps that arise from using AI.

Zoom Etiquette: If you are meeting with your TA or your fellow teammates via zoom you should have your camera turned on, unless there is some unusual circumstance that prevents you from doing this (such as driving a care or poor wifi). The camera allows for much clearer communication when verbally talking in small groups.

Class Participation: If you are feeling unwell do not attend lecture or labs in person and do not meet in person with your lab teammates. Simply communicate this to your lab TA **before class** and they will communicate with you on what you missed and what you will need to do to make up the assignment. Students are allowed to miss a maximum of 1 unexcused lab per semester. After this they will have a partial letter grade reduction (i.e. A to A-, B+ to B, etc.).

Late Assignments: All assignments are due at the time and on the date specified. If there is an extenuating circumstance please contact the Professor before the deadline.

Project: There will be a semester-long project in this class. Working in teams of 3-4, you will design, prototype, and test this system. More details will be given in class.

Design Journal: One of the most difficult challenges you will face in your professional lives is managing information. To help you develop this skill, each individual is required to keep an electronic design journal for the class and team project. This journal should contain answers to reflection question for all lab assignments and other information as requested by TAs and instructors.

Journals will be reviewed by the Lab Instructors during the semester. The reviews provide feedback on your engagement of the material. The reviews will be graded and recorded. Additional guidelines will be provided in class.

Learning by Doing: The best way to learn design is by doing it. Hands-on activities will be the primary instructional tool in this course. Most of the work will be team-based and project-oriented. The first several weeks consist of applications that illustrate the important issues in the design cycle. The last half of the semester will be devoted to a significant design activity.

Team Effectiveness: Many of the activities in this course will be done in teams and will thus receive a team grade. Each individual is expected to participate fully and equally in all team activities. Periodically, each individual will complete a peer evaluation of their team members which will be a factor in the final grade. We will use an on-line survey (www.CATME.org) to perform periodic team health surveys.

CANVAS: A CANVAS website will be used for posting of course materials, schedule, lab assignments, and grades. **Please make sure that you forward all email sent from the CANVAS website to your regular email account.** Please send emails directly to the Professor and TA's using their email addresses rather than through canvas.

Calculation of Final Grade: A weighted average grade will be calculated as follows:

Design Journal	10%
Peer Evaluation	15%
Lecture Participation	5%

Project team grade 70%(team grade*
= Progress report and presentation: 10%
Proposal report + presentation: 20%
Final Video Report: 10%,
Prototype evaluation: 60%**)

Final Average	> 93.0	90.0-92.99	87.0-89.99	83.0-86.99	80.0-82.99
Letter Grade	A	A-	B+	B	B-

Final Average	77.0-79.99	73.0-76.99	65-72.99	< 65
Letter Grade	C+	C	D	F

* All team members will normally receive the same grade if, in the judgment of the instructor, all members participated equally. However, at the discretion of the instructor, separate grades may be given.

** This includes weighted evaluation of Alpha 1 (7% of total grade), Alpha 2 (20% of total grade), and Beta prototypes (15% of total grade).

Note: We will not curve grades in this course. It is possible for everyone in the class to receive an A (or an F). Your performance depends on how well you perform, not on how everyone in the class does. It is therefore in your best interests to help your classmates, while acting within the bounds of the university's academic integrity policy. Education research has shown that helping others also increases your own learning.

Re-Grading Policy: If you believe that an error was made in grading of any assignment, report, memo or quiz, you must write a short, clear justification of your claim and attach it to the original assignment in question, and email it to Professor Moore. The statute of limitations for submitting such claims is one week after that assignment is returned. Note that the entire assignment will be examined and re-graded, not just the item in question, in order to ensure consistency and fairness.

Use of Cell Phones and Electronic Communication Devices: As a professional courtesy to your classmates, the TAs, and the instructor, please limit the use of cell phones in class and during lab sessions, except when asked. Students are encouraged to use social media to share and exchange pictures and events in class and lab sessions using #me340.

Work Load: Consistent with University policies for 3 credit hours, this course requires 8-10 hours per week of individual effort outside of scheduled class times. Please plan accordingly. It is critical that you establish regular times when your team can meet outside of class and lab, since most of the activities are team-based.

Counseling and Psychological Services: Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Counseling and Psychological Services at University Park (CAPS)
(http://studentaffairs.psu.edu/counseling/): 814-863-0395

Counseling and Psychological Services at Commonwealth Campuses
(https://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/)

Penn State Crisis Line (24 hours/7 days/week): 877-229-6400
Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Students with Special Needs: Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) website provides contact information for every Penn State campus (http://equity.psu.edu/sdr/disability-coordinator). For further information, please visit Student Disability Resources website (http://equity.psu.edu/sdr/).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines (http://equity.psu.edu/sdr/guidelines). If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

Educational Equity: Consistent with University Policy AD29, students who believe they have experienced or observed a hate crime, an act of intolerance, discrimination, or harassment that occurs at Penn State are urged to report these incidents as outlined on the University's Report Bias webpage (http://equity.psu.edu/reportbias/)