

Sample Syllabus

ME 340: Mechanical Engineering Design Methodology Syllabus

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Note that this syllabus may evolve as decisions at the university are made with respect to the COVID-19 pandemic and as a result of our experience using online instruction. All times are State College time (Eastern Time).

Location: Labs will be held in room 314 in the Hammond Building and on Zoom for all-remote students

Zoom Meeting Room: <https://psu.zoom.us/j/92959011090>. It is best to access this through Canvas and you must have logged in to your Penn State Zoom account in order to avoid being put in the waiting room for the room. If you have sound issues, please call in, for instance using the following phone numbers.

+1 646 876 9923 (US Toll)

+1 301 715 8592 (US Toll)

+1 312 626 6799 (US Toll)

+1 669 900 6833 (US Toll)

+1 253 215 8782 (US Toll)

+1 346 248 7799 (US Toll)

Meeting ID: 921 5760 7159

International numbers available: <https://psu.zoom.us/j/92959011090>

Time: MWF 12:20-1:10 PM

URL: The Canvas suite at <https://canvas.psu.edu/>

Instructor Office Hours: Wednesday at 8:30am at <https://psu.zoom.us/j/99459433557> and Fridays during our scheduled Zoom Lecture

Lab Instructors:

Dr. Jason Moore	jzm14@psu.edu	Section 001P	https://psu.zoom.us/j/93545392845
Annalie Fazio	aef5373@psu.edu	Section 002P	https://psu.zoom.us/j/98626601254
Christine Cummings	cmc6720@psu.edu	Section 003P	https://psu.zoom.us/j/99579742779
Zhiqing Lu	zxl5344@psu.edu	Section 005P	https://psu.zoom.us/j/91360643578
Dor Tillinger	dft5069@psu.edu	Section 006P	https://psu.zoom.us/j/99794897205
Nilesh Pandey	nxp34@psu.edu	Section 007P	https://psu.zoom.us/j/97130093169

TA Office Hours: Varies by lab instructor—days/times will be announced in class once teams are formed.

Writing Support: Michael Alley, Professor of Engineering Communications, mpa13@psu.edu

Additional Instructional Support: Dr. Jason Moore, Associate Professor of Mechanical Engineering, jzm14@psu.edu

Exam: There will not be an exam in this class.

Textbook: There is no required textbook; the course notes will be available online. You must purchase everything on the supply list which can be found on Canvas and has been sent to you by email.

Software: Required: *Matlab* will be used, available for free to students at this [link](#). Also, *everyone should download Zoom*—do not try to use Zoom in a browser.

Course 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.

Prerequisites: EDSGN100, ME360 concurrent, ME320 concurrent, prerequisite for ME440/441W

Testing, Homework, Grading

Grading will nominally be based on the following.

Design Journal:	10% of total grade.
Coding Prototype:	10% of total grade
Peer Evaluation	15% of total grade
Research Report*	10% of total grade
Proposal Report & Presentation*	15% of total grade
Final Video Report*	10% of total grade
Prototype Evaluation*	30% of total grade

*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.

Letter grades will be assigned as follows:

> 93	A
90–92.99	A-
87.0–89.99	B+
83.0–86.99	B
80.0–82.99	B-
77.0–79.99	C+
73.0–76.99	C
65–72.99	D
< 65	F

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 put in the instructor's office with additional notice via email ("ME340" must be in the subject line). 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.

The class outline is roughly as follows.

	Topic
1	Design Process and Management
2	Manufacturing Methods
3	Customer Needs and Product Specifications
4	Concept Generation and Selection
5	Prototyping
6	Patents and IP
7	Ethics in Design
8	Economic Analysis

Course Objectives:

- Develop proficiency in design skills and methodologies
- Gain first-hand experience of the design process in the context of a ‘real’, open-ended multi-disciplinary design project
- Work effectively and professionally in a team while executing a design project
- Apply engineering analysis tools in the design process
- Understand the holistic context of design, including global, societal, ethical, economic and environmental concerns
- Improve proficiency in professional communication skills
- Understand that it takes a minimum of 3-5 iterations to get a design, or a written document-right
- Realize that the first idea is almost never the best

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

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. *Note you are not to share your MATLAB code with any other team.*

Class Participation: If you are feeling unwell do not attend labs in person and do not meet in person with your lab teammates. Simply communicate this to your lab TA and they will communicate with you on what you missed and what you will need to do to make up the assignment.

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

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.

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

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/>)

Items Specific to Teaching Online:

You do not need to share video during lecture. However, when you are attending lab remotely and when you are holding a zoom meeting within your small group, you are expected to have your camera on unless there are special circumstances. The camera allows for much clearer communication when verbally talking in small groups.

This class or portions of this class will be recorded by the instructor for educational purposes. These recordings will be shared only with the TAs and students enrolled in the course. Portions of recordings in which students are visible will be deleted at the end of the end of the Spring 2021 term. You will access the recordings on Canvas.

Unauthorized student recording of classroom or other academic activities (including advising

sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact Student Disability Resources. Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited.

Notes on Online Learning:

- As mentioned above, students will be recorded on Zoom during lectures. If students do not wish to be recorded, they will need to keep their cameras and/or microphones off during the lectures.
- Students should become familiar with view options before the start of class, noting that the location of the view toggle may change when the instructor shares their screen.
- The instructor has the ability to mute/unmute all students. To unmute yourself, you can either hold down the space bar or use the toggle on the bottom left of the screen. In general we will prefer to use the space bar so that we do not get audio feedback loops.
- All students should log in to their Penn State zoom account prior to joining the class. (This way we can see you are a Penn State student and will be able to see your name during class.)
- We will not start out using a ‘waiting room’ for the Zoom meeting, but if we find that people not in the class are joining the class we will use the waiting room. We will, however, lock the meeting five to ten minutes after class has started to prevent unexpected intrusions.
- Breakout rooms will be used to facilitate discussion in small groups. Stay alert for on screen prompts to join/leave breakout sessions.
- The chat functionality can be used to ask questions. The TA’s will be monitoring the chat to either answer these questions or bring them to the instructor’s attention.
- We will update our approach as needed based on how the first few classes go. Please do not worry if the first class has some unexpected behavior—we will all make it work together!

Covid-19-Specific Text

Mask Wearing and Social Distancing: In accordance with PA Department of Health regulations and guidance from the Centers for Disease Control and Prevention (CDC), The Pennsylvania State University has determined that everyone will be required to wear a face mask in university buildings, including classrooms. You **MUST** wear a mask appropriately (i.e., covering both your mouth and nose) in the building if you are attending class in person. Masks have been provided for students, instructors, and staff, and everyone is expected to wear one. Students who choose not to wear a mask may not attend class in person. This is to protect your health and safety as well as the health and safety of your classmates, instructor, and the university community. Anyone attending class in person without a mask will be asked to put one on or leave. Instructors will end class if anyone present refuses to appropriately wear a mask for the duration of class. Students should also be sure they are situated at least six feet away from their fellow students and seated in a seat that is designated to ensure that distance. Your lab course will have seats arranged for this upon entering. Students who refuse to wear masks appropriately or adhere to other stated requirements may face disciplinary action for Code of Conduct violations. On a case-by-case basis, students may consult with Student Disability Resources for accommodations if they cannot wear a mask. Students requiring such accommodations may be advised to take advantage of and participate in the course through synchronous remote learning, if available. Students requiring such accommodations should

consult with academic advisors before the end of the drop/add period to locate alternative course offerings that will allow their participation through remote learning. Students who are experiencing COVID-19 related symptoms should not attend class in person and are encouraged to contact a health care provider.

Indoor Lab Procedure for COVID safety: Before you cross through the door of the lab, I expect that each of you is wearing a mask that covers your mouth and nose. Please also be sure you are situated at least 6 feet away from your fellow students and seated in a seat that is designated to ensure that distance. It is also important to remember that masks are required to be worn in any University building. These requirements are in place to promote the safety of our entire community. You will have a designated time to come to lab which will be discussed in class. Come to lab at that time. Avoid congregating in the hallways immediately before the start of your lab time. At the end of the lab session students will wipe down any used tools and computer surface used with disinfectant cloth and then leave.