

Sample Syllabus

ME 435 – Mechanical Engineering Systems Lab

Lectures: Mon & Fri

11:15-12:05

| Reber Building 135

Labs: Tue/ Thurs

8:00-11:00 AM; 11:15-2:15PM; 2:30-5:30PM; 6:00-9:00 PM

| ME Knowledge Lab (Reber Building 021)

Instructors:

Instructor	Dr. Siu Ling (Pansy) Leung	Phone	814-863-1653
Office	140 Reber Building	E-mail	szl12@psu.edu
Instructor	Dr. Stephen Lynch	Phone	814-867-4768
Office	149 NARCO	E-mail	spl11@psu.edu
Office Hours	By Appointment		

Teaching Assistants:

TBD

Text:

Laboratory Manuals and Supplemental Information will be posted on the Canvas website as necessary.

Course Description:

This course studies fundamental mechanical engineering subjects, including mechanics, dynamics, heat transfer, fluid mechanics, material science, and control in a holistic approach, through real-world systems in topics such as energy and sustainability, autonomy and robotics, and big data. Students will analyze and divide complex thermal and mechanical problems into manageable subtasks and devise and conduct hands-on experiments to solve engineering problems. This course will give students experience with data acquisition and analysis, evaluating the strengths and limitations of theoretical predictions using computational tools, and interpreting data to support a conclusion. In particular, the course emphasizes helping students develop skills in observation, problem-solving, analysis, and critical thinking. This course has weekly laboratory sessions as well as two weekly lectures to provide project background, reinforce knowledge, reflect and discuss experimental observations, and train communication, documentation, and presentation skills.

Prerequisites: ([ME 345](#) or [ME 348](#)) and [ME 330](#) and [ME 320](#)

Concurrent Courses: [ME 370](#)

Course Goals and Objectives:

Course Instructional Outcomes [Mapping to Student Outcomes shown in brackets]:

After completing this course, students will be able to:

- Identify fundamental engineering knowledge in complex thermal or mechanical systems. [SO1]
- Explain the connections between components in a complex problem. [SO 1]
- Apply ASTM standards to perform material testing.[SO7]
- Evaluate the benefits and limitations of computational and experimental works. [SO1,6]
- Analyze and interpret data to explore a hypothesis and draw a conclusion. [SO6]
- Devise and conduct experiments to evaluate parametric dependence. [SO6]
- Create a vision-aided robotic system. [SO1,6,7]
- Produce written documents and oral presentations for different audiences. [SO3]
- Practice team problem solving through laboratory activities. [SO5]

ABET Student Outcomes:

SO1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

SO3: An ability to communicate effectively with a range of audiences.

SO5: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

SO6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

SO7: An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Methods for Learning and Teaching:

This course relies primarily on three methods of learning:

- Course readings, module readings, and multimedia like video and recordings
- Practice by doing. Hands-on experimentations.

- Team-based learning. Peer-to-peer teaching and learning.

How to succeed in this course:

These are our recommended methods and strategies to help students prepare for this class:

1. **Get prepared** for the lab work by **reading through the lab protocol before attending the lab sections.**
2. **Actively participate** in the lectures by taking in-class notes and engaging in discussions.
3. **Start early** by working on assignments, pre-labs, lab submissions, and reports as early as possible.
4. **Work cohesively with your teammate.** An inclusive team drives success.
5. **Review** prior knowledge as needed.
6. **Let's experiment.** The more you do, the more you learn. **Get prepared to troubleshoot** - nothing works perfectly in the real world. Often error causes by human mistakes.
7. **Being patient and managing your time effectively - experiment takes time.** An FE analysis usually takes days, and a tensile test can take hours. So, plan on what to do while you are waiting, e.g., data analysis and discussion questions, and start drafting your report, etc.
8. **Think!** This lab is designed to build your problem-solving and higher-order thinking skills. As an engineer, your future supervisor will seldom provide explicit instructions. Therefore, in this course, **you should expect the amount of information being provided will decrease gradually, and you have to think about what information is needed to complete your task.**
9. **Ask** your instructors and TAs **questions** to clarify any confusion.

Resources:

Canvas

Course Format:

We will meet in person at the scheduled class time every week.

Lectures: (Two 50 mins lectures per week)

We will explain the background knowledge, lab activities, and weekly expectation in the lecture. **We recommend bringing a personal laptop with MATLAB installed for attending the lectures.**

Labs: (3 hrs per week)

Laboratory activities in this course are designed based on modern engineering research and development topics including Sustainability, Machine Learning, Additive Manufacturing, Autonomy and Robotics, and Energy. In this course, students will apply their prior knowledge in Heat Transfer, Fluid Mechanics, Solid Mechanics, Materials, and Chemistry and integrate with new materials to solve engineering problems involving multiple principles similar to real-world problems. Experiments in this lab are designed to gradually improve students' critical thinking ability and provide opportunities to utilize essential practical skills for engineers, including Data Acquisition, Data Analysis, Critical Thinking, Numerical Simulation, Problem Solving, Design of Experiments, and Communication Skills.

Format: Students will conduct experiments in the ME knowledge lab. Activities in the lab included both hands-on experiments and numerical simulations. **We recommend bringing a personal laptop with MATLAB installed for attending the lab sections**, even though a few computers will be available in the lab. Students will use their smartphones to collect data in the first three weeks of class. Please reach out to the teaching team if you have difficulty getting the computer and smartphone ready for class.

Lecture and Lab Schedule:

Week	Topic
1-3	Introduction & Machine Learning Lab
4-7	Material Selection Lab (Mechanical Material properties)
8-10	Turbine Cooling Lab (Heat Transfer)
11-15	Autonomous Vehicles Lab (Programming and Control)

Grading Policies

This course will follow all policies and rules as outlined in Senate Policy 47-20. Occasionally, a disagreement arises in the assignment of a grade. **A student who wishes to question or challenge the grade assigned must email a request for a grade change, including a copy of the question, the original answer, the points value for the request, and a paragraph explaining why a grade change is warranted.**

On the rare occasion that a student and instructor fail to resolve the course grade dispute through informal means, the student may request that the head of the academic program offering the course review the issue and take appropriate action to mediate and seek resolution. If this does not resolve the dispute, the student may seek further review from the associate dean for undergraduate or graduate education or the director of academic affairs for the college offering the course. The student may initiate this process by completing the Grade Adjudication Petition Form (available at <http://www.psu.edu/oue/aappm/grademed.pdf>) and returning it to the associate dean or director of academic affairs responsible for undergraduate education, or the associate dean for graduate studies. The request form must be submitted no later than ten weeks following the end date of the course (as it appears in the schedule of courses).

Grading:

Grades are based on assignments, contributions to the team, group reports. Detailed grading distribution is listed below. Submission for each lab module has to be completed before the start of a new lab module. **20% of the total maximum score will be deducted for each 24 hour period that it is late.**

** For all your online submissions, **please check and ensure the file can be opened and represents the latest version of the work** you intended to submit. Corrupted files or empty files will be graded as zero points. Resubmission after the submission deadline for the incomplete file is allowed, but a late penalty will apply as mentioned above.

The late policy will apply immediately after the deadline is passed, with no exceptions, to maintain fairness for all students. Please understand this is an over 100 students class.

We expect all members of the team will contribute equally toward all the group submissions. We will adjust individual members' grades if uneven workload distribution contribution is observed.

Formulas and weights for assignments:

Lab Submissions (30%)

Lab Reports (20%)

Prelab and Individual Assignments (25%)

Class Participations, In-lecture Discussions and Quizzes (15%)

Teamwork (10%)

Numerical Grade	Letter Grade
≥ 95.0	A
≥ 90.0	A-
≥ 85.0	B+
≥ 80.0	B
≥ 75.0	B-
≥ 70.0	C+
≥ 60.0	C
≥ 50.0	D
< 50.0	F

The syllabus, grading distribution, and schedule are subject to change based on class performance and needs.

Policies for missed projects/assignments:

Students will only be given an opportunity to make up missed work for **legitimate, unavoidable reasons**, such as: illness, injury, military service, family emergency, or religious observance. Non-legitimate missed work will receive a zero.

Policies for make-up labs:

If an evaluative event will be missed due to an unavoidable absence, the student should **contact the instructor before** (and as soon as) the unavoidable absence is known by email or in person to discuss ways to make up.

Policies for In-lecture discussions and quizzes:

We expect students to actively participate in lectures and lab discussions and arrive fully prepared at every lecture and lab section. Discussions and quizzes will be assigned randomly throughout the semester. We do not offer make-up. Instead, **ONE drop will be automatically provided** (the lowest score) to everyone for all the in-class discussions and quizzes **to accommodate any reason** that caused you to miss a lecture,

including, but not limited to, overslept, sickness, family emergency, or any other reason.

Attendance and late policies:

Attendance is required for all the lab sections. Attendance is required for all the lab sections. Students who missed the lab will receive **ZERO** points on any submission related to that lab until the work is made up. The student should contact the instructor **before** the unavoidable absence to discuss ways to make up. **We will NOT consider make up requests after the lab begins.**

Religious observances are not counted as absences, though observing students must inform the instructor during the first week of the course of any planned absences. Official universities activities are excused absences if the student informs the instructor in advance and provides appropriate paperwork. Absence due to sickness does not require a doctor's note, but it is the student's obligation to inform the instructor promptly and to bring to the instructor's attention extended medical absences as soon as possible. It is the responsibility of the absent student to catch up on any missed material and do any make-up work required by the instructor.

Course instructions for a campus closure

In-person classes will be canceled if campus closure is announced by the university. The instructor will communicate with students through email if asynchronous material is determined as necessary to make up the lecture materials. If the campus closure impacts lab sections, the instructor will communicate with all students by email within 24 hours to announce the rearrangement.

Academic Integrity:

The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. 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, refer to Senate Policy 49-20. Dishonesty of any kind will not be tolerated in this course. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions (refer to Senate Policy G-9).

Dishonesty Examples:

CHEATING is a general category of academic misconduct that, in the context of an academic course, involves dishonesty in completing work in the course, whether an examination or other kind of assignment. Assisting another student dishonestly is also cheating. Note that plagiarism, fabrication of research results, and other such violations of academic integrity may correctly be identified as particular kinds of cheating. Examples of cheating include, but are not limited to, the following:

- Knowingly discovering or attempting to discover the contents of an examination before the contents are released by the instructor
- Taking a picture of or otherwise copying an examination without permission to do so
- Providing such a picture/copy to another person
- Obtaining, using, or attempting to obtain or use any material or device dishonestly
- Supplying or attempting to supply any material or device to another person dishonestly
- Obtaining or attempting to obtain unauthorized information during the course of an examination from another student or another student's test materials
- Unauthorized possessing, taking, copying, or sharing of solutions manuals or computerized solutions (example CHEGG) for assigned homework or research problems
- Taking a quiz, an exam, performing a laboratory exercise or similar evaluation in place of another.
- Altering an exam, quiz, project or lab by changing incorrect answers and seeking a grade adjustment asserting the instructor made a mistake in grading.
- Facilitating acts by others; unauthorized collaboration of work; permitting another to copy; writing a paper for another; inappropriately collaborating on home assignments or exam without permission or when prohibited.

PLAGIARISM is that kind of cheating that involves using someone else's words, ideas, or other intellectual property as if they (the words, ideas, or other intellectual property) were one's own original work. Some common kinds of plagiarism are listed here:

- Because the richly varied resources of the Internet make copying the work of others easy, a particularly common kind of plagiarism occurs when someone reproduces or closely imitates one or more documents from the Internet and claims that the resulting essay or research paper is the copier's own work.
- Similar issues of dishonesty are raised by term paper sites or custom term paper writing services where one can purchase a term paper, research paper, or essay.
- Submitting as one's own an assignment prepared by another student is an obvious form of plagiarism.

- At other times, plagiarism occurs because a student does not understand the necessity or the mechanisms for acknowledging the words, ideas, or other intellectual property of others.

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FABRICATION is cheating by faking results, as of an experiment, or otherwise "making up" something that one presents as true, factual, or real. Fabrication in an academic context may occur in a number of forms, including these:

- falsifying research results or a report of research processes
- falsifying reports or records related to a field, practicum, or clinical experience

USE OF GENERATIVE TECHNOLOGIES

You must complete all coursework entirely on your own. You cannot assist other students or seek aid by using any online sites (e.g., Course Hero or Chegg). **Under the conditions without violating academic integrity, students can use AI technologies**, e.g., ChatGPT, Grammarly, or similar tools, provided that the content and concepts originate from the students themselves. For example, students can use ChatGPT to obtain suggestions for sentence structure and grammar checks, generate ideas, and provide feedback on their writing; however, seeking solutions or generating answers or reports from AI technology is prohibited and deemed as an academic integrity violation. **If you use any generative technology, such as ChatGPT, you must identify their source or quote appropriate references.**

Disability Resources:

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 & Psychological Services (CAPS):

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
- 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/Report Bias

Penn State University has adopted a Protocol for Responding to Bias Motivated Incidents <http://equity.psu.edu/reportbias/reports/protocol-for-responding-to-bias-motivated-incidents> that is grounded in the policy that the "University is committed to creating an educational environment which is

free from intolerance directed toward individuals or groups and strives to create and maintain an environment that fosters respect for others." That policy is embedded within an institution traditionally committed to academic freedom <https://guru.psu.edu/policies/OHR/hr64.html> . Bias motivated incidents include conduct that is defined in University Policy AD 91: Discrimination and Harassment, and Related Inappropriate Conduct <https://guru.psu.edu/policies/ad91.html> . Students, faculty, or staff who experience or witness a possible bias motivated incident are urged to report the incident immediately by doing one of the following:

- Submit a report via the Report Bias webpage (<http://equity.psu.edu/reportbias/>)
- Contact one of the following offices:

University Police Services, University Park: 814-863-1111

Multicultural Resource Center, Diversity Advocate for Students: 814-865-1773

Office of the Vice Provost for Educational Equity: 814-865-5906

Office of the Vice President for Student Affairs: 814-865-0909

Affirmative Action Office: 814-863-0471

* Dialing 911 in cases where physical injury has occurred or is imminent