

STEVENS

INSTITUTE OF TECHNOLOGY

ME 475: Mechanical Engineering Systems Lab

Mechanical Engineering Dept., Schaefer School of Engineering
Spring 2025

Meeting Times: M 2:00–4:50 pm/W 12:00-2:50 pm (A: first lecture in Babbio 319; lab various locations)

Instructor: Prof. Hamid Jafarnejad Sani hjafarne@stevens.edu

Office Hours: Thursdays 3:30 pm–5 pm (Zoom[\[Link\]](#), email instructor in advance)

Prerequisite(s): ME335, ME342, ME361

TA details:

Materials (Carnegie 107):	Ke Xu	kxu7@stevens.edu
PID water station (EAS 001):	Konnor Getz	kgetz@stevens.edu
Tablet Press lab (EAS 002):	Madison Kidd	mkidd1@stevens.edu
Solar thermal lab (ABS 1st floor):	Ke Xu	kxu7@stevens.edu
Sensors lab (EAS 001):	Ylva Gasch	ygasch@stevens.edu
3D Scan lab (EAS 304)	Nicholas Bibilouri	nbibilou@stevens.edu
Aero lab (EAS 304)	Konnor Getz	kgetz@stevens.edu

COURSE DESCRIPTION

ME 475: Mechanical Engineering Systems Lab is designed for students to apply and expand on the knowledge they have gained throughout the mechanical engineering curriculum in a practical manner. The course exposes students to realistic engineering tasks through a variety of different experiments. In these experiments, students will be required to work in teams to solve open-ended problems, follow correct engineering procedure and prepare technical reports and documentation. This course has two main goals:

1. Teach students correct techniques in the design of experiment and interpretation of experimental results (e.g. full factorial analysis, distributions and confidence intervals)
2. Develop student's critical thinking and problem solving skills

LEARNING OUTCOMES

1. Design of experiment:
 - a. Be able to describe tools used in the design of experiment (full factorial design)
 - b. Analyze the results of experiments using tools such as full factorial analysis and other appropriate statistical methods
 - c. Design an experiment based on the requisite parameters, specify and implement testing procedures to achieve accurate results
2. Employ prior knowledge and think critically to solve practical and open-ended engineering problems:

- a. Use background knowledge in thermodynamics and measurement equipment to determine the efficiency of a solar thermal water heater
 - b. Use control systems theory to develop and test a PID control scheme for an automated bottling station and analyze the effectiveness of this control scheme
 - c. Understand the usage and operation of Tablet Press equipment
 - d. Use material testing equipment to experimentally investigate the mechanical properties of a material under tensile loading conditions
 - e. Use MATLAB/SIMULINK and virtual twin of a reconfigurable dual-rotor experiment to model and control the dynamics of an aerospace system
 - f. Utilize a 3D scanner to perform quality assurance measurements on a complex part manufactured using a metal Fused Filament Fabrication process and analyze part shrinkage and scaling
 - g. Form arguments around current engineering topics and discuss the impacts of these topics
 - h.
 - i. Work independently and perform research to solve problems without significant instructor guidance
3. Report on, and interpret results, following appropriate engineering and technical writing standards
 - a. Communicate ideas, results and conclusions in a professional manner
 - b. Analyze errors in experimental results
 4. Develop professional and team working skills
 - a. Take on leadership roles and direct a team in completing practical activities
 - b. Take ownership of their work, by accepting and signing a code of conduct
 - c. Operate as a team, communicate ideas and actions while performing experiments and write a clear and concise engineering report that summarizes experimental findings

FORMAT AND STRUCTURE

- This course will primarily be delivered through a variety of experiments performed by students on a regular basis. See the course schedule [[Link](#)] on Canvas for more information as this class does not meet every week.
- Please read the lab handouts before each lab session and complete your lab reports within two weeks of taking each lab.

COURSE REQUIREMENTS

Attendance: Attendance is required. Students are required to attend all their seven labs in person, and they should contribute to writing the lab reports with their teammates. Students who miss a lab session without any arrangement with their instructor receive a zero score for an unexcused absence. Absences will be excused only for valid reasons (medical, job interviews, Stevens sports, etc.) with adequate documentation (doctor's note, letter from job interview, letter from coach, etc.) and with prior arrangement with instructor. An unofficial email from the coach/doctor/employer is not acceptable. In the case of an excused absence, students are still expected to contribute to the group lab report. In addition, students with valid reasons (e.g., isolating due to Covid exposure) can join a lab session remotely via Zoom (Instructors/TAs can help with such remote access arrangement).

Participation: Student engagement as part of their team and in classroom dialogue is expected and encouraged. Please ask questions and debate course related topics both inside and outside of the classroom/lab with your instructor and peers.

Assignments: This course is split into several practical lab-type experiences completed within class time and associated reports to be completed by the students outside of the scheduled class.

GRADING PROCEDURES

Grades will follow a typical grading scale i.e. 90-100% is an 'A/A-', 80-90% a 'B+/B/B-' and so on. Grades will be based on:

Lab Assignments (7 lab reports, equal weighting)	(92%)
Mini Project	(8%)

Lab report due: within **TWO WEEKS (14 days)** of each lab session. If you have your lab sessions scheduled on Mondays or Wednesdays, your lab reports are due two weeks later on Mondays or Wednesdays, respectively. A penalty of **-25% per day** will be applied to late submissions. No late report is accepted more than three days after the deadline. **Group members should briefly describe their contribution in one paragraph on each lab report.**

Mini Project due: May 5th, 2025

ACADEMIC INTEGRITY

Students should follow the procedures listed at: <https://catalog.stevens.edu/policies.html>. This site lists both the graduate and undergraduate academic policies.

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the [Honor System Constitution](#). More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at <http://web.stevens.edu/honor/>

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"I pledge my honor that I have abided by the Stevens Honor System."

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. Student Counseling and Disability Services works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities,

sensory impairments, and psychiatric disorders in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from SCDS staff. The SCDS staff will facilitate the provision of accommodations on a case-by-case basis. These academic accommodations are provided at no cost to the student.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the office of Student Counseling, Psychological & Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/sit/counseling/disability-services>. If you have any questions please contact: Lauren Poleyeff, Psy.M., LCSW - Disability Services Coordinator and Staff Clinician in Student Counseling and Disability Services at Stevens Institute of Technology at lpoleyef@stevens.edu or by phone (201) 216-8728.

INCLUSIVITY STATEMENT

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in education and innovation. Our community represents a rich variety of backgrounds, experiences, demographics and perspectives and Stevens is committed to fostering a learning environment where every individual is respected and engaged. To facilitate a dynamic and inclusive educational experience, we ask all members of the community to:

- be open to the perspectives of others
- appreciate the uniqueness their colleagues
- take advantage of the opportunity to learn from each other
- exchange experiences, values and beliefs
- communicate in a respectful manner
- be aware of individuals who are marginalized and involve them
- keep confidential discussions private

COURSE SCHEDULE

A tentative course schedule is provided on Canvas as it differs for each section. Labs will be conducted on either a weekly or bi-weekly basis depending upon the section of the class you are enrolled in.

Please read the lab handouts before coming to your lab session and complete your lab reports in a timely manner (within two weeks (14 days) of your lab session).