

Instructor: Karan Kakroo
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Office: By Appointment
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Office Hours: Tuesday 12:00 pm to 1:00 pm by appointment via email

Lecture Time/Location: Tuesday 1:00 pm - 1:50 pm in B155

Lab Location: F158

Required Course Material: Lab Manual & PPT Slides, which will be uploaded to Canvas for each lab

Reference Textbook: Experimental Methods for Engineers, 8th ed (or 7th ed)
J. P. Holman (ISBN: 978-0-07-352930-1)

Course Description:

This course is designed for third-year mechanical and energy engineering students to enable mastery of basic experimental skills in the thermal-fluid sciences. Students are expected to demonstrate capability of performing various levels of engineering measurements with reasonable accuracy. Continuation of MEEN-3240.

The lab course covers the following topics:

Category I: Basic knowledge in measurements and analysis

Category II: Thermodynamics and heat transfer

Category III: Fluid Mechanics

Category IV: Renewable Energy

Pre-requisites: MEEN 3240; MEEN 3120; all with a grade of C or better, and MEEN 3210 (may be taken concurrently)

Course Learning Outcomes (CLO):

Upon successful completion of this course, students will be able to demonstrate:

- Ability to perform statistical error analysis of experimental data
- Understanding measurements of transport properties
- Understanding temperature measurements
- Ability to design and construct mechanical engineering experiments
- Understanding basic electrical measurement techniques
- Concepts of the First Law of Thermodynamics
- Ability to compile, present and report scientific data
- Ability to control thermal science experiments
- Concepts of Fluid Dynamics
- Concepts of Heat Transfer

ABET Student Learning Outcomes (SO):

- 1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- 2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

- 3) an ability to communicate effectively with a range of audiences.
- 4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions on global, economic, environmental, and societal contexts
- 5) 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
- 6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- 7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

| MEEN 3242 Course Learning Outcomes | ABET EAC Student Outcomes | | | | | | |
|---|---------------------------|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Demonstrate ability to perform statistical error analysis of experimental data. | X | | | | | X | X |
| Demonstrate understanding measurements of transport properties. | X | | | | | X | X |
| Demonstrate understanding temperature measurements. | X | | | | | X | X |
| Demonstrate ability to design and construct mechanical engineering experiments. | X | X | X | | X | X | X |
| Demonstrate understanding of the First Law of Thermodynamics. | X | | | | | X | X |
| Demonstrate ability to compile, present and report scientific data. | X | | X | X | | X | X |
| Demonstrate ability to control thermal science experiments. | X | X | X | | X | X | X |
| Demonstrate understanding of Heat Transfer principles. | X | | | | X | X | X |
| Demonstrate understanding of Fluid Dynamics principles. | X | | | | X | X | X |

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|---------|--------------------|------|------------|---|
| Grades: | Lab Reports | 40% | ≥90% | A |
| | Lecture Attendance | 10% | 80 – 89.9% | B |
| | Lab Attendance | 10% | 70 – 79.9% | C |
| | Midterm | 20% | 60 – 69.9% | D |
| | Midterm 2 | 20% | < 60% | F |
| | Total | 100% | | |

Reports: Physical copies of lab reports are not required this semester. Lab reports need to be submitted on Canvas by a member of the group.

A template for the lab report in MS Word format is available on Canvas. [Download and use the template DIRECTLY.](#) Convert your report to PDF before submitting it.

Due days for lab reports (Definition of “late” lab reports): if not otherwise stated, lab reports are due before your next scheduled lab session. For example, if your lab session is Thursday from 1:00 – 4:00 pm. Your lab reports are due at 1:00 pm each Thursday.

Lecture attendance:

Lecture attendance is mandatory. Attendance checks will be conducted at random points during the lectures. There is a possibility that all lectures will move to a ZOOM only format at any point during the semester. If that is the case, attendance will still be checked, and an announcement will be made.

Lab attendance:

Lab attendance is also mandatory. A group picture in front of the lab equipment on the experiment day is required. This group picture should be labeled and included in the lab report. Compliance with COVID safety policies still applies during group photos. If at least 2 members of the group are not present to conduct the experiment (for ANY reason), then the entire lab report will automatically have 10 points deducted from it.

To further support attendance records and contact tracing, photos will need to be taken every 10 to 15 minutes that students are in the lab. The photo needs to show where students are located and what activities they are doing. The photos will need to be uploaded to Canvas by the end of the day in which the experiment was conducted. **Failure to take/upload the photos will impact the subsequent lab report grade by up to 20% of the total score.** This is an additional requirement not reflected on the rubric.

Teamwork:

Each group should consist of 4-7 students. Once the group is formed, students will have to stay in the same group and may NOT change groups. By definition, a group must have more than one individual. Anyone unwilling or unable to work in a group with multiple other individuals will receive an 'F' in MEEN 3242. **Reports submitted by individuals will not be graded.**

Peer Evaluation:

A peer evaluation will be performed for any individual experiment if any group member requests such a peer evaluation. Each group member will evaluate the **lab performance** and **report contributions** of other members in the same group anonymously by a scale of 0-100%. 100% means a good job on the assigned part of work while 0% means totally no contribution to the lab and the report. The **(average peer evaluation %) *(group experiment report score)** will be the score of that particular student for that particular lab report.

For example, a group receives an 88 on their lab report and an individual gets an average peer evaluation percentage of 50%, then that individual would receive a 44 for that lab report while the other members receive the normal 88.

Exams:

- **There will be NO make-up exams. Exceptions: medical emergency (student and/or important ones), transportation/traffic emergency, religious holidays/duties, jury duty, and military duty. Appropriate documentation must be submitted.**

Disability Accommodations:

If you need academic accommodations for disability, you must have documentation and register with the Office of Disability Access through the Division of Student Affairs. They will in-turn provide the instructor with a list of recommended assistance parameters.

Academic Dishonesty:

There is a zero-tolerance policy. Cheating of any kind will result in an automatic "F" in this course and the matter will be turned over to the appropriate student disciplinary committee.

Syllabus Changes:

The instructor reserves the right to make changes to the syllabus at any time in order to accommodate changing circumstances during the semester. Any changes will be announced, and an updated syllabus will be made available on CANVAS.