

Course Title: Laboratory

Course Code: MECH3830

No. of Credits: 3 Credits

pre-/co-requisites: LANG4034

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### **Course Description**

This required course for the BEng in Mechanical Engineering introduces students to experimental techniques, laboratory procedures, and technical communication. The course emphasizes hands-on experience in data acquisition, analysis, and design of experiments. Students will also develop skills in technical writing through collaboration with LANG 4034.

### **Course Objectives**

By the end of this course, students will:

- Gain proficiency in basic engineering measurement tools and systems.
- Develop independent experimental skills, ensuring efficiency and safety.
- Understand measurement uncertainty, calibration, and their significance in engineering experiments.
- Learn to write technical reports in standard formats used by engineers.

### **Methods of Instruction**

The course combines lectures and laboratory sessions to provide both theoretical knowledge and practical experience.

### **Lecture Topics**

1. Course introduction
2. Basic concepts and terminology
3. Design of experiments
4. Data acquisition and analysis
5. Measurement tools and techniques
6. Laboratory applications in:
  - Vibration
  - Material mechanics
  - Fluid mechanics

- Heat and mass transfer

### **Laboratory Schedule**

1. Data acquisition and analysis
2. Free and forced vibration measurements
3. Strain measurement and stress concentration
4. Flow measurement using a Venturi meter
5. Convective heat transfer
6. Refrigeration and air conditioning systems
7. Boundary layer analysis
8. Measurement of fracture toughness

This course equips students with essential experimental and technical skills, preparing them for advanced engineering challenges and real-world applications.

### **Assessments:**

Grading policy:

- Lab reports 32%
- Lab performance 28%
- Homework 15%
- Midterm exam 25%

<b>Assessment Task</b>	<b>Contribution to Overall Course grade (%)</b>
Lab reports	32%
Lab performance	28%
Homework	15%
Midterm exam	25%

### **Required Texts and Materials**

Lab manuals and tutorial videos

### **[Optional] Additional Resources**

[List any additional resources, such as online platforms, library resources, etc.]