MEC 317 Mechanical Engineering Laboratory II

Credits: 2  
Contact Hours: 3 hour laboratory per week

LEAD COORDINATOR  
J. Longtin

TEXTBOOK  
SUPPLEMENTAL MATERIAL  
Manuals for experiments are distributed to students

BULLETIN DESCRIPTION
Hands-on experience in solid and fluid mechanics and heat transfer. Emphasis is on the understanding of fundamental principles as well as familiarity with modern experimentation. Lectures at the beginning of the course provide background information and theories of experimentation. Student groups perform five experiments each in solid mechanics and in fluid mechanics and heat transfer. Report writing is an integral part of the course, with emphasis on design of experiment, interpretation and presentation of data, error analysis, and conclusions.

PREREQUISITES: MEC 316 and MEC 364  
THIS COURSE IS Required

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<tr>
<th>COURSE LEARNING OBJECTIVES</th>
<th>SOs</th>
<th>ASSESSMENT TOOLS</th>
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<tr>
<td>1. Demonstrate the ability to collect data from thermocouples, pressure sensors, pitot tube manometer, timer, moiré fringes, polariscope, fatigue testing machine, buckling machine, dynamic strain sensing, shear modulus tester, digital image recording.</td>
<td>b, n</td>
<td>10 Lab reports</td>
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<td>2. Learn how to compare experimental data with theoretical predictions.</td>
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<td>3. Learn how to work in a team and meet deadlines</td>
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<td>4. Develop technical writing skills</td>
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<td>5. Assess quantitatively experimental accuracy and dominant sources of uncertainties.</td>
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<tr>
<th>STUDENT OUTCOMES SUPPORTED (Scale 1-3)</th>
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3 – Strongly supported  2 – Supported  1 – Minimally supported  Program Criteria

COURSE TOPICS

**Solids Mechanics:**
1. Determination of material properties
2. Response of a cantilever beam under static and dynamic loading
3. Structural instability and material fatigue
4. Photoelasticity and beam under three-point-bending
5. Moiré methods and strain analysis

**Fluid/Thermal Sciences:**
6. Linear heat conduction
7. Saturation curve of water
8. Measurement of liquid viscosity and drag coefficient of a sphere
9. Natural convection from a sphere
10. Drag force on a cylinder in air cross flow