ME-405-104 MECHANICAL LABORATORY II SPRING 2025

Course Syllabus

<table>
<tr><td>COURSE NUMBER</td><td>ME 405</td></tr>
<tr><td>COURSE TITLE</td><td>Mechanical Laboratory 2</td></tr>
<tr><td>COURSE STRUCTURE</td><td>(1-2-2) (lecture hr/wk - lab hr/wk – course credits)</td></tr>
<tr><td>COURSE COORDINATOR</td><td>Swapnil Moon</td></tr>
<tr><td>COURSE DESCRIPTION</td><td>Laboratory emphasizes the use of fundamental principles, and instrumentation systems, for the analysis, and evaluation of mechanical components within a system.</td></tr>
<tr><td>PREREQUISITE(S)</td><td>ME 343 – Mechanical Laboratory I
ME 312 – Thermodynamics II</td></tr>
<tr><td>COREQUISITE(S)</td><td>ME 407 – Heat Transfer</td></tr>
<tr><td>REQUIRED, ELECTIVE, OR SELECTED ELECTIVE</td><td>Required</td></tr>
<tr><td>REQUIRED MATERIALS</td><td>a. J.P. Holman, Experimental Methods for Engineers, Seventh Edition, McGraw-Hill, 2001.
b. Harnoy, A, Mechanical Laboratory II Manual, Available on ME Dept, NJIT Web</td></tr>
<tr><td>Materials (not Required)</td><td>c. Beckwith, Marangoni and Lienhard, Mechanical Measurements, Fifth Edition, Addison-Wesley, 1993.
d. Beer, A Guide to Writing as an Engineer, 2nd Ed., Wiley ISBN 0-471-43074-9</td></tr>
<tr><td>COMPUTER USAGE</td><td>Lab report writing, data acquisition.</td></tr>
<tr><td>COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRETERIA:</td><td>
<table>
<tr><th>Course Learning Outcomes</th><th>SOs*</th><th>Expected Performance Criteria</th></tr>
<tr><td>1. Test mechanical systems, such as pumps and turbines, in the laboratory</td><td>2,7</td><td>Exam Question (75% of the students will earn a grade of 70% or better on this question)</td></tr>
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2. **Compare** measured transient heat transfer temperature to that calculated by the theory	1,2,4	**Exam Question** (75% of the students will earn a grade of 70% or better on this question)
3. **Apply** theoretical fluid mechanics, and thermodynamics to analyze the efficiency of pumps and turbines	7	**Exam Question** (same as 1)
4. **Produce** experimental graphs using computer data acquisition software.	1,2,3	**Report** (70% of the students will earn a grade of 70% or better on the report)
5. **Estimate** experimental errors.	1,2.3 .7	**Exam Question** (75% of the students will earn a grade of 70% or better on this question)
6. **Draw** sketches explaining laboratory machine components,	1	**Homework Assignm**

			ent (same as 2)
	7. **Write** appropriate technical reports explaining experiments, results and draw conclusions	6	**Report** (80% of the students will earn a grade of 70% or better on the report)
	8. **Apply** fluid mechanics concepts to analyze flow around a cylinder in wind tunnel experiments	1,2,4 7	**Exam** Question (75% of the students will earn a grade of 70% or better on this question)

CLASS TOPICS

1. Introduction to ME laboratory II
2. Performance test of a centrifugal pump.
3. Performance test of a gear pump.
4. Performance test of an impulse turbine (Pelton Wheel Experiment)
5. Wind tunnel experiment of pressure distribution around a cylinder
6. Transient heat conduction in bodies of finite length
7. Presentation/discussion of lab reports
8. Review.

STUDENT OUTCOMES (SCALE: 1-3)

1	**2**	**3**	**4**	**5**	**6**	**7**
3	3	-2	-	-22	-2	-3

3 – Strongly supported 2 – Supported 1 – Minimally supported

* Student Outcomes