ME395 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

<table>
<tr><td>COURSE NUMBER: ME395</td><td>COURSE TITLE: Laboratory I</td></tr>
<tr><td>REQUIRED COURSE OR ELECTIVE COURSE: Required</td><td>TERMS OFFERED: Fall, Winter</td></tr>
<tr><td>TEXTBOOK / REQUIRED MATERIAL: Course Pack</td><td>PRE / CO-REQUISITES: PH 240, 241, [PH 260,261] MECHENG 211, MECHENG 235, and MECHENG 240; preceded or accompanied by MECHENG 320, and MECHENG 382. I, II (4 credits)</td></tr>
<tr><td>COGNIZANT FACULTY: V. Sick</td><td rowspan="2">COURSE TOPICS:
1. Laboratory safety and procedures
2. Measurements and error analysis
3. Tensile tests, fracture and yield of materials
4. Analysis of a thermodynamic cycle
5. System identification and control
6. Flow measurement and performance of a turbo-machine
7. Wind tunnel measurements
8. Dimensional analysis</td></tr>
<tr><td>BULLETIN DESCRIPTION: Weekly lectures and experiments designed to introduce the student to the basics of experimentation, instrumentation, data collection and analysis, error analysis, and reporting. Topics will include fluid mechanics, thermodynamics, mechanics, materials, and dynamical systems. Emphasis is placed on report writing and team-building skills.</td></tr>
<tr><td colspan="2">COURSE STRUCTURE/SCHEDULE: Lecture: 2 days per week at 1.5 hours, Laboratory: 1 day per week at 3 hours</td></tr>
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COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets.	1. To teach students how to use basic measuring equipment for mechanical & thermal fluid systems [6] 2. To provide practical illustrations of concepts taught in the core classes [1, 3, 6] 3. To teach students how to present experimental results in clear and succinct written reports [3] 4. To teach standard lab procedures such as safety, use of computers in data acquisition, and thoughtful interpretation of the results [1, 3, 5, 6, 7] 5. To introduce students to methods of dealing with uncertainty [1, 2, 4, 6] 6. To provide an environment for students to work in teams [5]
COURSE OUTCOMES: for each course outcome, links to the Course Objectives are identified in brackets.	1. Use tensile testing machines, strain measuring devices, computer data acquisition systems, temperature and flow measuring devices, and wind tunnels [1,4] 2. Measure the modulus, yield strength, fracture toughness, and ultimate strength of materials [1, 2, 4] 3. Measure the thermal efficiency of a vapor-compression cycle, the performance and efficiency of a blower [1, 2, 4] 4. Have an increased understanding of the concepts of strain-hardening of metals, and optionally time-dependent deformation, upper and lower bounds of the modulus of a plastic or a composite [2] 5. Have an increased understanding of thermal efficiency, mechanical efficiency, flow within conduits and over immersed objects, and similitude [2] 6. Use similarity concepts for scaling experiments [2] 7. Reduce experimental data, whether acquired by hand or computer, into clear and informative figures [3] 8. Write a technical document [3] 9. Distinguish between experimental results and conclusions based on those results [3] 10. Present the results and conclusions of an experimental project in a clear, readable, succinct, and informative written format [3] 11. Estimate the uncertainty of an experimental result from the experimental errors associated with the data [5] 12. Interpret the significance of experimental results in the light of experimental uncertainty [5] 13. Delegate tasks among team members [6] 14. Work efficiently under constrained time limits [6] 15. Have the ability to determine the dynamics of a mechanical system
ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified	1. Several team based and two individual, lab reports containing a foreword, summary, results, discussion, conclusions, and figures 2. A full length report for each of the final and mid-term lab projects 3. Self and peer-evaluations by team members

PREPARED BY: V. Sick, ASO Staff
LAST UPDATED: 5/25/2021