

COURSE NUMBER: ME 4031W, 4 credits	COURSE TITLE: Basic Mechanical Measurements Laboratory
TERMS OFFERED: Fall, spring and summer	PREREQUISITES: ME 3333, IE 4521
TEXTBOOKS/REQUIRED MATERIAL: Laboratory Manual for Basic Instrumentation, Department of Mechanical Engineering, University of Minnesota, 2007. Experimental Methods for Engineers, J. P, Holman, McGraw-Hill, seventh edition. Writing Style and Standards in Undergraduate Reports, Jeter and Donnell, College Publishing, Glen Allen, Virginia.	PREPARED BY: Jan Davidson and Virgil Marple DATE OF PREPARATION: June 2007
COURSE LEADER(S): Jane Davidson, Virgil Marple, Allison Hubel	CLASS/LABORATORY SCHEDULE: Two 50-minute sessions per week and Ten 3-hour laboratories per semester CONTRIBUTION OF COURSE TO MEETING PROFESSIONAL OBJECTIVES: 100% Engineering Topics
CATALOG DESCRIPTION: Experimental methods, statistical estimates of experimental uncertainty, calibration, signal conditioning, selected transducers for mechanical measurements, data acquisition and processing, and presentation of results. Measurement of temperature, pressure, humidity, stress, force, acceleration, fluid velocity and flow, radiative properties, dynamic response of instruments, filter characteristics.	COURSE TOPICS: 1. Uncertainty analysis 2. Data analysis, presentation, and written report 3. Dynamic response of first order systems 4. Temperature Measurement 5. Pressure measurement 6. Measurement of fluid properties 7. Flow measurement 8. Strain gages/bridges 9. Force and acceleration 10. Instruments for measuring items 4 to 9 11. Digital sampling 12. Signal conditioning/filtration

COURSE OBJECTIVES	<ol style="list-style-type: none"> 1. To teach the principles of measurement. 2. To teach the principles of uncertainty of measurements 3. To teach the principles of temperature measurement and the instruments that measure temperature. 4. To teach the principles of viscosity measurement and the instruments that measure viscosity. 5. To teach the principles of pressure measurement and the instruments that measure pressure. 6. To teach the principles of flow measurement and the instruments that measure flow. 7. To teach the principles of digital sampling. 8. To teach the principles of signal conditioning/filtration
COURSE OUTCOMES	<p>(Letters shown in brackets are linked to program outcomes a-k)</p> <ol style="list-style-type: none"> 1. Apply the principles of uncertainty to data analysis from instrument measurement of a variety of properties. [a, b ,e , k] 2. Analyze the response of instruments that are first order systems. [a, b, c] 3. Obtain experience in operating instruments and measurement systems to measure the properties of temperature, viscosity, pressure, flow and strain. [a, b, k] 4. Apply the principles of digital sampling and signal conditioning to measurement instruments. [a, b, c, k] 5. Learn to write reports describing experimental setups, data collection, data analysis and data presentation. [e, g, k]
ASSESSMENT TOOLS:	<ol style="list-style-type: none"> 1. Mid-semester exams, final exam 2. Written lab reports 3. Homework/independent experiment design project/quizzes

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Nature of changes:

The course outcomes were reviewed by committee and no changes were made to this document. Please see Outcome Assessment Report