

COURSE NUMBER	ME 343		
COURSE TITLE	Mechanical Laboratory-I		
COURSE STRUCTURE	(2-2-3) (lecture hr/wk - lab hr/wk – course credits)		
COURSE COORDINATOR	C. Zhu		
COURSE DESCRIPTION	This course introduces the basic instrumentation and measurement in mechanical engineering, as well as the basic training on data analysis and lab report writing. Focus topics include the sensing of rotation speed, temperature, mechanical stresses and loads, flow pattern and rates, programmable logic controls and feedback controls, and sound pressure level. Particular attention also goes to the applicability of related measurement methods, as well as uncertainty analysis of measurement systems.		
PREREQUISITE(S)	ECE 405 – Electrical Engineering Principles; Math 225 – Survey of Probability and Statistics; ME 236 – Dynamics		
COREQUISITE(S)	None		
REQUIRED, ELECTIVE OR SELECTIVE ELECTIVE	Required		
REQUIRED MATERIALS	J.P. Holman, <u>Experimental Methods for Engineers</u> , 8th Edition, McGraw-Hill, 2010.		
Other supplemental materials (not Required)	1. J. Stenerson, <u>Fundamentals of Programmable Logic Controllers, Sensors, and Communications</u> , 3 rd Edition, Prentice Hall, 2004. 2. D. Beer, <u>A Guide to Writing as an Engineer</u> , 2nd Ed., Wiley ISBN 0-471-43074-0		
COMPUTER USAGE	Data acquisition; data analysis and graphic presentation; lab report writing		
COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:	Course Learning Outcomes Upon completing this course, students will be able to:	SOs*	Expected Performance Criteria
	1 perform the data acquisition and data analysis for error margin, least-square curve fitting and system uncertainty.	1,2,7	Report (80% of the students will earn a grade of 70% or better on the reports)
	2. perform the measurement of rotation speed via various techniques	1,2,4,6,7	Report (80% of the students will earn a grade of 70% or better on the reports)

	3. carry out the measurement of temperature under steady and transient conditions	1,2,4,6,7	Report (80% of the students will earn a grade of 70% or better on the reports)					
	4. perform the measurement of strain to determine the static and dynamic loading force or torque	1,2,4,6,7	Report (80% of the students will earn a grade of 70% or better on the reports)					
	5. explain the basic control technologies: programmable logic control and feedback control.	1,2,4,6,7	Exam Question (80% of the students will earn a grade of 70% or better on this question)					
	6. perform the measurement of flow rate, flow pattern, and flow velocity.	1,2,4,6,7	Report (80% of the students will earn a grade of 70% or better on the reports)					
	7. carry out the basic sound measurement.	1,2,4,6,7	Report (80% of the students will earn a grade of 70% or better on the reports)					
	6. write the basic lab reports with effective writing and graphical presentation of experimental methods and results	1,6	Report (80% of the students will earn a grade of 70% or better on the reports)					
CLASS TOPICS	<ol style="list-style-type: none"> 1. Basic concept of mechanical engineering measurements and uncertainty analysis. 2. Basic format and effective technical report writing. 3. Theory and measurement of rotation speed. 4. Theory and measurement of steady and transient temperature. 5. Theory and measurement of stress, strain and dynamic load. 6. Basic control theory and control experiment. 7. Theory and measurement of flow pattern, rate and velocity. 8. Theory and experiment of sound. 							
STUDENT OUTCOMES (SCALE: 1-3)	Outcome	1	2	3	4	5	6	7
	Scale	3	3		2		2	3
	3 – Strongly supported			2 – Supported		1 – Minimally supported		

* Student Outcomes