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| 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, flow pattern and rates, PLC 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) | ME 304 – Fluid Mechanics | | |
| 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 | SOs* | Expected Performance Criteria |
| | 1 describe the characteristics of signal conditioning and perform the data acquisition and data analysis. | a,c,d,e,g,k | Report (80% of the students will earn a grade of 75% or better on the reports) |
| | 2. perform the measurement of strain to determine the loading force or torque. | a,b,c,d,e,g,k | Report (80% of the students will earn a grade of 75% or better on the reports) |
| | 3. explain the basic control | a,b,c,d,e,g,k | Exam Question |

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| | technologies: programmable logic control and feedback control. | | (80% of the students will earn a grade of 75% or better on this question) | | | | | | | | |
| | 4. perform the measurement of flow rate, flow pattern, and flow velocity. | a,b,c,d,e,g,k | Report (80% of the students will earn a grade of 80% or better on the reports) | | | | | | | | |
| | 5. perform the basic sound measurement. | a,b,c,d,e,g,k | Report (80% of the students will earn a grade of 80% or better on the reports) | | | | | | | | |
| | 6. write the basic lab reports with effective written and graphical presentation of experimental methods and results | g,k | Report (80% of the students will earn a grade of 76% 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 signal conditioning. 4. Theory and measurement of rotation speed. 5. Theory and measurement of temperature. 6. Theory and measurement of stress and strain. 7. Basic control theory and control experiment. 8. Theory and measurement of flow. 9. Theory and experiment of sound. | | | | | | | | | | |
| STUDENT OUTCOMES (SCALE: 1-3) | a | b | c | d | e | f | g | h | i | j | k |
| | 3 | 3 | 3 | 2 | 2 | | 2 | | | | 2 |
| | 3 – Strongly supported | | | 2 – Supported | | | 1 – Minimally supported | | | | |

* Student Outcomes.