

EGR 390: Engineering Measurements

Spring Semester 2015

DEPARTMENT: Engineering and Physics

COURSE PREFIX: EGR

COURSE NUMBER: 390

CREDIT HOURS: 3

I. TITLE: Engineering Measurements

II. COURSE DESCRIPTION AND PREREQUISITE(S):

General considerations of signals and utilization of instruments to measure physical properties of systems. Review and introduction of useful mathematical concepts such as statistical data analysis. Introduction to digital data acquisition and signal processing. Application to the design of instruments which measure displacement, motion, count, strain, force, pressure, level, fluid flow and temperature.

Prerequisite(s): Junior standing, MAT 338 (corequisite)

III. COURSE OBJECTIVES:

The student will have

- A. hands-on experience in data collection and statistical data analysis;
- B. an understanding of electrical circuits and filters used for data measurements;
- C. a comprehension of the theory of operation of various types of sensors and transducers;
- D. an understanding of basics of sampling and analog-to-digital conversion;
- E. an ability to communicate experimental results in written laboratory reports;
- F. an ability to design (and to discuss the implementation of) practical measurement systems;

IV. CONTENT OUTLINE: This course will include the following topics:

- A. Basic concepts of measurement systems
- B. Statistics: finite-sized data set
- C. Regression analysis
- D. Uncertainty analysis
- E. Electrical devices and measurements
- F. Strain and strain measurement
- G. Sampling
- H. Dynamic systems

V. INSTRUCTIONAL ACTIVITIES: Lectures, discussions, assigned homework, assignments, labs and exams

VI. FIELD, CLINICAL, AND/OR LABORATORY EXPERIENCES: Two hours per week in lab experimenting with sensors and transducers and collecting data.

VII. INSTRUCTOR INFORMATION:

Semester: Spring 2015

Classroom: BL 155

Class Times: MW 10:30 –11:20

Lab: Th 10:30 – 12:20 pm, BL 019

Instructor: James Hereford, BL 171

E-mail: jhereford@murraystate.edu

Office Hours: MW 9:30-10:20 am, 1:00 – 3:00 pm, T 8:00 – 12:00, Th 8:00 – 10:15 am, by appointment or as a target of opportunity

VIII. TEXT(S) AND RESOURCES:

Introduction to Engineering Experimentation, 3rd Ed., A.J. Wheeler and A. R. Ganji, Prentice Hall, 2010. Plus supplementary handouts.

References:

AIP Style Manual, 4th Ed. New York, American Institute of Physics, 1990.

Experimental Methods for Engineers, 8th Ed., J. P. Holman, McGraw-Hill, 2012.

Theory and Design for Mechanical Measurements, 5th Ed., R. S. Figliola and D. E. Beasley, Hoboken, NJ: John Wiley & Sons, 2011.

IX. EVALUATION AND GRADING PROCEDURES:

Exams/Quizzes (includes homework)	45%
Lab exercises + writeup	25%
Final exam	30%

X. ATTENDANCE POLICY:

Students are expected to adhere to the MSU Attendance Policy outlined in the current MSU Bulletins.

Students are expected to be prompt and regular in class attendance. If you must miss class, however, you are responsible for material covered while absent. Extreme circumstances are required in order to be excused from a scheduled examination and, furthermore, makeup arrangements must be worked out with the instructor (not the chairman, secretary, your roommate, etc) prior to examination time.

During class, use of cell phones (including texting) and laptop computers is prohibited unless approved ahead of time by the instructor. Students violating this policy will be asked to leave, have their phone confiscated for the remainder of the class period or will be penalized on the next exam.

XI. ACADEMIC HONESTY POLICY:

Murray State University takes seriously its moral and educational obligation to maintain high standards of academic honesty and ethical behavior. Instructors are expected to evaluate students' academic achievements accurately, as well as ascertain that work submitted by students is authentic and the result of their own efforts, and consistent with established academic standards. Students are obligated to respect and abide by the basic standards of personal and professional integrity.

Violations of Academic Honesty include:

Cheating - Intentionally using or attempting to use unauthorized information such as books, notes, study aids, or other electronic, online, or digital devices in any academic exercise; as well as unauthorized communication of information by any means to or from others during any academic exercise.

Fabrication and Falsification - Intentional alteration or invention of any information or citation in an academic exercise. Falsification involves changing information whereas fabrication involves inventing or counterfeiting information.

Multiple Submission - The submission of substantial portions of the same academic work, including oral reports, for credit more than once without authorization from the instructor.

Plagiarism - Intentionally or knowingly representing the words, ideas, creative work, or data of someone else as one's own in any academic exercise, without due and proper acknowledgement.

Faculty reserve the right to invalidate any exercise or other evaluative measures if substantial evidence exists that the integrity of the exercise has been compromised. A student may appeal the decision of the faculty member with the department chair in writing within five working days. Note: If, at any point in this process, the student alleges that actions have taken place that may be in violation of the Murray State University Non-Discrimination Statement, this process must be suspended and the matter be directed to the Office of Equal Opportunity. Any appeal will be forwarded to the appropriate university committee as determined by the Provost.

XII. NON-DISCRIMINATION POLICY STATEMENT:

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, gender, sexual orientation, religion, age, veteran status, or disability in employment, admissions, or the provision of services and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities. For more information, contact the Director of Equal Opportunity, 103 Wells Hall. 270-809-3155.