Catalog Description:

MEEN 2146: Engineering Measurements
Basic experimental techniques and instrumentation commonly found in industry. Experimental planning and analysis. ASTM methods introduced. Data acquisition means studied. Significance of data presentation (written and oral). Computer usage and report writing emphasized. Prerequisites: MATH 2414, PHYS 2325/2125, MEEN 1320 or CSEN 2304 and CEEN 2301.

Text Book:

Alternative References:

Computer Usage:
Students use computers in this class for homework assignments and projects. Assignments will be turned in via BlackBoard website and turn-it-in

Grading Policy, Exams, Homework, etc.:
• Reports (30%)
• Homework (20%)
• Final Exam (15%)
• Project Report (10%)
• Presentation (10%)
• Reproducible experiment (10%)
• Prelab and Quizzes (5%)
Guidelines:
Lab activities will cover basic training in software and hardware, practical issues on data acquisition, interfacing, simulations and experimental validations. Experiments are to be announced. Experiments will be assigned and students will be working on them throughout the semester.

Course Content:
- Basic Concepts of Measurement Methods.
- Static and Dynamic Characteristics of Signals.
- Measurement System Behavior.
- Probability and Statistics.
- Uncertainty Analysis.
- Calibration of Sensors and Instruments
- Analog Electrical Devices and Instruments.
- Sampling, Digital Devices, and Data Acquisition.
- Measurement Reliability and Safety
- Sensor Technologies
- Temperature Measurements.
- Pressure and Velocity Measurements.
- Flow/Level Measurements.
- Strain Measurement.
- Motion, Force, and Power Measurements.
- Introduction to LabVIEW (graphical programming software for data acquisition, signal conditioning and basic analysis)

Mission Statement:
The mission of the faculty of the Engineering Measurements class is to help students acquire analytical, and experimental knowledge for measurements of engineering systems.

Course Objectives:
The objectives of the Engineering Measurements class are to help students learn how to:

1. Apply the fundamental principles of measurements, error analysis, instrumentation methodology, and experimental design to find the solution to practical problems related to experimental measurement and data analysis.
2. Demonstrate a working knowledge of the theoretical basis for operation of instruments, sensors, and associated equipment by analyzing practical problems dealing with the use of such instruments, sensors, and equipment.
3. Demonstrate familiarity with the operation of various instruments by hands-on application in the laboratory.
4. Effectively communicate the design and results of experimentation through engineering report writing.
5. Demonstrate understanding of ethical issues surrounding measurements in academics and profession settings.

Course Outcomes:
At the completion of this Engineering Measurements class, students should gain:

a. Ability to apply knowledge of basic mathematics, science, and engineering in solving engineering problems
   1. applying theoretical principles of sensors and actuators for measurements;
   2. using operational principles of measurement equipment, sensors and actuators;
   3. performing necessary calculations for determining parameters/variables of interest of a particular experiment;
   4. manipulating, graphing and calculating important parameters for experiment;
   5. understanding the basic elements of a measurement system and uncertainty analysis;

b. Ability to design and conduct experiments, as well as to analyze critically and interpret data
   6. designing a particular measurement experiment;
   7. measuring physical variables with instruments;
   8. understanding data acquisition and collecting data by automated means;
   9. conducting numerical simulations of experiments;
c. Ability to use modern tools, techniques, and computation methods necessary for engineering practice
10. use software’s to effectively communicate engineering technical knowledge
11. use of computers, data acquisition devices/tools, graphing software and other related software;

d. Ability to apply probability and statistics in engineering
12. use of probability and statistics principle when analyzing data and performing uncertainty analysis.

Disability statement (See pages 2 & 11 of Student Handbook):
Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator.

Academic misconduct (See page 23, section 100 of Student Handbook):
You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

Forms of academic dishonesty:
1. Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.
2. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.
3. Fabrication: use of invented information or falsified research.
4. Plagiarism: unacknowledged quotation and/or paraphrase of someone else’s words, ideas, or data as one’s own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one’s own work also constitutes plagiarism.

Nonacademic misconduct (See page 23, section 100 of the Student Handbook):
The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor’s ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

Sexual misconduct (See page 23, section 200 of Student Handbook):
Sexual harassment of students and employers at Texas A&M University-Kingsville is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.