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ETEC 241.01: Instrumentation

Steve Shen

University of Montana - Missoula, steve.shen@umontana.edu

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Missoula College UM
Department of Applied Computing and Engineering Technology
Course Syllabus

ETEC 241 Instrumentation

Credits: 3

Prerequisite: ETEC 245 Digital Electronics

Term: Spring 2015

Meetings

MWF 8:10AM to 9:00AM in HB 05

Final Exam

Monday, May 11, 2015, 10:10AM to 12:10PM in HB 05

Faculty Contact

Steve Shen, Instructor – steve.shen@umontana.edu

Phone: 406-243-7914

Office Hours: Monday 12:00PM to 2:00PM, Tuesday 1:00PM to 2:30PM,
Wednesday 1:00PM to 2:00PM, Friday 1:00PM to 2:00PM

Office: Griz House 8

Course Description

ETEC 241 Instrumentation 3 cr. Offered spring. Prereq., ETEC 245. The study and analysis of industrial measuring and process control instrumentation in both analog and digital form. Proper selection, use and interpretation of measurement equipment and data.

Course Overview

Electronic instrumentation deals with the study of current day instruments by learning the basic principles of the circuitry involved. Computer based electronic instrumentation is in use in our everyday lives which combines old and new techniques. This course covers the use and limitations of various electronic measuring devices and circuits used to measure electrical parameters of devices. Study of guidelines for selecting appropriate test equipment for specific measurements, interpreting measurements and understanding the statistical significance of measured data is learnt and practiced (using correlating labs in ETEC 242 Electronics lab 3). Both analog and digital measuring devices are studied in detail including electronic multimeters, oscilloscopes, signal generators and spectrum analyzers. Measurement and testing parameters on tuned and untuned circuits & Radio transmitter and receiver circuits are also studied in this course.

Learning Objectives

This course includes a detail study of factors involved with making measurements and dealing with errors, the different notations used in system calculations, ac and dc deflection meter principles and the proper use of analog meters & the application of comparison measurement to wheat stone bridge and potentiometer circuit. This course familiarizes students with working knowledge of involved circuitry, principles, types, precautions, output interpretation and usage while studying instruments like electronic multimeters, oscilloscopes, signal generators, spectrum analyzers and mechanical graphics chart recorders. Specifications and applications of special purpose laboratory amplifiers like chopper, carrier and lock-in amplifiers. Additionally measurement, testing and performance parameters of radio transmitter and receiver circuits are also studied.

Correlation with ETEC 242:

This course provides theory and preparation for lab activities in ETEC 242. Maintaining the study schedule of text and lecture material will be important to understanding the principles behind, and the outcomes of the lab activities.

Required Materials

- Terry Bartelt, *Industrial Automated Systems, Instrumentation and Motion Control*, Delmar, Cengage Learning, 2011
- Lab Manual on the CD accompanying the textbook
- ETEC 241 Toolkit

Reference Material

- *Elements of Electronic Instrumentation and Measurement* by Joseph Carr, 3rd Edition, Prentice Hall.

Evaluation Procedures

Grades will be assessed as follows

Assessment Area:

Attendance	5%
Assignments	35%
Midterm Exam	25%
Final Exam	35%

Grading Scale:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
Below 60%	F

General Requirements for the Course

1. All the even-numbered Problems at the end of each chapter are to be assigned as homework. The students are encouraged to do the odd-numbered Problems at the end of each chapter.
2. Late work may be accepted at most one week after the due date and can receive a maximum of **80%** of the full credit. No work will be accepted **one week after the due date**, or after the solutions have been gone through.
3. No work will be accepted after the final week of the semester, Friday May 8, 2015.

Academic Integrity:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at:

http://life.umd.edu/vpsa/student_conduct.php

Using the Web to research materials and concepts is an integral part of learning in the twenty-first century. Studying with other students is a productive method of learning. A certain amount of collaborating on concepts with other students and using resources found on the Internet in an assignment is recommended. Copy and paste is not acceptable. It is expected that each student will input his/her assignment into the computer, and each student must be able to explain any assignment turned in. Collaboration on exams is strictly forbidden.

Dropping and Adding Courses or Changing Sections, Grading or Credit Status

University Policy for dropping courses or requesting grading/credit status changes can be found in the catalog:

<http://www.umt.edu/withdrawal/Withdrawal%20Policies.aspx>

Students should become familiar with all academic policies.

For Complete Academic Policies Please View the Um Catalog at:

<http://www.umt.edu/catalog/academics/academic-policy-procedure.php>

Disability Accommodations:

Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at <http://www.umt.edu/dss> . Or call 406.243.2243 (voice/text).

Changes to Syllabi:

NOTE: Instructor reserve the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances. If changes are made to the syllabus, amended copies will be dated and made available to the class.

Cell Phone and other Electronic Communication Devices Policy:

All electronic communication devices must be tuned off and stowed away prior to the start of class.

Attendance Policy:

Regular classroom attendance is expected.

Exam, Project, and Assignment Policy:

All exams are to be taken on the assigned date and time. Projects and assignments are due at the start of class on the assigned date and time. Late assignments will be accepted at the instructor's discretion. Rescheduling of an exam will be approved at the discretion of the instructor and only in extraordinary situations.

Learning Management System:

It is the responsibility of the student to access and familiarize herself/himself with the Learning Management System (LMS) for the course (Moodle). Access & training is available through UOnline <http://umonline.umt.edu>

Topic Outline for ETEC 241 Instrumentation

1. Flow Control
2. Level-Control Systems
3. Analytical Instrumentation
4. Industrial Process Techniques and Instrumentation
5. Instrumentation Symbolology
6. Process-Control Methods
7. Instrument Calibration and Controller Tuning
8. Industrial Wireless Technology
9. Introduction to Programmable Controllers
10. Fundamental PLC Programming
11. Advanced Programming, PLC Interfacing, and Troubleshooting
12. Motion-Control Feedback Devices
13. Industrial Networking
14. Functional Industrial Systems