Missoula College UM
Department of Applied Computing and Electronics
Course Syllabus

ETEC 234 AUTOMATIC CONTROLS
Credit: 4
Prerequisite: ETEC 250 Solid State Electronics I
Syllabus Last Revised: August 2014

Meetings:
Lectures Mon, Wed & Fri 2:10PM – 3:00PM; Lab Thu 1:10PM to 3:00PM
Classroom: HB05

Faculty Contact:
Steve Shen - steve.shen@umontana.edu
Phone: (406)243-7914
Office Hours: Mondays, and Wednesdays 12:00PM to 1:00PM
Thursdays 3:00PM to 4:00PM
Office Location: 905 South Avenue, Griz House 8 (Modular – East side MC campus)

Final Exam: Monday December 8, 2014 from 1:10PM to 3:10PM in HB05

Course Description

ETEC 234 Automatic Controls 4 cr. Offered autumn. Prereq., ETEC 250. Explores the theory, terminology and components used in automatic control of industrial machines and processes. Uses the servomechanism as a representative control system to analyze open-loop, closed-loop, proportional, integral, and differential control strategies. The use of transducers and computers in automatic control systems in the industrial control setting is emphasized.

Course Overview

This course introduces the terminology, concepts, and the fundamental methods of analysis and design of automatic industrial control systems. The course is designed to provide students with an understanding and appreciation of some of the theoretical concepts behind control system elements and operations without much need of advanced mathematics and theory. Typical topics in process control, such as analog and digital signal conditioning, thermal, mechanical and optical sensors, final control, discrete-state process control, controller principles, analog controllers, digital control and control loop characteristics, and etc. are covered in the course.

Learning Outcomes

1. Describe the fundamentals of the methods of analysis and design of automatic control of industrial machines and processes.
2. Describe concepts of measurement, manipulation, and control of automatic controls in the industrial setting.
3. Demonstrate an understanding of and practical skills in industrial detection sensors and interfacing devices and circuits of control systems
4. Describe the characteristics and applications of thyristors, such as SCRs, IGBTs, UJTs, Diac, Triac, and etc.
5. Describe the controller operation
6. Describe the elements of motion control
7. Describe the fundamentals of servomechanism
8. Demonstrate an understanding of and practical skills in motors (including DC, AC, and servo motors) and drives
9. Describe process control methods
10. Describe control systems with different controlled variables, such as temperature, pressure, flow, level, and etc.
11. Describe the fundamentals of programmable logic controllers, including programming and interfacing
12. Demonstrate the ability to design, implement, test and troubleshoot a basic and complete automatic control system

Required Materials

- Lab Manual on the CD to accompany the textbook
- ETEC 234 Toolkit (available in the Bookstore)

Assessment
Grades will be weighted and graded as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework Assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Attendance</td>
<td>5%</td>
</tr>
<tr>
<td>Lab Exercises</td>
<td>20%</td>
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<tr>
<td>Control Project</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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Grading Scale:
- 90-100% A
- 80-89% B
- 70-79% C
- 60-69% D

Topic Outline (subject to change)
I. Introduction to Industrial Control Systems
II. Interfacing Devices
III. Thyristors
IV. The Controller Operation
General Requirements for the Course

1. All the assigned lab experiments and projects are to be done with physical components, unless otherwise indicated by the instructor.
2. Multisim simulations are required for some of the lab experiments.
3. Please demonstrate every lab experiment and project to the instructor as soon as you complete them.
4. Late work may be accepted at most one week after the due date and can receive a maximum of 80% of the full credit.
5. No work will be accepted one week after the due date, or after the solutions have been gone through.
6. No work will be accepted after the final week of the semester.

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.umt.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:
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 UMOnline http://umonline.umt.edu