ME 285 - Mechatronic System Engineering Spring 2001

Instructor: Dr. Buff Furman  Office: E-310G  Ph.: (408) 924-3817  E-mail: bfurman@email.sjsu.edu

Office hrs:  Monday 2-3:30 pm, Tuesday 1:45 –5:30 pm, or by appointment only.

Prerequisites: ME 106, ME 187, or equivalents.

Class rooms: E-333 (Lecture), E-125 (Lab.)

Class time/code:  Lecture - MW 19:00 – 20:15 (16870)  Lab - Thurs 19:00 - 2100

Final Exam:  Wednesday, May 23, 2001 19:45 – 22:00

COURSE DESCRIPTION:
Overview of mechatronic system engineering with emphasis on analog electronics, digital electronics, sensors and transducers, actuators, and microprocessors. Lectures are intended to provide the student with major concepts underlying the design of mechatronic systems. Laboratory experiments are designed to give the student hands-on experience with components and measurement equipment used in the design of mechatronic products.

Required Text: none

References: see last page

Grading: Homework 15%, Lab Reports 20%, Term Project 25%, Quizzes 20%, Final Exam 20%

Course Goals
1. To develop an understanding of the basic elements underlying mechatronic systems: analog electronics, digital electronics, sensors, actuators, and microcontrollers.
2. To understand how to interface electromechanical systems to microcontrollers.
3. To gain hands-on experience with commonly used electronic test and measurement instrumentation.
4. To improve written communication skills through laboratory and project reports.
5. To gain practical experience in applying knowledge gained in the course through a hands-on project.

Learning Objectives for ME 285
1. The student can explain the concept and characteristics of a signal source.
2. The student can select and configure operational amplifier circuits to achieve desired interfacing requirements between a signal source and a downstream device such as a microcontroller or data acquisition system.
3. The student can explain the practical limitations of operational amplifiers and can quantitatively estimate the effects of these limitations on output voltage and current of the op-amp.
4. The student can design and analyze the performance of RC low-pass and high-pass filter circuits.
5. The student can explain the basic operation of bipolar and MOS field-effect transistors and can design with them to activate solenoids, relays, motors, etc. from signal sources.
6. The student can explain the input/output characteristics of digital logic devices and can design a logic circuit to accomplish a given task.
7. The student can explain the underlying operational principles and construction of electromagnetic actuators such as DC, AC, and stepping motors.
Learning Objectives for ME 285 (cont.)

8. The student can determine the torque and speed requirements for a given motion control application considering system inertia, external forces or torques, and motion profiles and select an appropriate motor.

9. The student can explain the basic structure of a microcontroller.

10. The student can successfully write a program to perform digital input and output from a microcontroller port.

11. The student can explain the common analog-to-digital-conversion (A/D) methods.

12. The student can successfully write a program to do A/D conversion using a microcontroller.

13. The student understands the digital-to-analog (DAC) conversion process.

14. The student can successfully write a program to drive a DAC using a microcontroller.

15. The student can successfully write a program to interface analog and digital devices, such as sensors and actuators, with a microcontroller.

Additional Notes:

Homework and lab reports will be due at the start of the respective session on the assigned date. Late homework or lab reports will not be accepted unless prior arrangements have been made.

If you are going to be absent from class, please give me a call, or send me an email prior to the class meeting to let me know that you will not be coming. Don’t just not show up!

Start working on the term project as soon as possible. The most common lament heard from students who fare poorly in the class is, “We should have started earlier on the project.”

Lab experiments should be performed in a group of two students. The laboratory report is to be written individually. It is acceptable to work collaboratively with your lab partner or other students in the class on the lab report, but it is NOT acceptable to copy someone else’s report, in whole or in part. Such action is called plagiarism and is a specific violation of the SJSU policy on Academic Dishonesty, section 1.2.

References: (In addition to these hardcopy references, check out the ME106 tutorial web pages)


(Check the Reserve Book Room in Clark Library under ME 106 for several of the references above.)
## Course Schedule (tentative)

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<td>Op amps</td>
<td><a href="http://hyperphysics.phy-astr.gsu.edu/hbase/electronic/opampvar.html">http://hyperphysics.phy-astr.gsu.edu/hbase/electronic/opampvar.html</a></td>
<td>Digital I/O</td>
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<td>Motor action, dc motors, servos, drivers</td>
<td><a href="http://www.srl.gatech.edu/education/ME3110/primer/motors.htm">www.srl.gatech.edu/education/ME3110/primer/motors.htm</a></td>
<td>Motor Drive Lab</td>
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<td>4/2</td>
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<td><a href="http://www.compumotor.com/literature/pg223_engrg.htm#SIZING">http://www.compumotor.com/literature/pg223_engrg.htm#SIZING</a></td>
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