Instructor
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Office: Room 5-8C  Office Hours: or by appointment

Course Objectives
– Introduction to systems modeling and transient response analysis with an emphasis on mechanical engineering applications
– Application of control design methods on real problems

Requisites
Prerequisites: Math 201 or Equivalent
Corequisites: Mec E 390 or permission of instructor
Note: Credit may not be obtained in this course if credit has been obtained in either CH E 448 or E E 469

Text Book

Homepage
e-class: https://vista4.srv.ualberta.ca/webct/entryPageIns.dowebct (use your GPU login and password)

Schedule
Lectures: MWF 10:00 –1050 (NRE 2 090)
Labs: M,T,W,R 1400–1650 (MecE 4-19 TWR or MecE 3-10 MTWR) (starting Sept 14)

Mark Distribution
Homework and Lab assignments: 25% (see below for details)
Midterm Exam: 25% (2011-10-31, 10:00–1050)
Final Exam (tentative): 50% (2011-12-19, 900–1100 – see Beartracks in the last week of classes)

Course Outline
1. Introduction
2. Review: background for control system design, analysis, and synthesis.
   (a) complex numbers
   (b) Matlab/Simulink
3. Modeling of Dynamics Systems:
   (a) Linear dynamic models
   (b) Laplace Transforms
   (c) State Space Representations, Solution of ODE’s/Matlab
   (d) Input Signals
   (e) Analysis of dynamical systems
   (f) Linearization of non-linear systems
4. Transfer Functions
   (a) Block diagram representation of feedback systems, Algebra of block diagrams,
   (b) Characteristic equation and stability
   (c) Bandwidth vs robustness tradeoff
5. Basic Control Design
   (a) Performance criteria
   (b) PID Control/tuning, PID Tuning Rules

November 2011
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
19 20 21 22 23 24 25 26 27 28 29 30

December 2011
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25 26 27
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November 2011
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26 27 28 29 30

December 2011
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
19
Labs
All labs will take place in MEC E 4-19 and will use Quanser experimental equipment. The pre-lab and lab description is contained in a PDF on the course website.
File: USB_QICii_QET-DCMCT Student WorkBook.pdf
Password: R3C3A56000

Please download the appropriate sections and before the lab print and do the pre-lab. You will then fill in the sheets during the lab and hand in the pre-lab and lab at the end of the lab.

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<td>Modeling 1 - Motor Static Relations</td>
<td>2.5.1-2.5.2</td>
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<td>2</td>
<td>Modeling 2 - Motor dynamic model</td>
<td>2.5.3</td>
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<td>Speed 1 - PI Zeigler</td>
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<td>Position 2 - Ramp Tracking</td>
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<td>5.6-4-5.6.5</td>
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<td>Haptics</td>
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Assignments

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<td>Dec 7</td>
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Notes
1. Assignments are due at 1:00 p.m., on the dates detailed above or as announced by Dr. Koch in class. Please hand the lab and the assignment in the appropriate box on the 4th floor (near the Mec E Office).
2. Labs are due at the end of the Lab or as per instruction by the TA.
3. Assignments and exams are based on lecture, lab and assignment material.
4. The use of engineering judgment is essential when solving problems as a practicing engineer. Answers from work submitted by the student must: follow from the solution development, have consistent units, and have a correct magnitude and sign.
5. Faculty of Engineering approved Non-Programable calculator only.
6. Course handouts, student Grades, etc. will be posted, on e-class (formerly WebCT).
7. Recording is permitted only with the prior written consent of the professor.
8. Policy about course outlines can be found in section 23.4(2) of the University Calendar.
9. “The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honest and to uphold policies at the University in this respect. Students are particularly urged familiarize themselves with the provisions of the Code of Student Behavior (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behavior which could potentially result in suspicions of cheating, plagiarism, misrepresentation fax and/or participation in an offense. Academic dishonesty is a serious offense and can result in suspension or expulsion from the University.”