EE324/ME324: Dynamical Systems, Spring 2014

Course Description: Dynamic systems classification, mathematical modeling of mechanical, electrical and mixed dynamic systems, state space representation, equilibrium points and linearization, solution of linear input/output and state equations, Laplace transforms, transfer functions and block diagrams, first and second order systems, stability, frequency response and simulation techniques. Prerequisites: MA232.

Course Instructor: James J. Carroll  Tel.: x-7726  Email: jcarroll@clarkson.edu
Office Hours: M,W,F 2:00-3:30pm  Office Location: 164 CAMP
Lecture Days, Time, Location: M,W,F: 1:00-1:50PM, 177 CAMP
Course Website: www.clarkson.edu/class/ee324

Course TA: Xie Cai  Email: xicai@clarkson.edu
Office Hours: T,Th 2:30-4pm  Office Location: 111 CAMP

Required Text (available from Clarkson bookstore and elsewhere):

Reference Texts (available from the library for student check-out):


Course Learning Objectives: Students successfully completing this course will be able to:

1. Model continuous time dynamic systems using state space representation
2. Generate transfer functions and block diagrams of dynamical systems
3. Solve linear state equations in the time and frequency domain
4. Perform linearization and identify equilibrium points
5. Perform stability analysis
6. Use appropriate software and simulation techniques.
Course Grading Policy:

Homework: 30%
Semester Exam #1: 20%
Semester Exam #2: 20%
Final Exam: 30%

Final course grading will be curved with the following guarantees:

Averages of 90% or above will receive an A grade for the course,
Averages of 80% or above will receive at least a B grade for the course,
Averages of 70% or above will receive at least a C grade for the course,
Averages of 60% or above will receive at least a D grade for the course,
Averages below 60% may receive an F grade for the course.

Tentative Course Schedule (topical coverage based on the reference text):

Topic 1 (6 lectures): Modeling Translational Mechanical Systems
Topic 2 (4 lectures): Standard Forms for System Models
Topic 3 (4 lectures): Block Diagrams and Computer Simulation
Topic 4 (5 lectures): Modeling Rotational Mechanical Systems
Topic 5 (6 lectures): Modeling Electrical Systems
Topic 6 (6 lectures): Frequency Domain Solutions for Linear Models
Topic 7 (7 lectures): Transfer Function Analysis of Systems
Topic 8 (5 lectures): Developing Linear System Models

Exam #1 (2/28/14): Open book/closed notes, covering Topics 1-3, based on HW and class notes
Exam #2 (4/4/14): Open book/closed notes, covering Topics 1-6, based on HW and class notes
Final Exam Review (4/25/14)

Final Exam (week of 4/28/14, TBD): Open book/closed notes, covering all of the above.
Homework: Problems assigned from the text will be collected and graded for effort with solutions posted on the class website after the due dates listed below.

HW#1 (due 2/3/14): 2.2, 2.4, 2.17, 2.20, 2.30
HW#2 (due 2/10/14): 3.1, 3.11, 3.17, 3.24, 3.28
HW#3 (due 2/21/14): 4.1, 4.9, 4.12, 4.14, 4.19
HW#4 (due 3/3/14): 5.5, 5.9, 5.16, 5.17, 5.22, 5.33, 5.38
HW#5 (due 3/14/14): 6.1, 6.2, 6.5, 6.6, 6.8, 6.16, 6.19, 6.32, 6.37, 6.42
HW#6 (due 3/31/14): 7.1, 7.5, 7.6, 7.9, 7.12, 7.15, 7.22, 7.26
HW#7 (due 4/14/14): 8.1, 8.2, 8.4, 8.8, 8.10, 8.18, 8.27, 8.35, 8.47, 8.54

Expectations Regarding Student Work:

I encourage students to regularly ask questions in class and during office hours. I also encourage students to discuss the assigned course work, e.g., homework problems, sample exams, etc. I expect, however, that all work submitted for grading will be a student’s own work, performed honestly. Failure to meet this expectation will be handled according to the University’s Academic Integrity policy, as noted below.

Cell Phone Policy:

Students shall not bring cell phones, PDAs or similar communication devices to class during exam periods. Students who do will be asked to turn in their devices to the instructor prior to the start of the exam. Students failing to do so may be asked to submit their exams immediately and be excused for the remainder of the exam period. Students using their cell phone or other communication device during an exam may be investigated for possible Academic Integrity violations.

Academic Integrity (taken from the Clarkson Regulations):

“Clarkson values personal integrity. Matriculation at Clarkson carries with it the obligation that a student will not claim as his or her own, the work of another, or any work that has not been honestly performed, will not take any examination by improper means, and will not aid and abet another in any dishonesty...Violations of the Code of Ethics are regarded as most serious offenses and render the offenders liable to severe disciplinary action. Alleged violations of the Code of Ethics are dealt with according to the section on the Academic Integrity Committee."