CM 3310 / Spring 2004

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Office Hrs: Mon and Wed, 3-5
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Course Outline

I. Continuous Time Dynamics

*Week 1*

1. Introduction to dynamics systems and control p 1-20
2. Process modelling p. 31-50
3. Solution of Ordinary Differential Equations
   a) Analytical solutions: eigenvalues, time constants, damping coefficients

*Week 2*

b) Numerical solutions:
   Euler Method, Runge-Kutta Method

4. Empirical Models

*Week 3*

5. Linearization p. 60-66
6. PID Control (p.156-173)
   a) Concepts
   b) Analysis

*Week 4*

c) Performance

d) Tuning Methods p. 198-209

*Week 5*

Exam 1
**Week 6**

II. Laplace Transform Methods
1. Basics
   a) Definition and elementary transforms p.85-94
   b) Method of Partial Fractions

**Week 7**

2. Transfer Functions p. 95-119
3. Block Diagram Manipulations

**Week 8**

4. Stability and Performance
5. Routh – Hurwitz Methods p. 173-177

**Week 9**

Exam 2

6. Other control configurations
   a) IMC p.263-269
   b) Cascade p.313-323
   c) Feedforward/Feedback p.324-333

**Week 10**

III. Frequency Response Methods
1. Frequency response experiments and data p. 216-219
2. Bode and Nyquist Plots
   a) elementary transfer functions p. 219-223

**Week 11**

b) transfer functions in series p. 223

**Week 12**

4. Gain and phase margins p.231-232

**Week 13**

Exam 3
IV. Advanced Topics

Week 14

1. Multivariable Control/RGA p.381-408

Week 15

3. Sampled-Data/ Discrete Time Models

REVIEW

Week 16

FINALS
GRADING POLICY

Point Distribution

- Projects/Assignments: 50 pts
- Exam 1: 10 pts
- Exam 2: 10 pts
- Exam 3: 10 pts
- Finals: 20 pts

Letter Grade Equivalence:

- 100-90: A
- 89.99-80: AB
- 79.99-70: B
- 69.99-65: BC
- 64.99-60: C
- 59.99-55: CD
- 54.99-50: D
- 49.99-0: F

Additional Policies:

1. Projects may be worked on and submitted together by groups (maximum of 2 per group). All the names of the group members and their signatures are required on the front page.
2. Deadlines on the projects will be enforced strictly. (Each day late means a 10 point deduction.)
3. All projects and exams should be neatly written on one side of an 8-1/2” by 11” paper and stapled together. The name and mailbox number should appear in the upper right corner of the front page. Failure to do so will mean a maximum of 3 pt. deduction.
4. Submit your projects in BOX A (opposite 2nd Floor elevators of the Chem Sci Bldg.)