ME 655 − Introduction to Modern Control Methods

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Course Description: Introduction to modern control methods applied to mechanical and manufacturing systems. **Prerequisites:** Undergraduate system dynamics.

Course Objectives:
Students are expected to:
1. Model dynamic systems through block diagrams and signal flow graphs.
2. Understand state variable models of feedback control systems.
3. Analyze characteristics of dynamics systems, measures of performances, and assess system stability.
4. Design control system using root locus, Bode Diagram, Nyquist plot and Nichols Chart.
5. Use MATLAB Control Toolbox.

Required Text: Modern Control Systems (12th Ed.), by Richard C. Dorf and Robert H. Bishop, Prentice Hall, 2011, ISBN 0136024580.
Required Software: MATLAB with Control Toolbox

Grading Policy: Grades will be determined by performance on assignments and exams. The homework assignments will be worth 40% of total points. The midterm will be worth 25% of total points. The final exam will be worth 35% of total points.

Make-Up Exams: Make up exams will be possible only with a doctor's note or with prior approval. If you have a serious reason for missing an exam, you must notify me BEFORE the scheduled exam period. You are then responsible for arranging with me to make up the test within three days.

Academic Integrity: The university's academic integrity policy, which can be found at http://www.njit.edu/academics/pdf/academic-integrity-code.pdf, will be enforced.

COURSE OUTLINE:

Week	Topic	Reading Assignment
1	Introduction: Automation and Control	Chap. 1
2	Dynamic System Modeling & MATLAB	Chap. 2
3	Block Diagrams, Transfer Functions	Chap. 2
4	State Variable Models	Chap. 3
5	State Variable Models	Chap. 4
6	Control System Characteristics	Chap. 4
7	Measures of Performance	Chap. 5
8	Midterm, Stability	Chap. 6
9	Root Locus Method	Chap. 7
10	Root Locus Method	Chap. 7
11	Frequency Response: Bode Diagrams	Chap. 8
12	Frequency Response: Bode Diagrams	Chap. 8
13	Stability: Nyquist Criterion	Chap. 9
14	Open-loop and Closed-loop: Nichols Chart	Chap. 9
15	Final Exam	