ECE 4913/6913 Feedback Control Systems I

Current Textbook: Feedback Control Systems, by Charles L. Phillips and Royce D. Harbour, Prentice-Hall, Inc., 2000 (4th edition).

I. Introduction
II. Models of Physical Systems
    A. System Modeling
        1. Block Diagrams and Signal Flow Graphs
        2. Mason's Gain Formula
    B. Mechanical Translational Systems
    C. Mechanical Rotational Systems
    D. Electromechanical Systems
    E. Analogous Physical Systems
III. Laplace Transform (a quick review)
    A. Definition
    B. Partial Fraction Expansion
    C. Properties
    D. Differential Equations and Laplace Transforms
IV. System Responses
    A. Time Responses
    B. Frequency Responses
V. Control-System Characteristics
    A. Stability
    B. Sensitivity
    C. Disturbance Rejection
    D. Steady State Accuracy
VI. Stability Analysis
    A. Routh-Hurwitz Stability Criterion
    B. Roots of the Characteristic Equation
    C. Stability Analysis via Simulation
VII. Root-Locus Analysis and Design
    A. Root-Locus Principles
    B. Basic Root-Locus Techniques
    C. Effect of Compensators on Root-Loci
VIII. Frequency-Response Analysis
    A. Basic Concepts
    B. Bode Diagrams
    C. Nyquist Criterion
    D. Relative Stability
IX. Frequency-Response Design
    A. Gain Compensation
    B. Phase Lead and Phase Lag Compensators
    C. Analytical Compensators (using Mitchell's Technique)
    D. Multi-Stage Compensators