

**ME 422: Control Systems Engineering
Spring Term Only**

Type (check one): Required: Elective:

2005-2006 Catalog Data: Analysis and design of linear control systems. Transfer functions, block diagrams, and state variable representation. Feedback concepts and stability analysis in both the frequency and time domain. Design by Root locus, Bode plots, and State variable methods. Emphasis on use of computational software for complex cases. (Same as ECE 322 Linear Control Systems) Offered in the Spring semester. *One semester; three credits*

Prerequisites: MATH 231 and ME 202

Co-Requisites: None

Textbook: N.S. Nise, Control Systems Engineering, Fourth Edition, John Wiley & Sons, 2004

Other Required Materials: None

Other References: None

Instructor: Dr. Yeu-Sheng Paul Shiue, Professor of Mechanical Engineering

Course Objectives: 1. Develop understanding of theory and practice of control system analysis and design

Prerequisites by Topics:

1. Electric circuit analysis
2. Fluid mechanics
3. Heat transfer
4. Kinematics and dynamics of machines

Topics:

1. Control systems applications, analysis, and design
2. System modeling in the frequency domain
3. Time response for the system model
4. Block diagrams
5. Stability; Routh criterion
6. Steady-state errors
7. Transient response; root locus method
8. Compensators
9. Frequency response methods
10. Design Project

Class Schedule: Three 50-minute sessions per week

Prepared by: Dr. Yeu-Sheng Shiue

Date: 24-Oct-05

**Professional Component:
ME 422 – Control Systems Engineering**

Category (check one)	<input type="checkbox"/> Math/Basic Science <input checked="" type="checkbox"/> Engineering <input type="checkbox"/> General Education <input type="checkbox"/> Other
Design (check one)	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Some <input type="checkbox"/> None
Realistic Constraints (check all that apply)	<input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input type="checkbox"/> Sustainability <input type="checkbox"/> Manufacturability <input type="checkbox"/> Ethical <input type="checkbox"/> Health & Safety <input type="checkbox"/> Social <input type="checkbox"/> Political

Relationship to Program Outcomes:

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice