University of Wisconsin - Madison  
College of Engineering [EGR]  
Last Offered: 2015-2016 Fall [1162]  
Direct Link to this Syllabus:  

1. E C E 332, Feedback Control Systems  
2. Credits: 3  Contact Hours: 4.0  
3. Textbook and Materials: Automatic Control Systems; Golnaraghi and Kuo; 9th; 2010  

a. Other Supplemental Materials: None  

• Specific Course Information:  

a. Brief description of the content of the course (Course Catalog Description): Modeling of continuous systems; computer-aided solutions to systems problems; feedback control systems; stability, frequency response and transient response using root locus, frequency domain and state variable methods.  

b. Pre-requisites or Co-requisites: ECE 330  

c. This is a Selected Elective course.  

• Specific Goals for the Course:  

a. Course Outcomes:  

1. Mastery of Laplace Transforms in Control Context  
2. Expertise in Matlab, Simulink and Symbolic Computation  
3. Frequency Response Methods  
4. Manipulation of Signal Flow Graphs and Block diagrams  
5. Design using Bode Diagrams  
6. Various Stability Analysis Methods  

• ABET Student Learning Outcomes:
-(a) Ability to apply mathematics, science and engineering principles.
-(c) Ability to design a system, component, or process to meet desired needs.
-(d) Ability to function on multidisciplinary teams.
-(e) Ability to identify, formulate and solve engineering problems.
-(k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- **Brief List of Topics to be Covered:**

  - Modelling of dynamic systems in a control context
  - Block diagrams, signal flow graphs and Mason's Rule
  - Feedback in a sensitivity, linearization, disturbance context
  - Steady state behavior of feedback systems
  - Time response with emphasis on second order systems
  - Stability analysis: criteria of Routh, Nyquist and Kharitonov
  - Root locus analysis, its variants and design considerations
  - Frequency response: Bode analysis of feedback systems
  - Compensator design methods: PID, lead/lag and root locus
  - Closed loop considerations: frequency response and Nichol's plot