

METROPOLITAN STATE COLLEGE of DENVER
Office of Academic Affairs

REGULAR COURSE SYLLABUS

School of: Professional Studies

Department: Engineering Technology

Prefix & Course Number: EET 3715 Crosslisted With*: _____

Course Title: Control Systems Analysis

Check All That Apply: Required for Major: Required for Minor: _____ Specified Elective: _____
Required for Concentration: _____ Elective: _____ Service Course: _____

Credit Hours: 4 (3+2)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture 45 Lab 30 Internship _____ Practicum _____ Other (please specify type and hours): _____

Schedule Type(s): B Grading Mode(s): L

Variable Topics Courses (list restrictions, including the maximum number of hours that can be earned**):

** NOTE: This information must be included in the course description.

Restrictions (Variable Topics Course): _____

Prerequisite(s): EET 3110 and EET 3120 and MTH 2410, with a grade of "C" or better.

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Banner Enforced:

Prerequisite(s): EET 3110 and EET 3120 and MTH 2410, with a grade of "C" or better.

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Catalog Course Description:

This course analyzes classical, linear, continuous-time control systems. Topics include: Laplace transform, Bode plots, stability, transient response, steady-state response, and the design of PID, lag, and lead compensators. The laboratory section of the course uses the classical approach to the analysis and design of control systems.

APPROVED: Richard Pozzi 3/1/2011
Department Chair OR Program Director Date
BJ Morigan 3-1-11
Dean OR Associate Dean Date
Steve H. Thompson 6/2/11
Associate VP, Academic Affairs Date

*If crosslisted, attach completed Course Crosslisting Agreement Form

Required Reading and Other Materials will be equivalent to:

1. Ogata (2008). *Matlab for Control Engineers*. Upper Saddle River, NJ: Pearson Prentice Hall
2. Kuo (2001). *Automatic Control Systems*. Hoboken, NJ: John Wiley & Sons, Inc.

Specific, Measurable Student Behavioral Learning Objectives:

Upon completion of this course the student should be able to:

1. Analyze linear feedback system stability, response, and performance.
2. Determine the closed-loop transfer function from desired performance.
3. Design compensation to achieve a closed-loop behavior, using lead - lag compensators.
4. Describe the advantages/disadvantages of feedback and quantify system robustness.
5. Create and interpret Bode plots of system frequency response.
6. Make time and frequency domain measurements of control systems.
7. Make transfer function models of control systems based upon noise measurements.
8. Design, build, test lead lag, compensatory control systems and PID.

Detailed Outline of Course Content (Major Topics and Subtopics) or Outline of Field Experience/Internship (experience, responsibilities and supervision):

I. Introduction to Control Systems:

- A. Basic History
- B. Basic Principles of Negative Feedback
- C. Brief Introduction to Classification of Systems

II. Models (classical):

- A. Concept of Modeling
- B. Differential Equations Applied to Physical Systems
- C. Laplace Transform (emphasized)
- D. Transfer Functions
- E. Block Diagrams
- F. Linearization of Nonlinear Models
- G. Rigid body PD and PID control
- H. Fundamentals of Servo Control

III. System Stability

IV. Steady-state Error and Error Coefficients

Evaluation of Student Performance:

1. Written exams
2. Written homework
3. Written lab reports