The University of Texas at Tyler
Department of Electrical Engineering

Course: ENGR 4308 – Automatic Control (Required)

Syllabus

Catalog Description:

Introduction to automatic control systems; mathematical models of physical systems; block diagrams and signal flow graphs; transient and steady state responses; PID controllers; stability of linear feedback systems; root-locus and Routh's criteria; frequency response methods: polar, Nyquist and Bode plots; stability margins; state-variable formulation. **Prerequisites:** EENG 3305 (or EENG 3301/ EENG 3304 for ME) and MATH 3305 or permission of the instructor.

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Credits: 3 (3 hours lecture, 0 hours laboratory per week)

Text(s): Richard Dorf and Robert Bishop, Modern Control Systems, 10th ed., Prentice-Hall, 2005.

Additional Material: Matlab®
Instructor's Lecture Notes

Course Coordinator: Hassan El-Kishky, PhD, PE, Associate Professor of Electrical Engineering

Topics Covered: (paragraph of topics separated by semicolons)

Introduction to automatic control systems; mathematical models of physical systems; block diagrams and signal flow graphs; transient and steady state responses; PID controllers; stability of linear feedback systems; root-locus and Routh's criteria; frequency response methods: polar, Nyquist and Bode plots; stability margins; introduction to state-space systems.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Objectives[1]: By the end of this course students will be able to:

1. Know essential elements of control systems. [1, 2, 7]
2. Identify open and closed-loop control systems. [1,2,7]
3. Reduce a complex interconnection of blocks in a control system to the basic closed-loop configuration. [1,2,7]
4. Modify a control system's performance to meet specified design objectives.[4,5]
5. Perform stability analysis of linear time-invariant systems using Routh and Nyquist methods. [1,2,4,5,7]
6. Quantify a system's stability limits in terms of gain and phase margins from Bode plots and polar plots, and root locus [1,2,4,5,7]
7. Understand the principle of PID control and compensation methods. [1,2,4,5,7]
8. Familiar with introductory state space systems and their formulation. [1,2,4,7]

[1] *Numbers in brackets refer to method(s) used to evaluate the course objective.*

Relationship to Program Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply mathematics, science, and engineering principles in the practice of electrical engineering; [1,2,3,4,5,6,7,8]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering; [3,4,5,6]
3. have the ability to analyze electrical circuits, devices, and systems; [2,3,4,5,6,7]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements; [3,4,5,6,7]
5. have the ability to design and conduct experiments, and analyze and draw conclusions from experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods; [3,4,5,6,7]
7. have effective written, visual, and oral communication skills; [4,5,6]
8. possess an educational background to understand the broader context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering;
   b. the impact of engineering on society;
   c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively to multi-disciplinary engineering teams; [1,4]
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers. [7,8]

[2]Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0.5	Hours
Engineering Sciences and Design:	2.5	Hours
General Education Component:		Hours

Disability Support Service

"If you have a disability, including a learning disability, for which you request an accommodation, please contact Ida MacDonald in the Disability Support Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Support Services counselor. For more information, call or visit the Student Services Center located in the University Center, Room 282. The telephone number is 566-7079 (TDD 565-5579)."

Prepared By: Hassan El-Kishky Date: 08/18/08