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), EENG 2101, and MATH 3305 or permission of the instructor.

Prerequisites: EENG 3305 (EENG 3304 for ME), EE 2101, and MATH 3305

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

Text(s): Richard Dorf and Robert Bishop, Modern Control Systems, 11th ed., Prentice-Hall, 2009.

Additional Material: Matlab®
Instructor's Lecture Notes

Course Coordinator: Hassan El-Kishky

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. Determine the sensitivity, steady-state error, rise-time, time to-peak, settling-time, percentage peak overshoot, and transient response to step, impulse, and ramp input signals.
2. Determine the absolute stability of a control system using the Routh-Hurwitz criterion.
3. Determine the stability of a control system using the Root-Locus method
4. Construct Bode Plots and determine stability of control systems.
5. Determine the stability and Performance of a control system using the Nyquist criterion.
6. Determine the stability gain- and phase-margins of linear time-invariant control systems.
7. Analyze the performance of PI and PID controllers for a simple control systems.
8. Setup and solve state-space equations for simple systems

[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: 01/17/2011