TECHNOLOGY 375: Control Systems

2007-08 Catalog Data: TECH 375 Control Systems (3 Credits)

Catalog description: Analysis of mathematical models of feedback control systems. Emphasis on controllability and stability using root locus, Bode plot, and Nyquist criterion.

Prerequisite: TECH 271 and MATH 230

Co-requisites: None

Textbooks:

- Charles L. Phillips, and Royce D. Harbor, Feedback Control Control Systems, Fourth Edition, Prentice Hall, 2000.

Instructor: Said Oucheriah, Ph.D.

Learning Objectives	**Relational ABET Learning Outcomes**
Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn to use Laplace transform to solve linear differential equations	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn to find transfer functions for linear time-invariant electrical, mechanical and electromechanical systems	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.

	F. An ability to identify, analyze and solve technical problems.
Learn the concept of poles and zeros and how to find the time response from a transfer function	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn how to describe and quantify transients-response specifications of first- and second-order systems	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn how to find the steady-state error for unity and nonunity-gain feedback	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn how to determine the stability of a system	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn the effect of proportional, derivative, and integral controller actions on system performance	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of

	mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.
Learn how to use root-locus and frequency domain methods to design basic controllers	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives. F. An ability to function effectively on teams. M. A respect for diversity and a knowledge of contemporary professional, societal and global issues.