

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

Electrical Engineering Department

EE 380 Control Engineering I (Required)

Course description:

Introduction to feedback control systems. Block diagram and signal flow Graph representation. Mathematical modeling of physical systems. Stability of linear control systems. Time-domain and frequency-domain analysis tools and performance assessment. Lead and lag compensator design. Proportional, integral, and derivative control.

Prerequisites: EE 205 electric circuit II, EE 207 signals and systems.

Text Book: Modern Control System 10'th edition, R. Dorf, R. Bishop, Printice-Hall, 2005

Useful references:

1. Modern Control System Theory and Design 2nd edition, Stanley Shinner, Interscience, 1998.
2. Automatic Control Systems, Benjamin Kuo, Prentice-Hall 2002.

Website: <http://www.kfupm.edu.sa/ee/bscourses.htm>

Course material will be also available in electronic format on WebCT

Course Objectives:

1. Students will apply knowledge gained in basic mathematics, physical sciences and engineering courses to derive mathematical models of typical engineering processes (Criterion 3(a)).
2. They will hopefully learn the role of a control engineer in multi-disciplinary teams (Criterion 3(d)).
3. The course will show how to characterize modeling uncertainty, and formulate and solve basic robust and nonlinear controller design problems (Criterion 3 (c),(e)).
4. The course will provide an in-depth presentation of control system analysis and design tools, with emphasis on computer aided design (Criterion 3(k)).

Topics covered:

- Introduction to Control Systems. (2 lectures)
- Differential Equations of Physical Systems. (2 lectures)
- Transfer Functions of Linear systems - Block Diagram Models (5 lectures)
- Signal Flow Graphs [SFG] (3 lectures)
- State Variables Models - SFG State Models - TF from State Equations (5 lectures)
- State Transition Matrix (1 lecture)
- Performance of Feedback Control Systems. (4 lectures)
- Stability of Linear Feedback Systems. (3 lectures)
- Root Locus Technique (4 lectures)
- Frequency Response Methods (3 lectures)
- Stability in the Frequency Domain (4 lectures)
- Design of Feedback Control Systems (9 lectures)

Class Schedule: 3 hours a week, 50 minutes a lecture, 45 lecture a semester.

Contribution of courses to meeting professional components:

- Basic math and science
- Engineering topics, design, software

Course outcome:

- a- acquire working knowledge of system science-related mathematics,
- c- design a system, component or process to meet desired needs,
- e- identify, formulate and solve control engineering problems,
- k- use the techniques, skills and modern control engineering tools necessary for engineering practice

mapping of course outcomes to program outcomes:

		a	b	c	d	e	f	g	h	i	j	k	l	m
EE 380	Control Engineerng1	X		X		X				X		X		
1		+												
2				+						+				
3				+		+								
4				+								+		

Prepared by: Assistant Professor, Dr. Ahmad A. Masoud on the day of December 7, 2006