Course Number: **EE 380**

Course Title: Control Engineering I (Required Course)

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 207 Signals and Systems.

Textbook :

Modern Control Systems 12th edition, R. Dorf, R. Bishop, Pearson, 2011.

Other Useful References and Material :

- Modern Control System Theory and Design 2nd edition, Stanley Shinner, Interscience, 1998.
- 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 :

- Students will apply the knowledge gained in basic mathematics, physical sciences and engineering courses to derive mathematical models of typical engineering processes (Criterion 3(a)).
- They will learn the role of a control engineer in multi-disciplinary teams (Criterion 3(d)).
- The course will provide a basic knowledge of control system analysis and design tools, with emphasis on computer aided design (Criterion 3(k)).

Topics Covered:

- Introduction to Control Systems.
- Differential Equations of Physical Systems.
- Transfer Functions of Linear systems - Block Diagram Models
- Signal Flow Graphs [SFG]
- State Variables Models - SFG State Models - TF from State Equations
- State Transition Matrix

- Performance of Feedback Control Systems
- Stability of Linear Feedback Systems
- Root Locus Technique
- Frequency Response Methods
- Stability in the Frequency Domain
- Design of Feedback Control Systems

Class Schedule:

3 hours a week, 50 minutes a lecture, 45 lectures a semester.

Contribution of Courses to Meeting Professional Components:

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

Course Outcome:

- Acquire a working knowledge of system science-related mathematics
- Design and conduct experiments; analyze and interpret data
- Design a system, component or process to meet desired needs
- Identify, formulate and solve control engineering problems
- Understand and analyze the impact of control systems on the society
- Acquire skills to carry out search for technical issues
- Use the techniques, skills and modern control engineering tools necessary for engineering practice

Course Outcomes to Program Outcome Mapping:

Course Outcome	Program Outcome												
	a	b	c	D	e	f	g	h	i	j	k	l	m
1	X												
2		X											
			X										
4					X								
5								X					
6									X				
7											X		

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