REM master basic syllabus

Title:
EE9X1 Control Principles

Credit value:
5 ECTS

Mandatory/Optional:
Compulsory

Semester:
1

Lecturer/s:
Mohamed Reza Katebi, Hong Yue

University:
University of Strathclyde

Department:
Department of Electronic and Electrical Engineering

Rationale:
This module aims to introduce students to the basic concepts, mathematical tools and design methods of classical control theory and to use analysis and design tools used in control engineering.

Objectives:
1. To provide students with appreciation and experience state-of-the-art modelling and simulation tools, represent linear dynamic systems in state space and transfer functions, create simulations using MATLAB and Simulink.

2. To give students understanding of feedback control fundamentals, ability to use and interpret time and frequency domain performance measures, understand stability and controller tuning principles, understand the structure and effects of PID controllers including simple tuning methods.

Skills: *(according to the list of skills provided)*

Subject skills	REM Master Skills						
	L2.1	**L2.2**	**L2.3**	**L2.4**	**L2.5**	**L2.6**	**L2.7**
L3.1. Ability to model simple systems with transfer function and state space representation.	X	X				X	X
L3.2. Ability to analyse linear open loop and closed loop systems both in frequency and time domain.	X	X				X	X
L3.3. Ability to understand the theoretical and practical implications of feedback control systems	X	X	X			X	X
L3.4. Ability to assess control performance	X	X	X			X	X

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Teaching and learning methods:

The teaching method is based on a series of lectures where the lecturer explains the main concepts through power point presentations and worked out examples on the board. The students are also presented with a variety of issues of practical nature during the lectures. To support the learning process part of the modules covers tutorial-like sessions where the students are put to the challenge of working together and addressing problems of slight higher technical complexity

Allocation of student time:

	Attendance (classroom, lab,…)	**Non attendance (lecture preparation, self study…)**
Lectures	24 hours	24 hours
Tutorial	6 hours	6 hours
Assignment	10 hours	10 hours
Laboratory	10 hours	10 hours
Private study		25 hours

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Assessment:

Assessment will be based on the following:

Class test 50%
Practical Report 25%
Tutorial Report 25%

Assessment Matrix:

Subject skills	**Assessment method**					
	Exam	**Presentation**	**Home work**	**Report**	**…**	**…**
L3.1.	65%	%	%	35%	%	%
L3.2.	65%	%	%	35%	%	%
L3.3.	65%	%	%	35%	%	%
L3.4	65%			35%		

Programme:

Lesson 1	***First and second order systems*** *Distribution (3 h theory + 2 h tutorials)*
Lesson 2	***Open loop control and feedback control systems*** *Distribution 3 h theory + 2 h tutorials*
Lesson 3	***Closed loop stability*** *Distribution (3 h theory + 1 h tutorials)*
Lesson 4	***PID control and simple tuning methods*** *Distribution (3 h theory + 1 h tutorials)*

Resources:

Classrooms, Blackboard, laptop, projector, audio, computer room, laboratory, security issues,…

- *A classroom, equipped with a blackboard and audio-visual resources (laptop/computer with Matlab/Simulink installed and Internet connection + projector), for the lectures. A blackboard and a projector may be sufficient if the lecturer uses her/his own laptop.*

Bibliography:

Basic textbooks, deepening bibliography, Internet addresses of interest, specific journals, etc…

1. J. Wilkie, M. A. Johnson and M. R. Katebi, 2001, Control Engineering, Palgrave Publishers, ISBN 0-333-77129-X
2. G. F. Franklin, J. D. Power and A. Emami-Naeini, 1991, Feedback Control of Dynamic Systems, Pearson, 7th Edition, 2014.
3. K. Ogata, Modern Control Engineering, Prentice Hall, 5th Edition, 2015.
4. R.C. Dorf and R.H. Bishop, Modern Control Systems, Prentice Hall, 13th edition, 2016.

Further comments: