Liverpool John Moores University

Title:	CONTROL SYSTEM
Status:	Definitive
Code:	**5502ICBTEL** (127023)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

Academic Level:	FHEQ5	**Credit Value:**	15	**Total Delivered Hours:**	62
Total Learning Hours:	150	**Private Study:**	88		

Delivery Options
Course typically offered: Semester 1 and Summer

Component	Contact Hours
Lecture	45
Practical	9
Tutorial	6

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Report	AS2	Coursework (1500 words)	30	

Aims

This module introduces the basic techniques for analysis and design of feedback control systems.

Learning Outcomes

After completing the module the student should be able to:

1 Demonstrate an understanding of the basic concepts of control systems and their applications.
2 Examine and analyse the elements, structure and behaviour of a typical, high-level control system.
3 Solve problems related to block diagrams, system mathematical modelling, time response, frequency response, s plane, PID, Routh-Hurwitz stability criterion.
4 Demonstrate the knowledge of application for control systems using software simulation.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	3	2
Coursework	1	4

Outline Syllabus

Basic concepts:
Brief history of control systems and their industrial relevance, control system
Terminology and identification, including plant, process, system, disturbances,
Inputs and outputs and real world applications.
Simple mathematical models of electrical, mechanical and electro-mechanical
Systems
Block diagram representation of simple control systems
Introduction of Laplace transform and its properties, simple first and second
Order systems and their dynamic responses
System behavior:
Transient and steady behavior of simple open loop and closed loop control
Systems in response to a unit step input.
Frequency response and bode plots.
Poles and zeros and their role in the stability of control systems, steady-state
Error. Routh-Hurwitz stability criterion
S-plane, root locus.
Control parameters and optimum performance:
Introduction to the three-term PID controller, the role of a Proportional
Controller (P), Integral controller (I) and the Derivative controller (D).
Solve the relevant problems using PID and PID tuning.
Software simulation:
Modelling and simulation of simple first and second order control system using
MATLAB and Simulink.

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes,

in the following ways:

Control system principles and theories acquire through lectures, seminars and tutorials, and control system applications learn through case studies.
MATLAB simulation classes cover the practical aspects of the module.

Notes

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