COURSE DETAILS

Course Code: B30EJ
Full Course Title: Linear Control
SCQF Level: 10
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL

Undergraduate: Yes  Postgraduate Taught: No  Postgraduate Research: No

Additional Information:

COURSE AIMS

(a) To develop models of real systems.

(b) System types and error specification

(c) To present the root-locus design method for feedback control.

(d) To present the PID compensation method.

(e) Introduction to MATLAB/SIMULINK for control systems analysis

(f) To use the Z-transform for discrete system analysis

(g) To present design by emulation.

(h) To investigate the effects of sampling in a digital control system.

(i) To present stability assessment methods.

(j) To present compensation design by root-locus and PID techniques.

(k) Case study examples including a dc motor speed control system.
LEARNING OUTCOMES – SUBJECT MASTERY

EA1p A critical understanding of the concepts of dynamic system representation using Laplace and Z-transform methods.

EA2p Techniques to analyse the stability of feedback control systems.

EA3p The skills to predict control system errors and to use root-locus as a compensator design tool.

EA1p, EA2p, EA3p A detailed knowledge of how to design of digital control systems through emulation and the direct design of digital control systems using the Z-transform.

EA1m, EA2m, EA3m Understanding of the importance of MATLAB/SIMULINK for control systems design through case studies.

LEARNING OUTCOMES – PERSONAL ABILITIES

SM1f, SM2f A critical appreciation and awareness of the benefits and limitations of feedback control systems.

SM1p, SM2p To be able to identify the benefits of digital control systems compared to continuous control methods.

SM 1p, SM2p Use of MATLAB/SIMULINK to aid control system analysis and design.

SM1i, SM2i Appreciation of control problems in industry.

SYLLABUS

Development of models of real systems, Specification of systems, Errors in following different inputs, Root locus analysis, Estimating damping factor and time response from root locus, effect of adding poles and zeros, PID controllers, Velocity feedback.

Introduction to the Z-transform and its properties, Methods of inverting z-transforms, Relationship between s-plane and z-plane, Discretisation methods, Design by emulation, Sample rate choice in digital control systems, Block diagram analysis of sampled data systems, Stability analysis, Root-locus design, Digital PID controllers, Digital control case studies using MATLAB/SIMULINK.

COURSE RELATIONSHIPS

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<th>School</th>
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<td>B38SA</td>
<td>8</td>
<td>Signals and Systems</td>
<td>School of Eng &amp; Physical Sci</td>
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LOCATION AND ASSESSMENT METHODS

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### B30EJ Linear Control

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