Liverpool John Moores University

Title:	Digital Control
Status:	Definitive
Code:	**7007ELE** (120112)
Version Start Date:	01-08-2021

Owning School/Faculty: Engineering
Teaching School/Faculty: Engineering

Team	Leader
Barry Gomm	Y
Dingli Yu	

Academic Level:	FHEQ7	**Credit Value:**	10	**Total Delivered Hours:**	38
Total Learning Hours:	100	**Private Study:**	62		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	24
Tutorial	12

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	70	2
Technology	Tech	PC Based Assignment	30	

Aims

To extend concepts of digital control theory into system identification, controller design and self-tuning control techniques for single-input, single-output systems.

Learning Outcomes

After completing the module the student should be able to:

1   Outline the theory of sampled-data control systems
2   Apply system identification techniques and understand their operation
3   Design and implement digital and self-tuning controllers
4   Use computer software for discrete-time identification and controller design

Learning Outcomes of Assessments

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

Examination   1   2   3

PC based assignment   4

Outline Syllabus

Discrete-time systems: sampling and reconstruction, open loop and closed loop discrete time analysis, system time response characteristics, poles and zeros, stability analysis techniques.
System identification: ARX/ARMAX models, least squares, model validation, recursive parameter estimation algorithms (e.g. RLS, ELS), implementation

Digital control: control system specifications, design techniques (e.g. discretisation, direct design), ringing poles, self-tuning control algorithms (e.g. pole assignment, minimum variance, optimal) and operation.
Computer packages will be used to gain experience in applying and simulating techniques.

Learning Activities

Lectures supported by handouts & tutorials where appropriate.
Computer sessions will use software packages (MATLAB, SIMULINK and toolboxes).
Individual student reports are required for the coursework.

Notes

This level 7 module expands a student's experience of discrete single-input, single-output control systems. The emphasis is on the understanding of design and identification techniques and to be able to apply the techniques both theoretically and practically.