

## Liverpool John Moores University

Title: COMPUTER CONTROL  
Status: Definitive  
Code: **7010ENG** (105385)  
Version Start Date: 01-08-2016

Owning School/Faculty: Electronics and Electrical Engineering  
Teaching School/Faculty: Electronics and Electrical Engineering

Team	Leader
Barry Gomm	Y

**Academic Level:** FHEQ7      **Credit Value:** 20      **Total Delivered Hours:** 38  
**Total Learning Hours:** 200      **Private Study:** 162

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	30
Tutorial	6

**Grading Basis:** 50 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Essay	AS2	Design Study	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 comprehend 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
Individual Report	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) 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.