

## Liverpool John Moores University

Title: Industrial Control Systems and Programming  
Status: Definitive  
Code: **6104MSE** (128579)  
Version Start Date: 01-08-2021

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

Team	Leader
Rob Darlington	Y

**Academic Level:** FHEQ6      **Credit Value:** 40      **Total Delivered Hours:** 106.5

**Total Learning Hours:** 400      **Private Study:** 293.5

### Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Tutorial	12
Workshop	90

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	A three part open book examination	100	4.5

### Aims

- 1. To develop understanding of structured programming applied to industrial controls systems to enable the student to assess a control problem and create a program solution to that problem;*
- 2. To introduce elements of control hardware, provide an understanding of the hardware operations, and to enable the student to assess a problem and choose appropriate hardware combinations;*
- 3. To provide the student with the knowledge and methods required to analyse and*

*troubleshoot hardware and software in a control system, to isolate problems, and provide solutions.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Evaluate a control problem and determine an appropriate structured solution
- 2 Appraise a control problem and select appropriate hardware combinations
- 3 Determine problems in a control system and develop a solution

## **Learning Outcomes of Assessments**

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

Practical exam	1	2	3
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## **Outline Syllabus**

*Block call and the multi-instance model applied to structured programming; Use and application of complex data types and variables; Indirect addressing and address register instructions; Block cells and parameter passing; Handling of synchronous and asynchronous errors; Using recipes.*

*Inter device communications; Data communication with industrial Ethernet; Introduction to the PROFINET I/O system; Introduction to totally integrated automation (controllers, CPU's, modules, tools and software packages); Configuration of CPU hardware and running diagnostics; Symbolic addressing.*

*Principles and application of structured programming; Application of binary operations; Application of extended digital operations; Troubleshooting and debugging functions to analyse controller problems.*

*Introduction to the G120 and controlling of variable speed drives; Storing process data; Application and use of functions and function blocks; Application and use of organisational blocks; Processing of analogue inputs and values*

*Methods for program design; Application of multi-instance control instructions; Implementing data exchange between controllers; Analysing diagnostic data for fault finding.*

## **Learning Activities**

Lectures followed by guided practical programming exercises.

## **Notes**

The course combines Siemens Total Integrated Automation (TIA) units: TIA-PRO1 (5 days), TIAPRO2 (5 days), TIA-PRO3 (5 days) and CPT-FAP (3 days)). These take the student from fundamental to advanced programmer level. Students should assess their basic knowledge of automation technology by taking an on-line test (Test TIA-PRO1) and achieve more than 70% before enrolling on the course.