

## Module Information

2022.01, Approved

### Summary Information

Module Code	6104MSE
Formal Module Title	Industrial Control Systems and Programming
Owning School	Engineering
Career	Undergraduate
Credits	40
Academic level	FHEQ Level 6
Grading Schema	40

### Teaching Responsibility

LJMU Schools involved in Delivery
Engineering
LJMU Partner Taught

### Partner Teaching Institution

Institution Name
Siemens PLC

### Learning Methods

Learning Method Type	Hours
Tutorial	12
Workshop	90

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-PAR	PAR	September	28 Weeks

## Aims and Outcomes

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.
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**After completing the module the student should be able to:**

### Learning Outcomes

Code	Number	Description
MLO1	1	Evaluate a control problem and determine an appropriate structured solution
MLO2	2	Appraise a control problem and select appropriate hardware combinations
MLO3	3	Determine problems in a control system and develop a solution

## Module Content

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.
Module Overview	
Additional Information	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.

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Practical exam	100	4.5	MLO1, MLO2, MLO3

## Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Rob Darlington	Yes	N/A

**Partner Module Team**

Contact Name	Applies to all offerings	Offerings
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