MODULE SPECIFICATION

Part 1: Information			
Module Title	Control and Automation		
Module Code	UFMFMN-30-3	Level	Level 6
For implementation from	2018-19		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Contributes towards			
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: The automation of production/manufacturing systems plays a vital role in today's economies. Automation of industrial processes helps to achieve consistent quality as well as economic production whilst adhering to ever stricter environmental standards.

Outline Syllabus: In this module we will introduce you to overall concepts of industrial automation, including material handling, machining, quality control and process planning as part of the wider concept of Computer Integrated Manufacturing (CIM).

Particularly, automation techniques and the underlying technologies will be covered in more depth. These include sensing and actuation technologies as well as typical control systems (programmable logic controller (PLC) and industrial PCs (IPC)). Here, we will cover the theoretical foundations as well as typical industrial examples. PLC concepts are introduced and several programming and system engineering concepts are studied in depth. These include small compact PLCs as well as distributed system using field bus technologies as well as visualisation and plant supervision and production control integration.

Teaching and Learning Methods: The practical session of this module will focus on the application of closed-loop and open-loop control system to automate 'industry-like' automation/production systems. Students will develop their own PLC programmes in order to drive small scale electrical motors, pneumatic cylinders and conveyors that mimic a typical production system. Furthermore, digital and analogue sensors as well as encoder interfaces are interfaced in order to automate a small-scale industrial system.

Programming languages used are those defined by the IEC 61131-3 standard from programmable logic controller, focusing on structured text (ST), sequential function charts (SFC) as well as function block diagram (FBD). Ladder diagrams (LD) and instruction list (IL) will be briefly introduced for completeness.

Concepts and the scope of the syllabus topics will be introduced in lectures, supported by directed reading and lab experiments/simulation based work. The labs sessions will enhance the understanding of students of real-world applications of the material delivered in the module.

Relevant ethical issues will be highlighted and students will be encouraged to consider these further through directed reading.

Part 3: Assessment

This module is assessed via an exam EX1 (Component A) and a group report CW1 (Component B).

EX1 is designed to assess the students' ability to describe components of a typical automation system and to perform a high level design of an automation solution. Some of their coding abilities will also be assessed by using pseudo-code or state-diagrams.

CW1 is a group report (2 students per group, 3000 words). The report describes an automation problem the students evaluated during the academic year. The report should include an overall system design as well as fully documented code and a visualisation of an automation task developed during the year. Students should contribute equally to the report and need to clearly label who contributed to what. The mark for CW1 will consist of the group mark (52.5% of the module) and an individual mark determined via an individual viva (22.5% of the module).

Consistent with the largely practical approach of this module, a relatively lowly weighted exam (25% of the module) assesses the more theoretical element.

The resit CW1 element consists of an individual report of 1500 words describing an automation problem either evaluated during the academic year or as given by the tutor.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		52.5 %	Written group report (3000 words)
Presentation - Component B		22.5 %	Individual viva regarding the group report 10-15 mins
Examination - Component A	✓	25 %	Closed book exam (3 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		52.5 %	Written report (1500 words)
Presentation - Component B		22.5 %	Individual viva regarding the report (10-15 mins)
Examination - Component A	✓	25 %	Closed book examination (3 hours)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to:

	Module Learning Outcomes
MO1	Apply from automation and control to real-world industrial manufacturing problems and quality control
MO2	Develop software based on current PLC technologies, addressing openloop and closed loop control paradigms
MO3	Critically analyse potential solutions (each with pros and cons) to automation problems and apply economic and technical arguments to each
MO4	Research novel and/or appropriate methods for automation and control solutions and describe findings into both written and oral forms
MO5	Effectively distribute workloads between members of a small team and manage projects accordingly

Contact Hours

Contact Hours	
Independent Study Hours:	
Independent study/self-guided study	228
Total Independent Study Hours:	228
Scheduled Learning and Teaching Hours:	
Face-to-face learning	72
Total Scheduled Learning and Teaching Hours:	72
Hours to be allocated	300
Allocated Hours	300

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/index.html