Module Title:	PLCs		Level:	5	Credit Value:	20

Module code:	ENG53A	Is this a new module?	No	Code of module being replaced:	ENG52B

Cost Centre:	GAEE	JACS3 code:	H131

Trimester(s) in which to be offered:	1, 2 & 3	With effect from:	September 18

School:	Faculty of Arts, Science and Technology	Module Leader:	Dr Zheng Chen

Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
FdEng Industrial Engineering	☐	✓
BEng (Hons) Electrical & Electronic Engineering	✓	☐
BEng (Hons) Automation Engineering	✓	☐

Pre-requisites
None

Module Aims

The module aims to facilitate the Understanding of the principles of PLC (Programmable Logic Controllers) controlled systems and how they interface with field devices to form the control system. Along with software familiarisation, communication methods and programming techniques

Intended Learning Outcomes

Key skills for employability

KS1 Written, oral and media communication skills
KS2 Leadership, team working and networking skills
KS3 Opportunity, creativity and problem solving skills
KS4 Information technology skills and digital literacy
KS5 Information management skills
KS6 Research skills
KS7 Intercultural and sustainability skills
KS8 Career management skills
KS9 Learning to learn (managing personal and professional development, self-management)
KS10 Numeracy

	At the end of this module, students will be able to	Key Skills	
1	Understand the knowledge of Logic programming methods and functionality of basic, intermediate and developing into the advanced instruction set	KS3	
2	Establish PLC communications, upload/download programmes, monitor on line operation, edit existing, and develop new PLC programmes whilst considering system performance	KS5	
3	Evaluate devices and configurations to suit application specifications, development budget constraints, and quality control requirements.	KS6	
4	Develop knowledge and skills on plan and manage process control system design; Integrate PLCs as part of a control system; effectively communicate the design.	KS9	

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Assessment:

By means of a portfolio (Practical work) - several exercises developing knowledge of PLC functionality and programming methods. All outcomes will be covered by this assessment.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1 to 4	Portfolio	100		4000

Learning and Teaching Strategies:

Lab work – The student will have practical 'hands on' experience using Industrial standard PLC equipment and software. This is intended to develop, in stages, their learning and understanding. A series of lab exercise sheets will be used in order to affirm competency of specified outcomes.

Syllabus outline:

- Principles of PLC control;

- Interfacing with field devices;

- Familiarisation with industry standard PLC equipment;

- Software familiarisation – Programme configuration for hardware, communications configuration, menus, sub-menus, file structure and trees, memory allocation, data monitoring, editing, upload/download, communication protocols;

- Principles of logic programming – discrete devices, analogue devices, mathematical functions, functions used in data manipulation and control;

- Fault location and determination, removing faults, re-start of system, programming to ensure system stability;

- Programme structure – use of, and potential problems associated with, sub-routines. Allocation of file/bit addresses, in an organised manner to allow for future modification and data transfer between devices;

- Advanced functionality of PLC – indirect addressing methods, indexed addressing methods, multiplexing data inputs, etc.
- Process control system design and integration of PLC in process control systems.

Bibliography:
Essential reading
Petruzella, F.D. (2010) *Programmable Logic Controllers*, McGraw-Hill Higher Education
Other indicative reading
Tubbs,S.P. (2007) *Programmable Logic Controller Tutorial, Siemens SimaticS7-200*, Siemens Bolton, W. (2009) *Programmable Logic Controllers*, Newnes