Prifysgol Wrecsam
Wrexham University

Module specification

When printed this becomes an uncontrolled document. Please access the Module Directory for the most up to date version by clicking on the following link: Module directory

Module Code	ENG6AQ
Module Title	Industry 4.0
Level	6
Credit value	20
Faculty	FACE
HECoS Code	100209
Cost Code	GAME
Pre-requisite module	None

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
BEng (Hons) Mechatronics Engineering	Optional

Breakdown of module hours

Learning and teaching hours	60 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	0 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	**0** hrs
Placement hours	0 hrs
Guided independent study hours	140 hrs
Module duration (Total hours)	200 hrs

Module aims

This module will introduce the student to the principles of Industry 4.0 (fourth industrial revolution), and the current trend of automation, smart sensors and data exchange in manufacturing. The student will understand how Industry 4.0 integrates smart sensors, Ethernet based communication networks and cloud storage to optimise production and increase production flexibility.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Investigate features requirements of a commodity sensor for the integration into a digital factory. Consider the advantages (and disadvantages) of adapting discrete sensors for 'Internet of Things' (IOT) applications.
2	Critically analyse how intelligent automation and sensor technology promotes sustainable production.
3	Identify how existing automation systems can be adapted and developed to achieve the requirements of Industry 4.0, and how can RFID systems and Fieldbus technology to promote efficient manufacturing.
4	Examine the benefits and challenges of Industry 4.0 i.e. Security of information technology.

Assessment

Indicative Assessment Tasks:
This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assignment 1: A portfolio of a project.

Assignment 2: A case study.

A typical assignment may be:

Example 1

Develop a device specification for an IOT ready proximity sensor i.e. process data, parameterisation and diagnostics data.

Example 2

Using PROFIBUS, PROFINET, IO-Link to undertake innovative projects.

Case Study

Evaluate the security challenges of the IOT and cloud data storage system. How to mitigate risk by developing policies and procedures.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1, 2	Portfolio	3000 words	60%	
2	3, 4	Coursework	2000 words	40%	

Derogations

None

Learning and Teaching Strategies

Presentation will be through a series of lectures, tutorials, practical lab sessions and assignments using suitable computer packages where appropriate.

Case Studies will be used to promote student's research and investigative skills.

Problem Based Learning – The problem will be based upon certain aspects of a system design, whereby the students, in small groups, will provide a solution to a design problem for a given sensor system. This learning process will be facilitated by the module leader.

Welsh Elements

Programme is delivered in English and Chinese, however students can submit assessments in Welsh.

Indicative Syllabus Outline

Understand the term Industry 4.0 means the fourth industrial revolution. It incorporates emerging technical advancement to optimise manufacturing.

Examine what "Things" refer to in the definition Internet of Things (IOT), and how any physical object with an IP address can be connected via a network. How does Industry 4.0 relate to IOT's for Industrial Application (IIOT)

Develop an application to control a device using a PLC and Web interface. How a web server acts as a gateway between user and programmable controller.

The potential risks of connecting devices to IP based system, and how this can be mitigated using security policies. Why Infosec policies and device based firewalls are important to protect assets from malicious attacks from the internet.

Indicative Bibliography

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads:

Alasdair Gilchrist (2016) Industry 4.0: The Industrial Internet of Things; Apress.

Other indicative reading:

Subhas Chandra Mukhopadhyay (2014) Internet of Things: Challenges and Opportunities (Smart Sensors, Measurement and Instrumentation), Springer

Eric D Knapp (2014) Industrial Network Security: Securing Critical Infrastructure Networks for Smart Grid, SCADA, and Other Industrial Control Systems; Syngress

Administrative Information

For office use only	
Initial approval date	24/09/2020

For office use only	
With effect from date	24/09/2020
Date and details of revision	22/07/2025 revalidated, LO 2 reworded not changed, assessment types recategorized, updated template, derogation removed
Version number	2