

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](#)

Refer to the module guidance notes for completion of each section of the specification.

Module code	ENG6AQ
Module title	Industry 4.0
Level	6
Credit value	20
Faculty	FAST
Module Leader	Dr Teng Gao
HECoS Code	100209
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Mechatronics Engineering	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	60 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	0 hrs
Placement / work based learning	0 hrs
Guided independent study	140 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	24/09/2020
With effect from date	24/09/2020
Date and details of revision	
Version number	1

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	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. 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

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.

Indicative Assessment Tasks:

Assignments and case studies totalling 100%.

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	Weighting (%)
1	1, 2	Coursework	60%
2	3, 4	Case Study	40%

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%.

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.

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 import 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

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas. [Click here to read more about the Glyndwr Graduate attributes](#)

Core Attributes

Creative
Ethical

Key Attitudes

Curiosity

Practical Skillsets

Digital Fluency
Communication