Module specification

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Module Code	ENG6AB
Module Title	Industrial Communication Systems
Level	6
Credit value	20
Faculty	FAST
HECoS Code	100159
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Production Engineering	Core
BEng (Hons) Industrial Engineering Design (Electrical & Electronic)	Core
BEng Industrial Engineering (Electrical and Automation)	Core
BEng Industrial Engineering (Mechatronics)	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	36 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	**36 hrs**
Placement / work based learning	0 hrs
Guided independent study	164 hrs
Module duration (total hours)	**200 hrs**

For office use only	
Initial approval date	11/09/19
With effect from date	11/09/19
Date and details of revision	30/01/20 admin update of derogation
12/8/20 Temporary change to assessment for 2020/21 post Covid.
22/9/21 Temporary change to assessment extended for 21/22
Sept 22 Template update via Engineering revalidation, addition of BEng Industrial Engineering top up programmes
07/03/2022 AM0 Realignment of assessments and learning outcomes
Version number	4

Module aims

The module aims to develop in-depth knowledge and skills on industrial data networks enabling students to plan, implement and troubleshoot data communication solutions, and to develop students' ability to synthesise information from a variety of sources in order to characterise and evaluate digital communication systems and to fulfil industrial requirements.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Systematically demonstrate the practical implementation of the theoretical engineering concepts.
2	Identify, critically analyse and communicate the potential technical problems in the industrial communication system to the stake holders.
3	Critically evaluate the performance, research and provide solution to a complex engineering problem using the available tools and equipment in the laboratory and the work place.
4	Define the synthesis of significant installations of the communication systems in industry through applied knowledge and practical skills to maintain a secure control of the physical processes in the infrastructure.

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: C3 & C4 for BEng degree apprenticeship programmes and B3 & B4 for BEng Industrial Engineering Level 6 top-up programmes.

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.

Assessment One: A written examination of 3 hours duration at the end of the module to assess a complete understanding of the contents of the module. This will be a comprehensive paper composed of multiple questions and complex engineering problem(s).

Assessment Two: A course work of minimum 2500 words count will be submitted to assess practical skills. This will be composed of the reports of all the laboratory sessions in which simulations and/or practical work was performed during the module.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	2	Examination	50
2	1, 3, 4	Coursework	50

Derogations

A derogation from regulations has been approved for this module 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

The module will be presented to the students in the form of lectures and practical demonstrations. The tutor will give the necessary theoretical knowledge to the students and the students will then implement practically to corroborate the theoretical knowledge. Where possible, visits to industries will be arranged to demonstrate the operation of actual communication systems. Relevant videos and tutorials will also be used to support the learning process. Practical exercises will be devised to enhance the students' technical and team working skills.

Indicative Syllabus Outline

Communication and Networking: OSI Model, TCP/IP, IP Addressing, Analog and Digital Communication.

Industrial Data Communication: Copper Cable, Fibre Optics, RS-232, RS-485, Modbus, Industrial Ethernet, Field Bus, Profibus, Profinet, HART Protocol.

Wireless Communication: Wireless Technologies, 3G, 4G, 5G, LTE, Bluetooth, ZigBee, etc.

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update. Please *ensure correct referencing format is being followed as per University Harvard Referencing Guidance.*

Essential Reads

B. P. Lathi and Z. Ding, *Modern Digital and Analog Communication,* 4th ed. New York: Oxford University Press, 2010.

Other indicative reading

J. Proakis and M. Salehi, *Fundamentals of Communication Systems.* 2nd ed. Boston: Pearson, 2014.

D. Reynders, et. al., *Practical Industrial Data Communications*. Boston: Elsvier, 2005.

J. Kraus, et. al., *Antennas and Wave propagation*. 4th ed. McGraw Hill, 2010.

M. Kolawole, *Satellite Communication Engineering.* 2nd ed. FL: CRC Press, 2017.

M. Skolnik, *Radar Handbook*. 3rd ed. Maidenhead: McGraw Hill, 2008.

J. Senior and M. Jamro, *Optical Fiber Communications Principles and Practice.* 3rd ed. Harlow: Financial Times/Prentice Hall, 2009.

S. Mackay, et al., *Practical Industrial Data Networks: Design, Installation and Troubleshooting.* Oxford: Newnes, 2004.

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.

Core Attributes
Engaged
Enterprising
Creative
Ethical

Key Attitudes
Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Emotional Intelligence
Communication