Wrexham glyndŵr UNIVERSITY

MODULE SPECIFICATION PROFORMA

Module Title:	**Industrial Communication Systems**	**Level**:	6	**Credit Value**:	20

Module code:	ENG663	**Is this a new module?** YES	**Code of module being replaced**:	

Cost Centre:	GAME	**JACS3 code**:	H641

Trimester(s) in which to be offered:	1, 2 & 3	**With effect from:**	September 16

School:	Applied Science, Computing & Engineering	**Module Leader:**	James Robinson

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
BEng (Hons) Industrial Engineering	☐	✓

Pre-requisites
None

Derogations
A derogation from regulations has been approved for this module which means that whilst the pass mark is 40%, each element of assessment requires a minimum mark of 30% for the module to be passed overall.

Office use only

Initial approval June 16

APSC approval of modification *Enter date of approval*	Version 1
Have any derogations received SQC approval?	Yes ✓ No ☐

Module Aims
The module should develop an in depth knowledge relating to industrial data networks enabling the student to plan, implement and troubleshoot data communications solutions. The student should develop the ability to synthesise information from a variety of sources in order to characterise and evaluate digital communication systems and hence anticipate future developments in applications and technology.

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	Evaluate the performance of digital communication systems, including optical, copper and wireless systems, using standard criteria and international standards.	KS5	
2	Demonstrate skills that enable both high and low level testing of industrial data network systems. Whilst utilising industrial standard equipment and implementing accredited testing methods.	KS3	

3	Analyse network data, in terms of signal quality, integrity and identify data anomalies. With a view to provide qualified reasoning as to why any problems occur.		
		KS3	
		KS10	

Assessment:

A series of practical 'tests' will be undertaken by the students which relate to the transmission of data over a number of typical network systems, using different transmission media. These should be observed by the tutor and the student should provide a written summery and supporting evidence.

A report covering a range of the theoretical aspects of data transmission should be produced. This should also include an element of 'self-study' and research.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	2 & 3	Practical	50		2000
2	1	Report	50		2000

Learning and Teaching Strategies:

Lab work – The student will have practical 'hands on' experience using Industrial standard network 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.

Specialist knowledge and expertise from industrial partners can and will be disseminated to other students where relevant.

Syllabus outline:
Satellite communication: Earth station. Satellite orbit and systems. Design and analysis of up-link and down-link systems. DBS and basic satellite receiver design principles. Satellite TV, types of modulation systems, PAL, MAC, MPEG, JPEG. Compare different scrambling, compression, decoding, and error correction systems. **Optical Fibre Communication:** System components. Modulation and demodulation of light. Operating frequency. Ray theory transmission (T.I.R., critical angle, acceptance angle, numerical aperture, skew rays). Material absorption (extrinsic, intrinsic). Scattering Losses (linear - Mie, Rayleigh; non-linear - Raman, Brilloun). Intramodal and intermodal dispersion. Types of optical fibre cable**,** R.I. profile, relative cost of Step index fibres (multimode, monomode), Graded index fibres. **Industrial Data Communication systems:** An analysis of current and possible future technologies. Typically this may include systems such as Profi-Bus, Profi – Net, ASI bus etc. This should include the practical elements of the module and develop the student's knowledge base relating to testing, analysis and fault correction methods.

Bibliography:
Essential reading
Makay & Wright (2014) *Practical Industrial Data Network*, Newnes
Other indicative reading
D. Reynders (2005) *Practical Industrial Data Communications*, Butterworth-Heinemann