MODULE SPECIFICATION

Part 1: Information			
Module Title	Remote Sensing		
Module Code	UFMFPP-15-3	Level	Level 6
For implementation from	2018-19		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Contributes towards			
Module type:	Standard		
Pre-requisites	Measurements and Instrumentations 2018-19		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: This module teaches concepts of remote sensing based on the available wireless and mobile communications systems.

Outline Syllabus: In order to monitor and control the process data wirelessly, efficient (i.e., interference-free) wireless standards will be required to study. Wireless communication systems (WCS) such as short range Wi-Fi, WiMAX, Li-Fi Bluetooth, ZigBee, UWB, commercial cellular systems, WLAN and DECT are being used in industrial applications. However, the industrial applications such as instrumentation processes are required either hybrids or amended WCS depending on their data extraction and control requirements. Networks of industrial instrumentation systems require higher quality, secure, fast and intelligent wireless systems. The module will equip students with the advanced knowledge and concepts of the above and future wireless technologies, which will make students confident in planning, designing and analysing the performance of industrial instrumentation systems situated at remote locations. In order to teach the above, the indicative content includes:

Basics of wireless communication, modern wireless technologies, available standards, their

properties, advantages and disadvantages, essential requirements in remote industrial instrumentation applications.

Wireless sensors networks: types and topologies, standards, frequency spectrums and security issues in remotely sensed wireless instruments.

Network architecture and protocol: comparison of ZigBee, Wireless HART, Wi-Fi, Bluetooth, and many others, evaluation of networks performance, reliability of the operations of the networks.

Teaching and Learning Methods: Concepts and the scope of the syllabus topics will be introduced in lectures, supported by directed reading and lab experiments/simulation based work. The tutorial exercises and labs sessions will enhance the understanding of students of real world applications of the material delivered in the module.

Scheduled learning includes lecture and tutorials/practical classes.

Independent learning includes hours engaged with essential reading, assignment preparation and completion etc. These sessions constitute an average time per level.

Part 3: Assessment

The assessment consists of an end of module examination and a group coursework.

The strategy chosen to ensure that the concepts of wireless instrument system, working principles, networks standards architecture and protocols, data transmission techniques are assessed under controlled conditions, while a more open-ended research based assignment (component B) is used to encourage wider engagement and reflection on this topic. In component B, the students will learn designing and analysing a wirelessly connected instrumentation system that may focus on running automatic processes in the industry or remotely operated wireless system based on the simulation packages. Within the group project students will have the opportunity to present their individual research for feedback. The submission will involve a group report and an individual evaluation of the group design against a set of criteria addressing technical and user requirements.

In the resit run in component A, control condition written exam will be required. In component B, the individual student will rework the original coursework submission following feedback.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		50 %	Group project report (max page limit 10 excl. Appendices/additional info)
Examination - Component A	✓	50 %	Exam
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		50 %	Individual report (max page limit 10 excl. Appendices/additional info)
Examination - Component A	✓	50 %	Exam

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to:

	Module Learning Outcomes
MO1	Demonstrate knowledge of wireless network engineering applications and technologies
MO2	Understand and describe the instruments data communication techniques
MO3	Analyse performance of the instruments network systems
MO4	Apply wireless communication design concepts
MO5	Design a wireless instrumentation system
MO6	Understand the real-time data processing techniques used in oil and gas, power and car industries

Contact Hours

Contact Hours	
Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/index.html