Module Specification

Remote Sensing

Version: 2022-23, v2.0, 09 Jun 2022

Contents

Part 1: Information

Module title: Remote Sensing

Module code: UFMFPP-15-3

Level: Level 6

For implementation from: 2022-23

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Delivery locations: Frenchay Campus, Global College of Engineering and Technology (GCET)

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: Measurements and Instrumentations 2022-23

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

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.

Part 3: Teaching and learning methods

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.

Module Learning outcomes: On successful completion of this module students will achieve the following 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

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/index.html

Part 4: Assessment

Assessment strategy: The assessment consists of a project presentation (A2) before a research project submission (A1) and also a lab-based group project (B).

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 (A1), 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 lab-based group report and an individual evaluation of the group design against a set of criteria addressing technical and user requirements

Assessment components:

Presentation - Component A (First Sit)
Description: Component A1: Project presentation
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Report - Component A (First Sit)
Description: Individual research report
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Group work - Component B (First Sit)
Description: Laboratory-Based Group project report (Groups 4-6)
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Presentation - Component A (Resit)
Description: Individual Project presentation

Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Report - Component B (Resit)
Description: Individual lab report report
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Report - Component A (Resit)
Description: Individual Research Report
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Instrumentation and Control Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2019-20

Instrumentation and Control Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2019-20