# Module Specification

## Measurements and Instrumentations

Version: 2023-24, v2.0, 15 Mar 2023

**Contents**

## Part 1: Information

**Module title:** Measurements and Instrumentations

**Module code:** UFMFNP-15-2

**Level:** Level 5

**For implementation from:** 2023-24

**UWE credit rating:** 15

**ECTS credit rating:** 7.5

**Faculty:** Faculty of Environment & Technology

**Department:** FET Dept of Engineering Design & Mathematics

**Partner institutions:** None

**Field:** Engineering, Design and Mathematics

**Module type:** Module

**Pre-requisites:** Practical Electronics 2023-24

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** Pre-requisites: students must take one out of UFMFVA-15-1 Electrical and Electronic Principles B or UFMFCA-15-1 Practical Electronics

**Features:** Not applicable

**Educational aims:** This module aims to develop students' broad understanding of instrumentation techniques which are used in a wide range of engineering applications.

By the end of the module students should be able to understand the instrumentation requirements in the specific engineering contexts and specify appropriate instrumentation (if available off the shelf), design new instruments and instrument systems fit for the purpose, critically evaluate and carry out a performance analysis of a complete instrumentation system.

**Outline syllabus:** In order to equip students with the advanced knowledge of the instrumentations, the following areas will be focussed:
The physics and mathematics of sensor action
Measurement technique
Errors and their control
Design principles of instrumentation systems
Data conditioning
Relevant signal processing techniques.

## Part 3: Teaching and learning methods

**Teaching and learning methods:** In order to achieve the educational aims, the following content will be taught:

General principles of measurements and instrumentation:
Structure and classification of measurement systems, systematic characteristics (range and span, errors and accuracy, linearity, sensitivity and hysteresis), statistical characteristics (repeatability and reproducibility), calibration, traceability and standards.

Sensing devices and principles:
Introduction to a range of sensors and transducers.

Working principles and characteristics of commonly used instruments in automation industry.

Signal conditioning and data presentation:
Design of bridges, amplifiers and filters, panel meters, LED and LCD displays, moving coil meters, chart recorders and printers, data acquisition with microcomputers, smart sensors and intelligent instrumentation systems.

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

**MO1** Demonstrate knowledge of general principles of measurement and instrumentation

**MO2** Express an awareness of commercial instrumentation design process

**MO3** Understand the working principles of measuring instruments used in automation/ processes in oil & gas, power and car industries

**MO4** Use electronics associated with the instrumentation systems

**MO5** Understand and use analytical techniques relevant to instrumentation design

**MO6** Design an instrumentation system using traditional as well as microprocessor and microcontroller programming techniques

**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 an end of module examination and a group coursework.

The strategy has been chosen to ensure that the measurements and instrumentations engineering principles are assessed under controlled conditions in an exam, while a more open-ended research-based assignment is used to encourage wider engagement and reflection on this topic.

Students will design an instrumentation system for running automatic processes in the industry and will implement it by simulating using a given simulation package. 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 students will take the controlled conditions written exam. For the report, the student will rework the original coursework submission following feedback.

**Assessment tasks:**

**Report** (First Sit)
Description: Group Project Report: maximum page limit 10 (excluding appendices and any additional material)
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

**Examination** (First Sit)
Description: Exam (2 Hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO3, MO5, MO6

**Report** (Resit)

Description: Group Project Report: maximum page limit 10 (excluding appendices and any additional material)
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

**Examination** (Resit)
Description: Exam (2 Hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO3, MO5, MO6

## Part 5: Contributes towards

This module contributes towards the following programmes of study:

Instrumentation and Control Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2021-22

Instrumentation and Control Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2021-22

Instrumentation and Control Engineering {Foundation} [Feb][PT][GCET][8yrs] BEng (Hons) 2018-19

Instrumentation and Control Engineering {Foundation} [Oct][PT][GCET][8yrs] BEng (Hons) 2018-19