Module Proforma

Approved, 2022.01

Summary Information

Module Code	4518USST
Formal Module Title	Mechatronics 1
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Dante Matellini	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
University of Shanghai For Science and Technology

Learning Methods

Learning Method Type	Hours
Lecture	22
Practical	22

Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-PAR	PAR	January	12 Weeks

Aims and Outcomes

Aims	The aim of this module is to introduce electromechanical systems focusing on applications in the areas of Mechanical, Automotive and Marine Engineering. The module covers the essential concepts of electrical circuits including AC and DC systems, signals, sensors, actuators and digital electronics.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Describe and model the principles of electrical and electronic systems.
MLO2	Analyse circuits which include passive and active electrical components.
MLO3	Differentiate between digital and analogue circuits and analyse the requirement for each type.
MLO4	Select appropriate transducers (sensors and actuators) for a mechatronic application and demonstrate an understanding of their characteristics and practical interfacing requirements.
MLO5	Determine different types of signals and perform the required signal processing for digital or analogue interface.

Module Content

Introduce the mechatronics design approach/philosophy - system interfacing, instrumentation and control.
Basic principles for Electrical Circuits and Systems:

- Voltage, current and resistance.
- Kirchhoff's voltage and current laws.
- Thevenin and Norton theorems.
- AC theory.
- Response of RL and RC circuits.
- Electric fields and flux.

Electronic Circuits:

- Operational amplifier.
- Voltage regulators and dividers.
- Circuit equivalent.

Digital Electronics:

- Logic circuits and logic algebra.
- Number Systems.
- Semiconductor materials.
- Diode circuits.
- Transistor types and operation.

Signal types and Signal Processing:
- Analogue signals.
- Digital signals.
- Sensors and actuators.
- Drive systems.

Embedded Systems and Microcontrollers:

- Hardware synthesis.
- Software tools.
- Programming concepts and design.
- Programming languages.

Module Overview

Additional Information

This module is designed to be linked with the level 5 module Mechatronics 2. It provides the basic foundations and theories of Mechatronic systems that students need for the practical based Mechatronics 2 module.

This module includes content which relates to the following UN Sustainable Development Goals:

SDG9 – This module provides students with knowledge regarding the electrical infrastructure and electricity industry and innovation.

SDG11 – This module considers the issues of sustainable cities and communities when designing electrical circuit solutions for domestic and industrial use.

SDG12 – this module considers the issues of energy consumption and electrical waste when designing electrical engineering solutions.

AHEP4 - C1,C2,C3,C5,M6,M12

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	Case Study Report	40	0	MLO3, MLO5
Exam	Examination	60	2	MLO1, MLO2, MLO4