Module Specification

Heat Transfer and Power

Version: 2023-24, v2.0, 06 Jul 2023

Contents

Part 1: Information

Module title: Heat Transfer and Power

Module code: UFMFXP-30-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

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: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: The Heat Transfer and Power module introduces the principles of heat transfer and power, develop commercial awareness and review the methods of power generation. The key topics are the modes of heat transfer and how they are used to generate power.

Features: Not applicable

Educational aims: Learners will develop the theoretical understanding of heat transfer and entropy, and how this is applied in heat exchangers and power generation. Learners will develop the theoretical understanding and some professional behaviours needed to generate power utilising different sources of energy.

Outline syllabus: The topics covered in this unit are:

Heat Transfer:

Heat transfer theory: conduction, convection and radiation

Conduction for simple geometries. Numerical methods for complex geometries

Forced convection: boundary layers and heat transfer coefficients

Natural convection

Heat exchangers: surface area, outlet temperature, pressure loss calculations

Radiation. Kirchoff's law and view factor calculation, black body radiation

Extended surface

Unsteady heat transfer

Power Generation:

Generation methods and evaluation of climate impact, carbon reduction, embedded energy, life cycle costing

Entropy concept and calculations: work and heat transfer. Isentropic efficiency

Efficiency and performance of IC engines, gas turbines and steam power plant

Combustion chemistry and system performance improvements using data

Compressible flows: nozzles, orifices, friction

In this module the following mathematical topics will be introduced and developed:

Fourier Series

Fourier Transform

Part 3: Teaching and learning methods

Teaching and learning methods: See Assessment

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

MO1 Conduct mathematical analysis on heat exchange and experimental data.

MO2 Analyse the principles of heat transfer and power generation.

MO3 Evaluate the environmental sustainability of power generation.

MO4 Evaluate cost drivers, risks and health and safety in power generation.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

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 for this module is as follows:

A Written examination: The examination will assess the students' knowledge and skills of heat transfer and principles of heat exchangers through mathematical analysis. It will assess the students' knowledge and understanding of the methods of power generation and the concepts of entropy.

Group Presentation and Written Report – The learners will conduct a scoping and feasibility study on planned improvements to piece of workshop equipment within the heat transfer and power context. The presentation will discuss the scope of the project and the individual written component will support this discussion and include an explanation of heat transfer and power generation principles. The group presentation will be in subject discipline.

Resit is the same as the first sit

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Assessment tasks:

Examination (First Sit)
Description: Written Exam (90 minutes)
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1

Written Assignment (First Sit)
Description: Written Report (1500 words)
Weighting: 30 %
Final assessment: No
Group work: No

Learning outcomes tested: MO3, MO4

Presentation (First Sit)
Description: Group Presentation
Weighting: 45 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO2

Examination (Resit)
Description: Written Exam (90 minutes)
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested:

Written Assignment (Resit)
Description: Written Report (1500 words)
Weighting: 30 %
Final assessment: No
Group work: No
Learning outcomes tested:

Presentation (Resit)
Description: Group Presentation

Resit deliverable(s) will be scaled appropriately to group size and task complexity
Weighting: 45 %
Final assessment: No
Group work: Yes
Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mechanical Engineering with Nuclear {Apprenticeship-UCS} [UCS] BEng (Hons) 2022-23

Mechanical Engineering with Nuclear [UCS] BEng (Hons) 2022-23

Mechanical Engineering with Nuclear {Apprenticeship-UCS} [Sep][FT][UCS][5yrs] BEng (Hons) 2021-22

Electromechanical Engineering (Nuclear) {Apprenticeship-UCS} [UCS] FdSc 2022-23

Electromechanical Engineering (Nuclear) [UCS] FdSc 2022-23