Module Specification

Nuclear Science, Materials and Design

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

Contents

Part 1: Information

Module title: Nuclear Science, Materials and Design

Module code: UFMFRP-30-1

Level: Level 4

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: Learners will be working as part of a team designing a product for use in industry. The module develops a theoretical foundation of nuclear science and materials and mathematical analysis skills.

Features: Not applicable

Educational aims: This module covers a foundation knowledge of science and engineering knowledge for the selection of materials and methods. The concepts of

radioactivity, chemistry and health physics are introduced in this module.

Exploration of products, materials and processes will develop the knowledge and understanding of classification and processes related to materials. CAD is introduced during this module and it will explain different design methodologies and manufacturing processes.

Outline syllabus: Topics covered in this module are:

Nuclear Science:

Nuclear Physics including fusion and fission process
Nuclear Chemistry including binding energy potentials
Nuclear Biology including radiochemistry and health physics

Material Classification and Processes:

Material Classification
Primary (Forming) Processes
Secondary (Removal) Processes
Tertiary (Finishing) Processes

Design and Manufacturing Methods:

Design Methodology
Computer Aided Design
Production & Manufacture

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

Dimensions and Physical Quantities
Complex Numbers
Engineering Functions
Differentiation and Integration

Differential Equations
Numerical Methods
Solving Differential Equations using computer software

Part 3: Teaching and learning methods

Teaching and learning methods: See Assessment, Hours and Outline Syllabus

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

MO1 Conduct basic radionuclide and health physics calculations

MO2 Describe materials by exploring their behaviour and structure.

MO3 Examine manufacturing processes for a given applications.

MO4 Produce designs and production/manufacture documentation for a nuclear science or engineering application.

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:

Core Analytical Competency – 2 hour – examination The exam will assess the student's ability to conduct mathematical analysis of health physics and radionuclide

calculations. It will also assess the students' knowledge and understanding of chemistry and health physics process.

Design Report and Group Presentation – Students will produce designs and production manufacture documentation for a nuclear maintenance application. They will also present to their peers and a panel of experts. In the presentation students will be expected to explain the process of their design and a possible manufacturing process they would employ to produce their designs. Students will also need to describe the materials they would use. If a student fails this component they must write a report on their product.

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 (2 Hours)
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1

Report (First Sit)
Description: Design report (1500 words)
Weighting: 30 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3, MO4

Presentation (First Sit)
Description: Group presentation
Weighting: 45 %

Final assessment: No
Group work: Yes
Learning outcomes tested: MO2, MO3

Examination (Resit)
Description: Written Exam (2 Hours)
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested:

Report (Resit)
Description: Design 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) 2023-24

Mechanical Engineering with Nuclear {Apprenticeship-UCS} [UCS] BEng (Hons) 2023-24

Mechanical Engineering with Nuclear [UCS] BEng (Hons) 2023-24

Electromechanical Engineering (Nuclear) {Apprenticeship-UCS} [UCS] FdSc 2023-24

Electromechanical Engineering (Nuclear) [UCS] FdSc 2023-24

Electrical, Electronic and Control Engineering with Nuclear {Apprenticeship-UCS} [UCS] BEng (Hons) 2023-24

Electrical, Electronic and Control Engineering with Nuclear {Apprenticeship-UCS} [UCS] BEng (Hons) 2023-24

Electrical, Electronic and Control Engineering with Nuclear [UCS] BEng (Hons) 2023-24