Module Specification

Nuclear Knowledge

Version: 2023-24, v1.0, 12 Apr 2023

Contents

Part 1: Information

Module title: Nuclear Knowledge

Module code: UFMFYL-20-3

Level: Level 6

For implementation from: 2023-24

UWE credit rating: 20

ECTS credit rating: 10

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: MOD security cleared staff only

Features: Not applicable

Educational aims: See learning outcomes.

Outline syllabus: The Nuclear Industry: Technological and political origins of nuclear weapons and nuclear power.

Atomic and Nuclear Physics: atomic structure, nuclear structure, radioactivity, nuclear reactions, particle/atom interactions, radiation detection and measurement, the nuclear fuel cycle.

Radiation Hazards and Protection: types and properties of radiation, biological effects of radiation, external radiation hazards, internal radiation hazards, environmental protection.

Nuclear and Radiological Regulation: the philosophy of radiation protection, the International Commission on Radiological Protection system of radiation protection, the UK regulatory framework for radiation protection and for nuclear safety, the UK nuclear safety philosophy and regulatory approach.

Accident Studies: world-wide nuclear and major industrial accident case studies, root cause analysis methodologies, learning from experience.

Nuclear Safety, Safeguards and Security: nuclear safety culture and its analysis, the international nuclear safeguards regime, nuclear security and regulation.

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled learning includes lectures, seminars, tutorials, practical classes and workshops.

Independent learning includes hours engaged with essential reading, assignment preparation and completion etc. These sessions constitute an average time per level as indicated in the table below.

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

MO1 Demonstrate knowledge of the scientific principles of the interactions of alpha, beta, gamma and neutron radiations with matter, including energy loss mechanisms

MO2 Explain the principles of operation of radiation detectors and critically evaluate their suitability for use in different environments

MO3 Demonstrate knowledge of the Gaussian plume model used for modelling atmospheric releases to enable appreciation of its applicability and limitations.

MO4 Analyse the effectiveness of protective measures used for both internal and external hazards in the context of the biological effects of radiation

MO5 Evaluate the nuclear regulatory philosophy of the UK and its use in the development of appropriate methodologies to meet statutory requirements

MO6 Demonstrate knowledge and understanding of the methodologies used to identify root causes of nuclear emergencies worldwide

MO7 Apply the principles that underpin a strong nuclear safety culture to the evaluation of organisations using appropriate performance indicators

Hours to be allocated: 200

Contact hours:

Independent study/self-guided study = 140 hours

Face-to-face learning = 60 hours

Total = 200

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/modules/ufmfyl-20-3.html

Part 4: Assessment

Assessment strategy: The submission components have been designed to enable students to demonstrate, for the purposes of assessment, their acquisition of the skills, knowledge, understandings and experiences that will enable them to meet the learning outcomes for this module. This includes the very specific safety issues and codes inherent in the operation of nuclear reactors in the UK and worldwide.

These will consist of:

A (two hour) closed-book controlled-conditions examination to ensure rigour and two assessed assignments, a coursework to ensure that students engage with the wider context of the discipline and a practical examination where students demonstrate essential practical skills.

The examination will be designed to enable demonstration of the understanding of the scientific principles and their application taught in Learning Outcomes (LO) 1-4 inc.

Two assignments designed to enable demonstration of the understanding and practical application of the principles taught in LOs 5-7 inc. these will be characterised by involving the application of knowledge in a work-based context and environment.

The output from B1 will be a 2000 word individual report.

Assessment tasks:

Examination (First Sit)
Description: Written examination (2 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Report (First Sit)
Description: Individual report
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO5, MO6, MO7

Examination (First Sit)
Description: Practical exam
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (Resit)
Description: Written examination (2 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested:

Report (Resit)
Description: Individual report
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested:

Examination (Resit)
Description: Practical exam
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electro-mechanical Engineering (Nuclear) {Apprenticeship-UCW}{Top-Up}[Frenchay] BEng (Hons) 2023-24

Electronic Engineering (Nuclear) {Apprenticeship-UCW} {Top-Up} [MOD] - Withdrawn BEng (Hons) 2023-24