Module Specification

Physical Sciences and Imaging Technology 1

Version: 2023-24, v2.0, 11 Jul 2023

Contents

Part 1: Information

Module title: Physical Sciences and Imaging Technology 1

Module code: UZYKGE-30-1

Level: Level 4

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Health & Applied Sciences

Department: HAS School of Health and Social Wellbeing

Partner institutions: None

Field: Allied Health Professions

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: This module will introduce the physical principles of radiation and how it applies to imaging and treatment.

This is a module delivered jointly for both the BSc (Hons) Diagnostic Radiography and BSc (Hons) Radiotherapy and Oncology programmes, as the principles apply to both, and profession- specific sessions will be delivered as necessary.

Features: Not applicable

Educational aims: This module will cover fundamental radiation principles, their application to the diagnostic X-Ray tube and the linear accelerator, and principles of other relevant imaging modalities. The structure is designed to encourage gradual building of knowledge. By the end of the module you will be able to describe and explain the basic design and functionality the radiation equipment that you will use during your first placement.

Outline syllabus: This module will typically cover:

Physical principles:

Concept of energy and electromagnetic radiation

Ionising and non-ionising radiations in the environment

Interaction of ionising radiation with matter

Inverse square law; half value-thickness

Biological effects of ionising radiation

Radiation protection: principles and regulations; diagnostic or radiotherapy IR(ME)R (Ionising Radiations for medical exposure Regulations) 2017, IRR (Ionising Radiation Regulations) 2017

International radiation protection principles for delivery at Hainan Medical University

Detection and measurement of ionising radiation

Radioactivity; decay process; half-life Radiographic equipment:

Imaging principles including Digital Radiography (DR)/Computed Radiography (CR)

Rotating anode, x-ray tube

x-ray geometry

Image intensifier

Static diagnostic imaging equipment or radiotherapy megavoltage equipment (including on board imaging tools

Introduction to Computed Tomography (CT), application to Diagnostic Radiography and Radiotherapy clinical environments

Introduction to Magnetic Resonance Imaging (MRI), application to Diagnostic Radiography and Radiotherapy clinical environments

Introduction to Ultrasound, application to Diagnostic Radiography and Radiotherapy clinical environments

Introduction to hybrid imaging, application to Diagnostic Radiography and Radiotherapy clinical environments

IR(ME)R ‘Pause and Check’ procedures to be followed when delivering radiation exposures.

Part 3: Teaching and learning methods

Teaching and learning methods: These will comprise of lectures and practical sessions in addition to online learning materials and group work.

Teaching will be supported and guided by independent study in the form of pre-lecture preparation tasks and post lecture learning tasks to consolidate knowledge. These may include, but are not limited to quizzes, work books, interactive TEL (technology enhanced learning) based activities, self-directed investigation of topics

and other bespoke activities. Guided independent study will support the module, but typically there are 4 hours of lectures per week.

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

MO1 Describe and explain the design features of either static x-ray imaging equipment (Diagnostic Radiography) or the linear accelerator (Radiotherapy).

MO2 Describe the physical principles of x-ray photon production and interaction processes with matter, and relate these to their practical application in Diagnostic Radiography and Radiotherapy.

MO3 Explain the principles of the inverse square law and its relevance to practice.

MO4 Demonstrate a knowledge and understanding of the principles of radiation protection and current UK regulations/recommendations with reference to patients, staff and members of the public/carers in either diagnostic radiography or radiotherapy.

MO5 Describe the principles and common applications of a range of imaging methods and technologies including an introduction to functional imaging.

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://rl.talis.com/3/uwe/lists/097CBBD5-483C-6605-858D-0F167751963E.html?login=1

Part 4: Assessment

Assessment strategy: This module has two assessment tasks; a written examination and a written evaluative account.

Written examination - 1.5 hour (typically including Multiple Choice Questions and labelling diagrams)

Rationale: To enable students to demonstrate the core knowledge required in order to meet the learning outcomes of the module. This knowledge base will be comprehensively assessed to ensure students have the required level of radiation physics knowledge in order to practice safely. The examination process is deemed to be most appropriate in order to demonstrate the breadth of student knowledge.

A 2000 word written evaluative account; of an IR(ME)R/ IRR related scenario using video capture of a standardised patient interaction.

Rationale: To enable the students to reflect on their actions in relation to the practical application of IR(ME)R/IRR guidelines 'Pause and Check', to develop application of knowledge to the clinical environment. Whilst this is only addressing one learning outcome, the learning outcome is of high significance to this module as they are related to important radiation regulations, and essential to safe practice in the clinical environment.

Formative assessment: Formative assessment will include a variety of tasks designed to encompass all learning styles, such as quizzes, diagram drawing and labelling and completion of mock questions.

Assessment tasks:

Written Assignment (First Sit)
Description: 2000 word evaluative account
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO4

Examination (First Sit)
Description: 1.5 hour written examination (typically including Multiple Choice Questions and labelling diagrams)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Written Assignment (Resit)
Description: 2000 word evaluative account
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO4

Examination (Resit)
Description: 1.5 hour written examination (typically including Multiple Choice Questions and labelling diagrams)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Radiotherapy and Oncology [Glenside] BSc (Hons) 2023-24

Diagnostic Radiography [Glenside] BSc (Hons) 2023-24