University of the West of England
BRISTOL

MODULE SPECIFICATION

Part 1: Information			
Module Title	Scientific Basis of Medical Physics		
Module Code	USSKLJ-30-1	Level	1
For implementation from	September 2017		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Health & Applied Sciences	Field	Applied Sciences
Department	Applied Sciences		
Contributes towards	FdSc Healthcare Science		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	N/A		
Co- requisites	N/A		
Module Entry requirements	None		

Part 2: Description

This module explores the scientific basis of medical physics. Indicative content includes:

Medical Physics and patient pathway

- Diagnostics
- Therapeutics
- The equipment life cycle
- Innovation and service development

Introduction to ionising radiation equipment in Medical Physics

- Radiation detectors
- Gamma camera and single-photon emission computed tomography (SPECT)
- Basic diagnostic X-ray equipment
- Computed tomography (CT)
- SPECT-CT
- Positron emission tomography (PET) and PET/CT
- Linear accelerator
- Orthovoltage (kV) radiotherapy unit
- Radiotherapy treatment planning system (TPS)
- Brachytherapy after-loaders
- Cyclotron

Introduction to the basic science and the role of the Healthcare Science Practitioner (HCSP) in radiotherapy

- Mould Room
- Treatment planning
- Quality Assurance (QA) and Quality Control (QC)
- Dosimetry
- Brachytherapy

Introduction to the basic science and the role of the HCSP in nuclear medicine

- Radiopharmacy
- Scanning
- Radionuclide therapy

Introduction the basic science and the role of the HCSP in radiation protection

- Room surveys
- QA and QC
- Environmental monitoring
- Personnel monitoring
- Sealed sources
- Unsealed sources
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Basic ionising radiation protection

- International and national legislation, guidance, standards and recommendations
- Hospital organisation of radiological protection: radiation safety policy, local rules
- Designation of areas
- Classification of persons
- Roles and responsibilities of staff, including duty holders
- As Low as Reasonable Practicable (ALARP)
- Basic principles of dose limitation: time, distance, shielding
- Radiation protection of patients, public and staff
- Transportation of radioactive materials and administration of radionuclides
- High activity materials
- Disposal of radioactive materials
- Personnel and environmental dose monitoring

Interactions of radiation with matter

- Radiation quality – Half Value Layer (HVL) and Tenth Value Layer (TVL), Quality Index
- Exponential attenuation of monoenergetic photons
- Ionisation and excitation
- Electron range and energy
- Filters and filtration
- Effects of electron and photon energy, absorber density and atomic number tissue equivalent materials

There will be 3 weeks of contact time at UWE in 3 x 1 week blocks. Included in each block week are laboratory workshops, lectures and tutorials. The contact time will equate to approximately 12 hours per block (a total of 36 hours).

In addition to the allocated hours on campus learning, students will engage in synchronous and asynchronous online learning. This will comprise a total of approximately 36 hours of online engagement through a combination of lectures, synchronous online tutorials, synchronous and asynchronous discussions, online quizzes, and collaborative group work.

Theoretical material within the module will be presented to the students in the form of regular lectures throughout each of the semesters in the academic year. During those times of work based learning, these lectures will be delivered online and involve a number of technological enhancements. The learning of lecture content will be reinforced through time spent in independent learning by the directed reading of recommended texts and through the use of technology enhanced learning resources that will be provided online. This online learning and engagement will be delivered through several avenues:

- Synchronous online tutorials in protected learning time where the student will contribute/attend an online activity appropriate to the content at the time at which the academic will be present online to facilitate and lead this scheduled/timetabled session. This tutorial will be themed/planned.

- Asynchronous discussions in the student's own time (or during protected time where permitted and appropriate) where they will engage/collaborate with other students on the course or in specified groups, and in which the academic is permitted to moderate where necessary, but is not expected to contribute.
- Synchronous surgery sessions timetabled for a specific time in which the academic will be available online to answer live questions via discussion boards/blogs/collaborate or to respond to questions posted/asked prior to the session.
- Interactive, online formative quizzes made available either following a particular package of knowledge exchange/learning, or in specified sessions/time periods.
- Lectures delivered online through a combination of one or more of the following: visual/audio/interactivity/personal formative assessment

A number of relevant practical sessions will be incorporated during the campus based blocks in addition to the work based learning that must be achieved under supervision by a workplace supervisor. Practical sessions will both drive hands on learning and the acquisition of technical skills at both an individual and group working level.

The remainder of the independent learning time allocated to the module should be spent preparing assessments [B1, B2], and undertaking revision for the exams [A1, A2].

Scheduled learning includes lectures, seminars, tutorials, project supervision, demonstration, practical classes and workshops; fieldwork; external visits; work based learning; supervised time in studio/workshop.

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc. These sessions constitute an average time per level as indicated in the table below. Scheduled sessions may vary slightly depending on the module choices you make.

Part 3: Assessment

The Assessment Strategy has been designed to support and enhance the development of both subject-based and more general skills, whilst ensuring that the modules learning outcomes are attained, as described below.

Component A

The written exams will provide students with an opportunity to demonstrate both their knowledge on a broad range of topics through a series of short answer questions, and more in-depth knowledge though a selection of medium length questions.

Component B

The radiation equipment assignment which will provide an opportunity for students to demonstrate their ability to apply the principles of medical physics to radiation equipment and evidence their skills in approaching it appropriately. This will be through a combination of practical and written work. The second element allows students to apply their knowledge and identify examples of the role of a HCSP within Medical Physics through preparation and defence of a poster.

Formative feedback is available to students throughout the module through group discussions, and in workshops. Students are provided with formative feed-forward for their exam through a revision and exam preparation session prior to the exam and through the extensive support materials supplied through Blackboard.

All work is marked in line with the Faculty's Generic Assessment Criteria and conforms to university policies for the setting, collection, marking and return of student work. Where an individual piece of work has specific assessment criteria, this is supplied to the students when the work is set.

This assessment strategy has been designed following best practice on effective assessment from JISC (http://www.jisc.ac.uk/whatwedo/programmes/elearning/assessment/digiassess.aspx) and The Open University's Centre for Excellence in Teaching and Learning (http://www.open.ac.uk/opencetl/centre-open-learning-mathematics-science-computing-and-technology/activities-projects/e-assessment-learning-the-interactive-comp).

Technical design and deployment of the activities will also follow best practice developed at UWE by the Education Innovation Centre in collaboration with academic colleagues across the university. Staff guidance and support are already in place (http://info.uwe.ac.uk/online/Blackboard/staff/guides/summative-assessments.asp).

Identify final timetabled piece of assessment (component and element)	A2	
% weighting between components A and B (Standard modules only)	**A:**	**B**:
	40%	**60%**
First Sit		
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**	
1. Examination (1.5 hours)	50%	
2. Examination (1.5 hours)	50%	
Component B **Description of each element**	**Element weighting** **(as % of component)**	
1. Integrated radiation equipment assignment	50%	
2. Poster presentation and defence (15 minutes)	50%	
Resit (further attendance at taught classes is not required)		
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**	
1. Examination (3 hours)	100%	
Component B **Description of each element**	**Element weighting** **(as % of component)**	
1. Integrated radiation equipment exercise (including case study poster)	100%	

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to (assessment intended for each learning outcome designated by [*] corresponding to assessment section):

- Describe and explain the basic equipment and clinical applications of each type of radiation [A1]
- Describe and explain the biological effects and measurement of each type of radiation [A2, B1]
- Describe and explain the possible health effects and safety of each type of radiation [A2, B1]
- Describe the procedures and need for evaluation of adverse incidents and the potential impact of adverse incidents on patients, carers and healthcare professionals [B1, B2]
- Know and discuss basic radiation protection principles and the basic application of legislation within the workplace [A1]
- Describe the role of a Medical Physics Technology HCSP within their specific practice environment, the patient pathway and within the wider context of healthcare [A2, B2]

Key Information Sets Information (KIS)

Key Information Set - Module data

Number of credits for this module				30
Hours to be allocated	Scheduled learning and teaching study hours	Independent study hours	Placement study hours	Allocated Hours
300	72	228	0	300

Contact Hours

The table below indicates as a percentage the total assessment of the module which constitutes a;

Written Exam: Unseen or open book written exam
Coursework: Written assignment or essay, report, dissertation, portfolio, project or in class test
Practical Exam: Oral Assessment and/or presentation, practical skills assessment, practical exam (i.e. an exam determining mastery of a technique)

Total Assessment

Total assessment of the module:	
Written exam assessment percentage	40%
Coursework assessment percentage	60%
Practical exam assessment percentage	0%
	100%

Reading List

Modernising Scientific Careers Programme Training Manual for appropriate Division and Specialist Route. Available from http://www.nshcs.hee.nhs.uk/curricula

The module reading list can be accessed through the following link:

https://uwe.rl.talis.com/lists/7363C327-F49E-176E-0367-6E9F81584D36.html

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