University of the West of England
BRISTOL

MODULE SPECIFICATION

Part 1: Information			
Module Title	Applied Medical Physics		
Module Code	USSKLL-30-2	Level	2
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	USSKLJ-30-1 Scientific Basis of Medical Physics		
Excluded Combinations	N/A		
Co- requisites	USSKLK-30-2 Advanced Medical Physics		
Module Entry requirements	N/A		

Part 2: Description

This module explores applied topics on medical physics relating to medical imaging and medical equipment quality assurance and quality systems. The syllabus covers:

Introduction to image formation, acquisition, manipulation, analysis, storage and sharing

- Theory of image formation, including reconstruction from projections
- Display, manipulation and analysis of images
- Image registration and fusion
- Image storage, sharing files and formats:
  - PACS
  - DICOM
  - HL7

Principles of operation

- Formation of the X-ray image, fluoroscopy, computed radiography, digital radiography (CR/DR), CT scanners, electronic portal imaging devices, cone beam CT (CBCT)
- Ultrasound
- Nuclear medicine
- Magnetic resonance imaging (MRI)

Clinical applications (including hybrid imaging)

- Choice of modality for common clinical scenarios

- Common clinical applications of each modality
- Planning and delivery of radiotherapy:
- Mammography
- Future directions in imaging
- Gating techniques and 4D CT imaging (cardiac and respiratory)
- The possible risks and health effects of each modality (risk benefit ratios)
- Overview of QA and testing
- Radiation protection of patients and diagnostic reference levels

Operation and principles of non-imaging equipment in Medical Physics

- Radiation detectors
- Linear accelerator
- Orthovoltage (kV) radiotherapy unit
- Radiotherapy TPS
- Brachytherapy after-loaders
- Cyclotron

Basic quality systems

- International and national legislation, guidance, standards and recommendations
- Record keeping
- Risk assessments and risk-based analysis
- Basic acceptance and safety testing

For a range of commonly performed Quality assurance tests:

- Best practice protocols
- Test equipment
- Action limits
- Frequency

Basic planned preventative maintenance

- Repair and post-repair QC requirements
- Process of handover to and from clinical use
- Factors affecting decisions on maintenance activity
- Calibration and QA

Decontamination and waste management

- Infection control
- Biological decontamination techniques
- Radioactive decontamination
- Decontamination records
- Disinfection, sterilisation and cleaning
- Special waste, clinical waste, radioactive waste, waste electrical and electronic equipment (WEEE):
- Data storage
- Incident investigation and reports

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 written and oral 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 exam will provide students with an opportunity to demonstrate both their knowledge on a broad range of topics through a series of short essay questions.

The in-class open book test will assess the students' ability to research relevant information and provide critical thinking in a variety workplace scenarios where the application of knowledge is required.

Component B

The first element will be an independent case study of direct relevance to the student's employment, which is to be prepared and presented for assessment as an oral presentation during a block attendance at university.

The second element is a contextual review of a recent article related to diagnostic advance(s) in a technique(s) of relevance to the student's employment, the content of which will be negotiated with the appropriate tutor.

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:** **50%**	**B**: **50%**
First Sit		
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**	
1. Examination (1.5 hours)	50%	
2. In-class test (1.5 hours)	50%	
Component B **Description of each element**	**Element weighting** **(as % of component)**	
1. Case study oral presentation (15 minutes)	50%	
2. Short contextual review (1000 words)	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. Case study oral presentation (15 minutes)	50%	
2. Short contextual review (1000 words)	50%	

Part 4: Teaching and Learning Methods	
Learning Outcomes	On successful completion of this module students will be able to fulfil the learning outcomes (assessment intended for each learning outcome designated by [*] corresponding to assessment section): • Describe and explain the principles of image formation, acquisition and manipulation including image registration, reconstruction, display, storage and sharing [A1] • Describe and explain the principles of operation and application in the patient pathway of a range of ionising radiation and non-ionising radiation imaging modalities and appraise the choice of imaging technique [A1, B1] • Appraise the risks and benefits of each modality including the health effects of radiation [A1, B1] • Describe and explain the QA and legislative framework for each modality [A1] • Explain the role of quality systems and their place in the safe delivery of modern healthcare [A2] • Describe and understand QA tests commonly performed on medical equipment and systems encountered in medical physics and their impact on patient safety [A2, B2] • Explain the importance of control of infection and decontamination of medical equipment [A2, B2] • Know the processes and regulations relating to the decommissioning and disposal of medical devices [A2]

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	50%
Coursework assessment percentage	50%
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/9ABD5447-F605-4C5C-30A2-C30FD81EFDA9.html

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First CAP Approval Date	31 May 2017			
Revision CAP Approval Date		Version	1	Link to RIA 12275