UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Radiology and Radiation Engineering
Module Code	MHT4005-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 4

Contact Hours	
Type	Hours
Laboratories	9
Lectures	24
Directed Study	167

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims

The purpose of this module is to give an introduction to, and provide fundamental knowledge in, radiological science, including the fundamentals of radiological physics, diagnostic imaging, radiobiology, basic anatomy, radiographic positioning and radiation management.

Outline Syllabus

This module provides a basic knowledge of radiological science including the fundamentals of radiological physics, diagnostic imaging, radiobiology, radiography positioning and radiation management.
The fundamentals of radiological science cannot be removed from mathematics, and this module does not assume a mathematics background; for this reason, mathematical equations will be presented and followed by sample problems with direct clinical application.

Students will learn about the following main elements:

- RADIOLOGICAL PHYSICS
Essential concepts of radiological science, radiation health and safety

- X-RADIATION
The X-ray imaging system, including X-ray tube, production, emission and its interaction with matter

- THE RADIOGRAPHIC IMAGE
Concepts of radiographic image quality and control of scatter radiation

- THE DIGITAL RADIOGRAPHIC IMAGE
Computed and digital radiography

- ADVANCED X-RAY IMAGING
Advanced x-ray imaging techniques and associated clinical science including mammography, fluoroscopy, interventional radiography and computed tomography (CT)

- MRI AND IMAGE PROCESSING/ANALYSIS
Fundamental principles of MRI. Simple computational techniques to simulate and visualise solutions to specified engineering problems

- RADIOBIOLOGY
- Fundamental principles of radiobiology as well as molecular and cellular radiobiology
- PRELIMINARY STEPS IN RADIOGRAPHY
Ethics in radiologic technology

- GENERAL ANATOMY AND RADIOGRAPHIC POSITIONING TERMINOLOGY
General anatomy of bone (osteology), joints/cartilage (arthrology), fractures, medical and radiographic positioning terminology

- RADIOGRAPHY POSITIONING
Professional conduct in radiology. Radiography positioning for the skeletal system including upper/lower limb, skull, shoulder, pelvis, vertebral
column, thorax, as well as main systems within human body including digestive system, urinary system, reproductive system, central nervous system, vascular, cardiac, and interventional radiography; Paediatric imaging; geriatric radiography; nuclear medicine; bone densitometry and radiation oncology

Learning Outcomes	
Outcome Number	Description
01	Understand the fundamentals of radiology physics, radiobiology and radiation management.
02	Be able to apply knowledge of radiation physics to solve mathematical problems about radiation and dosimetry.
03	Understand the basic principles of advanced x-ray techniques including fluoroscopy, CT, mammography, and sonography as well as other techniques such as MRI with basic understanding of image interpretation.
04	Learn basic radiographic positioning of various parts of the human body, including professional conduct, patient and room preparation and protection as well as preliminary steps in radiography.

Learning, Teaching and Assessment Strategy

Key lectures will deliver core content, providing Clinical Technology and other healthcare students with the opportunity to acquire the information to enhance their knowledge and understanding of subject LO 1,2,3,4. This will be done by interactive teaching sessions with many tutorial questions plus possible answers as well as prepared online lecture notes and handouts to cover relevant questions/answers (LO 1,2,3,4) for radiation engineering and radiology.
Directed study provides students the opportunity to undertake guided reading and to develop their own profile to enhance transferable skills and knowledge LO 1,2,3,4. The fundamentals of radiological physics, diagnostic imaging, radiobiology, radiographic positioning and radiation management explored in online lectures and practical tutorials. Cognitive skills developed in problem solving exercises, tackled by working in small groups supported by members of academic staff.

It is a requirement of the Institution of Engineering and Technology (IET) that students MUST achieve a mark of at least 30% in assessment components weighted above 30% IN ADDITION to achieving a mark of at least 40% in the module overall. This requirement applies ONLY to students on IET accredited programmes, which is the BDA occurrence/version of the module.

The summative assessment will be in three sections:

1) Coursework (1)
For this coursework students will work individually to prepare an assignment about a specific radiological topis. Students are required to submit a maximum of 1500 words for the assignment. The assignment carries 30% of the total mark which has to cover all LO 1,2,3,4.

2) Coursework (2)
This coursework will assess all the learning outcomes expressed in the descriptor (LO 1,2,3,4).Students are required to submit a maximium of 1500 words for the assignment. The assignment carries 40% of the total mark.

30 Practical Exam (Clinical Assessment):
This practical exam (Clinical Assessment) will assess all the learning outcomes expressed in the descriptor (LO 1,2,3,4). Students are required to attend practical question and answer sessions in the presence of the module leader. This practical exam carries 30% of the total mark.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework - Written	Individual Coursework 1 (1500 words)	30%

Type	Method	Description	Weighting
Summative	Coursework - Written	Individual Coursework 2 (1500 words)	40%
Summative	Clinical Assessment	Practical - Clinical Assessment	30%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:
This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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