Imperial College London

Module Specification (Curriculum Review)

Basic details

UID		Cohorts covered	Earliest cohort: Latest cohort:
Long title	Physics of Medical Imaging and Radiotherapy		
New code		New short title	
Brief description of module *(approx. 600 chars.)*	This course covers fundamental concepts and advanced topics on a range of clinical imaging modalities and radiotherapies		

120 characters

Available as a standalone module/ short course? N

Statutory details

	ECTS	CATS	Non-credit		
Credit value	7.5	15	N	HECOS codes	
FHEQ level	Level 6				

Allocation of study hours

	Hours	
Lectures	12	
Group teaching	9	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	1	*Incl. project supervision, fieldwork, external visits.*
Independent study	165.5	*Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.*
Placement	0	*Incl. work-based learning and study that occurs overseas.*
Total hours	187.5	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed? No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term		Other	Term 2, exam in term 3

Ownership

Primary department	Physics
Additional teaching departments	None
Delivery campus	South Kensington

Collaborative delivery

Collaborative delivery? N

External institution	N/A
External department	N/A
External campus	N/A

Associated staff

Role	CID	Given name	Surname
Lecturer		Chris	Dunsby
Lecturer		James	McGinty
Lecturer		Ken	Long

Learning and teaching

Module description

Learning outcomes	On completion of this module you will be able to: 1) Explain and discuss the physical principles underlying the interactions of x-ray radiation with tissue and how these can be used to generate contrast in an x-ray image 2) Explain the principle behind tomographic image reconstruction 3) Explain and discuss the generation of radionuclides for medical imaging and how they may be detected in gamma cameras and SPECT imaging systems 4) Demonstrate an understanding of the physics underlying magnetic resonance (MR) imaging and how MR imaging systems can be used for medical imaging 5) Explain and discuss the principles of ultrasound imaging and how the physical interaction of sound with different tissues can be used to generate contrast in an ultrasound image 6) Demonstrate an understanding of image quality and what determines this in different imaging modalities 7) Discuss the advantages and disadvantages of different medical imaging modalities 8) Explain the physical principles underlying the interactions of ionising radiation (gamma, beta, proton and ion) with tissue and how these can be used in therapy
Module content	a) X-ray imaging and tomography b) Ultrasound imaging c) Nuclear imaging, including SPECT and PET d) MRI e) Nuclear medicine
Learning and Teaching Approach	The course is delivered as a series of lectures (12) introducing different imaging modalities and concepts that cut across all of these. Each week during the lectures, the students will each be assigned a topic that goes beyond the material covered in lectures. They will be given specific material to study on their allocated topic. The following week they will be asked to explain their topic to their peers in small groups during a seminar. Towards the end of the lectures, the students will work in small groups to prepare a problem sheet-style question with answers on an assigned topic. The questions will then be distributed to the whole class and each group will rank and give feedback on the questions prepared by the other groups. At the end of the course, the students will work in groups to write a report and give a joint presentation on a topic selected from a list. The groups will each provide an assessment of the presentations given by the other
Assessment Strategy	Assessment is based on: 5% on the problem sheet excercise (50% peers, 50% academic staff) 15% for the report presentation (50% peers, 50% academic staff) 30% for the report (100% academic staff) 50% final exam on the material covered in lectures and the seminars (rubric: answer all questions) For peer assessment, the groups will each return a survey on their contribution to each element relative to the others in their group. If their contribution is more than 20% below the average then the marks for that student
Feedback	Peer feedback on the topic explanations given in seminars Peer feedback on the problem sheet-style questions and answers Formative feedback during report research meetings with "supervisor"
Reading list	Material covered in lectures will be available via Panopto and will be supported by notes. The seminar excercise will be supported by defined reading (course notes and/or books) and/or material available via Panopto. Textbooks used will include: • The Essential Physics of Medical Imaging (2nd Edition), Bushberg, Seibert, Leidholt & Boone (Lippincott,

Williams and Wilkins)
• Medical Imaging Physics (4th Edition), Hendee & Russel Ritenour (Wiley Liss)
• The Physics of Medical Imaging, Webb (Taylor & Francis)
• Physics in Nuclear Medicine (3rd Edition), Cherry, Sorenson & Phelps, (Elsevier)
• Radiobiology for the Radiologist, Eric J. Hall and Amato J. Giaccia, Wolters Kluwer

Quality assurance

Date of first approval	
Date of last revision	
Date of this approval	
Module leader	
Notes/ comments	

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

Template version 16/06/2017

Assessment details

Grading method	Numeric	Pass mark	40%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
			40%	
Examination	90 minute exam on material covered in lectures and in seminars	50%		N
Coursework	One 20 page report prepared in small groups and assigned a single mark	30%		N
Coursework	One 15 minute presentation given in small groups and assigned a single mark	15%		N
Coursework	Problem sheet and answers exercise done in small groups and assigned a single mark	5%		N
		100%		