MODULE SPECIFICATION

Part 1: Information			
Module Title	Magnetic Resonance Imaging Technology (AEL)		
Module Code	UZYYBK-15-M	Level	Level 7
For implementation from	2020-21		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Health & Applied Sciences	Field	Allied Health Professions
Department	HAS Dept of Allied Health Professions		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: This distance learning module aims to provide students with the necessary knowledge of the core physical principles, instrumentation and quality assurance of Magnetic Resonance Imaging (MRI). This will enable students to apply this knowledge clinically in a safe and appropriate manner that offers a quality service to patients. Educational Aims: See learning outcomes.

Features: Module Entry Requirements: Radiography professional qualification or relevant clinical Magnetic Resonance Imaging (MRI) experience

Outline Syllabus:
The syllabus will include:
Nuclear Resonance:
-properties of hydrogen nuclei: spin, precession, Larmor frequency
-net magnetization-nuclear magnetic resonance
-Radiofrequency excitation and signal detection
-Chemical Shift
-Free Induction Decay
-relaxation mechanisms
-stages of a Spin
-echo sequence

-K-space
-Relationship between TR and TE for T1W T2W and PD contrast
-Basics of contrast in relation to tissue type

Spatial Encoding:
-The effect of bipolar gradients on the magnetic field, precession frequency and spin phase
-The stages of spatial encoding in 2D and 3D imaging
-The relationship between amplitude, gradient application time and dephasing
-Similarities and differences between frequency spatial encoding and phase encoding
-Advantages and disadvantages of 3D imaging
-Look at the relationship between spatial encoding and the notion of spatial frequency

Pulse Sequences – parameters and relationships to anatomical and pathological appearances:
-Spin Echo sequences
-Gradient echo sequences
-Echo planar Imaging sequences
-Magnetization-prepared sequences

Signal suppression techniques:
-Spatial presaturation
-Magnetization transfer suppression
-Frequency selective saturation

Instrumentation and safety:
-Types of main magnet, their advantages and drawbacks
-The cryogen – its role, temperature maintenance and safety implications (quench)
-Specifications and performance of a magnetic field gradient
-Acoustic noise
-The components of the radiofrequency channel and the different types of antenna
-Projectile and eddy current effects
-Materials at risk and the precautions prior to an MRI examination
-Peripheral nerve stimulation during an MRI examination
-Factors affecting SAR and how to reduce it

Image quality and artefacts

Quality Assurance

Improving contrast:
-Magnetisation transfer
-Fat Saturation
-STIR-Contrast agents

Parallel acquisition methods

The module will be delivered online via a Virtual Learning Environment (VLE) which will be a wiki. The teaching and learning strategy will embrace a series of vodcasts and enquiry-based learning activities presented via the VLE. Students will engage in knowledge construction, peer learning and social constructivism through work on the wiki. The wiki will provide a medium for tutor facilitation and formative feedback/feedforward.

Teaching and Learning Methods:
Scheduled learning
To include planned synchronous discussion board activity and tutorial support.

Independent learning
To include keynote lectures, presented as recordings or vodcasts, wiki facilitation by subject area experts, essential reading, wiki writing, group work, assessment preparation. Additional student support will be available via telephone, e-mail and Skype.

Part 3: Assessment			
Component A: Individual contribution to a wiki. Rationale: Working in groups, students will write a Wiki throughout the run of the module. The wiki will be themed on the learning outcomes and draw from lecture/ vodcast content and material from independent study. Grades will reflect individual contribution and academic performance. The creation of the wiki is very much a learning process and therefore this component of assessment takes an assessment for learning approach. The wiki will be facilitated by a tutor who will be able to provide formative feedback/feedforward.			
First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Pass/Fail module outcome	✓	100 %	Individual contribution to a wiki

Part 4: Teaching and Learning Methods

Learning Outcomes

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

Module Learning Outcomes	**Reference**
Demonstrate a systematic understanding of the core physical principles of Magnetic Resonance Imaging (MRI) and the general relationships between anatomy, pathology and image appearances	MO1
Demonstrate an in depth understanding of MRI safety, legislation and guidelines and how to apply these appropriately in a clinical setting	MO2
Critically evaluate the technical quality of MR images to determine errors and determine remedial action	MO3
Critically analyse a range of image reformatting and post processing technologies	MO4

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	141
Total Independent Study Hours:	141
Scheduled Learning and Teaching Hours:	
Face-to-face learning	9
Total Scheduled Learning and Teaching Hours:	9
Hours to be allocated	150
Allocated Hours	150

Reading List	*The reading list for this module can be accessed via the following link:* https://rl.talis.com/3/uwe/lists/F5246995-DF51-6CC2-2D33-8ED0849A51CE.html?lang=en-GB

Part 5: Contributes Towards
This module contributes towards the following programmes of study: