

**MODULE SPECIFICATION**

Part 1: Information			
Module Title	Magnetic Resonance Imaging Technology		
Module Code	UZZY4Q-15-M	Level	M
For implementation from	January 2018		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Health and Applied Sciences	Field	Allied Health Professions
Department	Allied Health Professions		
Contributes towards	MSc Advanced Practice Continuing Professional Development Module		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	Radiography professional qualification or relevant clinical Magnetic Resonance Imaging (MRI) experience		

Part 2: Description
<p>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.</p> <p>The syllabus will include:</p> <p><b>Nuclear Resonance</b></p> <ul style="list-style-type: none"> <li>• properties of hydrogen nuclei: spin, precession, Larmor frequency</li> <li>• net magnetization</li> <li>• nuclear magnetic resonance</li> <li>• Radiofrequency excitation and signal detection</li> <li>• Chemical Shift</li> <li>• Free Induction Decay</li> <li>• relaxation mechanisms</li> <li>• stages of a Spin-echo sequence</li> <li>• K-space</li> <li>• Relationship between TR and TE for T1W T2W and PD contrast</li> <li>• Basics of contrast in relation to tissue type</li> </ul> <p><b>Spatial Encoding</b></p> <ul style="list-style-type: none"> <li>• The effect of bipolar gradients on the magnetic field, precession frequency and spin phase</li> </ul>

- 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.

**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

Identify final timetabled piece of assessment (component and element)

**Component A**

% weighting between components A and B (Standard modules only)		<b>A:</b> 100%	<b>B:</b>																														
<b>First Sit</b>																																	
<b>Component A</b> (controlled conditions) <b>Description of each element</b>		<b>Element weighting</b> <b>(as % of component)</b>																															
1. Individual contribution to a wiki.		100 %																															
<b>Resit (further attendance at taught classes is not required)</b>																																	
<b>Component A</b> (controlled conditions) <b>Description of each element</b>		<b>Element weighting</b> <b>(as % of component)</b>																															
1. Individual contribution to a wiki.		100%																															
<b>Part 4: Teaching and Learning Methods</b>																																	
Learning Outcomes	On successful completion of this module students will be able to: <ul style="list-style-type: none"> <li>• Demonstrate a systematic understanding of the core physical principles of Magnetic Resonance Imaging (MRI) and the general relationships between anatomy, pathology and image appearances (Component A)</li> <li>• Demonstrate an in depth understanding of MRI safety, legislation and guidelines and how to apply these appropriately in a clinical setting. (Component A)</li> <li>• Critically evaluate the technical quality of MR images to determine errors and determine remedial action. (Component A)</li> <li>• Critically analyse a range of image reformatting and post processing technologies (Component A )</li> </ul>																																
Key Information Sets Information (KIS)	<table border="1"> <thead> <tr> <th colspan="5">Key Information Set - Module data</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </thead> <tbody> <tr> <td colspan="4">Number of credits for this module</td> <td style="border: 2px solid black; color: red;">15</td> </tr> <tr> <td>Hours to be allocated</td> <td>Scheduled learning and teaching study hours</td> <td>Independent study hours</td> <td>Placement study hours</td> <td>Allocated Hours</td> </tr> <tr> <td style="color: red;">150</td> <td style="color: red;">9</td> <td style="color: red;">141</td> <td style="color: red;">0</td> <td style="color: red;">150</td> </tr> <tr> <td colspan="4"></td> <td style="text-align: center;"></td> </tr> </tbody> </table>			Key Information Set - Module data										Number of credits for this module				15	Hours to be allocated	Scheduled learning and teaching study hours	Independent study hours	Placement study hours	Allocated Hours	150	9	141	0	150					
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Total Assessment	<p>The table below indicates as a percentage the total assessment of the module which constitutes a;</p> <p><b>Written Exam:</b> Unseen or open book written exam  <b>Coursework:</b> Written assignment or essay, report, dissertation, portfolio, project or in class test  <b>Practical Exam:</b> Oral Assessment and/or presentation, practical skills assessment, practical exam (i.e. an exam determining mastery of a technique)</p>																																

	Total assessment of the module:					
	Written exam assessment percentage				0%	
	Coursework assessment percentage				100%	
	Practical exam assessment percentage				0%	
				100%		
Reading List	<a href="https://uwe.rl.talis.com/lists/0E128B24-B1DC-8B34-1CFE-155FA92FF544.html">https://uwe.rl.talis.com/lists/0E128B24-B1DC-8B34-1CFE-155FA92FF544.html</a>					

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First CAP Approval Date	31 October 2017			
Revision CAP Approval Date		Version	1	<a href="#">Link to RIA 12383</a>