# Physics

## Radiology

<table>
<thead>
<tr>
<th>Credit Value of Unit 6</th>
<th>GLH of Unit 60</th>
<th>Level of Unit 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLH of Unit 60</td>
<td>60</td>
<td>3</td>
</tr>
</tbody>
</table>

### Learning Outcomes

<table>
<thead>
<tr>
<th>1</th>
<th>Understand the principles and practices involved in X-ray radiography</th>
<th>1.1 Explain key terminology used in radiography and the types of radiographic equipment available</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understand the principles and practices involved in X-ray radiography</td>
<td>1.2 Explain the process of radiography, how radiation is detected and how radiographic images are produced and processed</td>
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<tr>
<td>1</td>
<td>Understand the principles and practices involved in X-ray radiography</td>
<td>1.3 Explain how X-ray techniques are used in diagnosis</td>
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<tr>
<td>1</td>
<td>Understand the principles and practices involved in X-ray radiography</td>
<td>1.4 Describe how a CT scan can produce coronal and sagittal images of the body in two or three dimensions</td>
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<tr>
<td>2</td>
<td>Understand the principles and practices involved in Ultrasonography and MRI</td>
<td>2.1 Assess the applicability, benefits and limitations of ultra-sound imaging techniques and discuss their use in diagnosis</td>
</tr>
<tr>
<td>2</td>
<td>Understand the principles and practices involved in Ultrasonography and MRI</td>
<td>2.2 State the general principles involved in MRI and explain the benefits and limitations of the technique</td>
</tr>
<tr>
<td>3</td>
<td>Understand the procedures used in radiology and patient care</td>
<td>3.1 State the hazards associated with radiation and explain concepts and methods of radiation protection</td>
</tr>
<tr>
<td>3</td>
<td>Understand the procedures used in radiology and patient care</td>
<td>3.2 Calculate the effective radiation dose in a given case</td>
</tr>
<tr>
<td>3</td>
<td>Understand the procedures used in radiology and patient care</td>
<td>3.3 Explain relevant health risks to a patient</td>
</tr>
<tr>
<td>3</td>
<td>Understand the procedures used in radiology and patient care</td>
<td>3.4 Evaluate, for the patient and clinician, methods of: record keeping procedures, medical exposure control, radiation safety, infection control</td>
</tr>
</tbody>
</table>

### Assessment Methodology

A time constrained assignment.
## Grading of this unit

The following grade descriptors will be applied to the assessment of this unit:

1. Understanding of the subject
2. Application of knowledge
3. Application of skills
4. Communication and presentation
5. Quality

Please refer to the QAA Grade Descriptors for detail of the components of each descriptor.

### Indicative Content

**Radiation**
- the sub-atomic components of an atom.
- beta ($\beta$) and gamma ($\gamma$) radiation decay equations using a periodic table
- the mechanism of gamma ($\gamma$) rays indirect ionisation.
- characteristic radioactive decay curves and the "spin-spin" interaction.
- calculations of decay rates, values of half-lives and of half value thickness for absorption.
- the health hazards of using ionising radiation.

**Use of X-rays**
- labelling the structure of an x-ray tube.
- detecting and measuring radiation intensity via photographic film, via the ionising effect of radiation detected electronically and via scintillation caused by chemical fluorescence.
- suitable techniques of image processing for diagnostic and dosimetric evaluations.
- Comparing and contrasting the use of 2D tomography to computed 3D tomography.
- how the CT scan can produce coronal and sagittal images of the body.
- how CT scanning can be used in diagnosis.

**Use of Ultra-sound**
- sound waves and how they are reflected from an object.
- speed/time/distance calculations and acoustic impedance equations for ultrasound.
- the applicability, benefits and limitations of ultra-sonography techniques.
- the use of ultra-sonography to develop 3D images of baby tissue in a mother’s womb.

**Use of Magnetic Resonance Imaging**
- how strong magnetic fields can be used to align atomic nuclei.
- how radio waves can be used to disturb the axis of rotation of aligned atomic nuclei.
- the Larmor frequency for resonance induction utilising the gyromagnetic process.
- how the radio frequency emission generated by disturbed nuclei returning to their baseline states can be collected and used to generate an image.
- the effectiveness, benefits and limitations of using MRI.

**Safety and Procedures**
- assessing the health implications of using ionising radiation.
- methods of radiation safety and infection control for both the patient and the clinician.
- calculating the effective radiation dose for a patient in a given case.
- the health risks to a patient from undergoing treatment such as a CT scan.
- evaluation of methods for record keeping and procedures used for safety precautions.