B27FF Waves and Matter

**COURSE DETAILS**

**Course Code:** B27FF  
**Full Course Title:** Waves and Matter  
**SCQF Level:** 7  
**SCAF Credits:** 15  
**Available as Elective:** Yes

**DELIVERY LEVEL**

<table>
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<th>Undergraduate:</th>
<th>Yes</th>
<th>Postgraduate Taught:</th>
<th>No</th>
<th>Postgraduate Research:</th>
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**Additional Information:**

**COURSE AIMS**

To provide an understanding of the fundamentals of wave phenomena and its application to simple harmonic motion, sound and optics. The course aims are:

- To assist students towards an understanding of the use of mathematical models and techniques used for describing wave phenomena.
- To provide an understanding of wave-particle duality and foundations of quantum physics, the uncertainty principle, and the atomic model.
- To assist students towards an understanding of the use of mathematical models and quantitative description for describing wave-particle duality and quantum physics.
- To provide an understanding of molecular bonds, semiconductors and radiation.
- To assist students towards an understanding of the use of mathematical models and quantitative description for describing molecular bonds, semiconductors and radiation.
- To provide a history of the impact of modern physics.

**LEARNING OUTCOMES – SUBJECT MASTERY**

Students should be able to apply basic calculus to derive equations of simple wave phenomena.

Students should be able to understand and apply mathematical descriptions of physical processes and relationships relating to:

- Wave phenomena, optical interference, the photoelectric effect, the Bohr model of the atom, radiation and spectroscopy.  
- Students should be able to interpret a physical problem in wave phenomena and modern physics and formulate a solution to this problem using mathematical models where necessary.

**LEARNING OUTCOMES – PERSONAL ABILITIES**

Critically evaluate a problem, sketch a problem out, plan and organise their work, review and evaluate academic material, express and interpret physical models mathematically, and solve problems mathematically.

Take an interest in current developments and applications for the content material, make critical and evaluative comments,
B27FF Waves and Matter

think independently about the subject, appreciate the historical background of the subject.

Make effective use of online learning support materials, make use of tutorial support, organise study time in a way that allows them to meet coursework submission deadlines and prepare effectively for assessment.

SYLLABUS

- Simple Harmonic Motion
- Waves
- Superposition and Optical Waves
- Optics and Polarisation
- Interference in Optics
- Wave-Particle Duality
- The Atomic Model
- Quantum Physics
- Molecules and Condensed Matter
- Forces of Nature

Pre-requisite: Pass in Higher Physics (SCQF level 6) at grade B or better, or equivalent

COURSE RELATIONSHIPS

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<th>Course Code</th>
<th>Level</th>
<th>Title</th>
<th>School</th>
<th>Type</th>
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<td>7</td>
<td>Mechanics, Fields and Forces</td>
<td>School of Eng &amp; Physical Sci</td>
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LOCATION AND ASSESSMENT METHODS

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