**COURSE DETAILS**

**Course Code:** B27MW  
**Full Course Title:** Mechanics, Fields and Forces  
**SCQF Level:** 7  
**SCAF Credits:** 15  
**Available as Elective:** Yes

**DELIVERY LEVEL**

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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:**

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**COURSE AIMS**

To provide a basic understanding of the fundamentals of mechanics, dynamics, electrical and gravitational fields. The course aims are:

- To provide an understanding of the fundamentals of linear and rotational dynamics, including an introduction to special relativity.
- To develop the principles of dynamics by showing a wide range of applications in engineering and science.
- To assist students towards an understanding of the use of mathematical models and techniques used for describing kinematics and mechanics.
- To develop an understanding of gravitational, electric and magnetic fields, potentials and forces.
- To assist students towards an understanding of the use of mathematical models and techniques used for describing gravitational and electric fields.
- To provide an understanding of satellite and planetary motion and in the use of mathematical models to explain that motion.
- To provide a basic understanding of the principles of inductors and their application.

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**LEARNING OUTCOMES – SUBJECT MASTERY**

- Students should be able to apply basic calculus to derive equations of motion describing linear kinematics and rotational kinematics.
- Students should have an awareness of special relativity and the effects on the mass and energy of a moving object.
- Students should be able to understand and apply mathematical descriptions of physical processes and relationships relating to:
  - Linear dynamics, relativistic dynamics, rotational dynamics, gravitational fields and forces, electrical fields and forces, magnetic fields and forces.
- Students should be able to interpret a physical problem in mechanics, fields and forces and formulate a solution to this problem using mathematical models where necessary.

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**LEARNING OUTCOMES – PERSONAL ABILITIES**

Students should develop abilities to:

- 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, 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

- Kinematics
- Dynamics
- Rotation of Rigid Bodies
- Dynamics of Rotational Motion And Equilibrium
- Special Relativity
- Gravitational Forces And Fields
- Kepler's Laws And Black Holes
- Electric Forces, Fields and Potential
- Application Of Electric and Magnetic Fields
- Faradays Law and Induction

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

### COURSE RELATIONSHIPS

N/A

### LOCATION AND ASSESSMENT METHODS

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<tr>
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