B27MW Mechanics, Fields and Forces

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

DELIVERY LEVEL
Undergraduate: Yes
Postgraduate Taught: No
Postgraduate Research: No

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 provide and understating of gravitational, electric and magnetic fields, potentials and forces.
- To provide an understanding of the linkage between 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.

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.

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
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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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