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 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 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
- Faraday’s Law and Induction

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

COURSE RELATIONSHIPS

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LOCATION AND ASSESSMENT METHODS

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