PX161-10 Tutorial (Physics)

26/27

Department
Physics
Level
Undergraduate Level 1
Module leader
Michael Pounds
Credit value
10
Module duration
24 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This is a composite module made of 2 components: physics problems (5 credits) and five worksheets (5 credits). Problem solving forms a vital part of the learning process and therefore each lecturer issues a set of problems on their module which you are expected to make serious attempts to solve. A subset of these problems is marked for credit. These problems are discussed in the weekly Examples Classes.

Module web page

Module aims

To cover some background mathematical material assumed by other modules, to give experience of learning by self-study and to develop the habit of keeping up with the problem sheets handed out in physics modules.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Techniques: Revision of mathematics from A-level - mainly algebra, differentiation, integration and trigonometry

Worksheets

Complex Numbers: Their construction from the reals; norm, argument, real and imaginary parts; addition, subtraction, multiplication and division; the Argand diagram and geometric view of complex numbers. de Moivre's theorem, exponential representation of a complex number in terms of its norm and its argument.

Curve Sketching: Basic Functions: trigonometric, exponential, modulus. Odd/even functions. Limiting values, continuity, differentiability. L'Hopital's rule. Asymptotes and strategies for graph sketching.

Maths for Waves: Notation for partial derivatives. Examples of equations admitting wave-like solutions: wave equation, advection equation, traffic flow. Linear operators, principle of superposition. Boundary conditions, reflection and transmission coefficients. Plane waves, exponential form. Energy in waves. Wave groups, group velocity.

Integration along Lines, Surfaces and Volumes: Notation for integration of both scalar and vector quantities over lines, surfaces and volumes. Integration along lines using parameterised curves, circulation around a contour. Infinitesimal surface element as a vector in 3D, use to compute flux across a surface. Volume integrals and revision of the Jacobian.

Fourier Series: Revision of lectured material: definition of Fourier series, the coefficients, periodic extensions, Gibbs phenomenon. The complex form, Parseval's theorem. Functions on intervals of length 2L. Introduction to Fourier transforms as the limit of L -» infinity.

You should answer the questions on each of the worksheets and hand in your answers to your personal tutors as directed.

Weekly Problem Sheets:
You will be asked to hand in written answers to designated problems from the problem sheets and attempt designated problems from the Mastering Physics package.

Learning outcomes

By the end of the module, students should be able to:

- Demonstrate a facility with complex numbers, curve sketching, the mathematics used to model waves, integration and Fourier methods
- Prepare and submit pieces of work on a weekly basis
- Discuss questions arising out of their modules in small groups

Subject specific skills

Mathematical techniques, physics problem-solving

Transferable skills

Communication, group working, problem-solving, self-study

Study

Study time

Type	Required
Seminars	25 sessions of 1 hour (25%)
Tutorials	25 sessions of 1 hour (25%)
Private study	50 hours (50%)
Total	100 hours

Private study description

Studying material on worksheets, answering associated questions. Working on weekly problem sheets and computer problems

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A2

	Weighting	Study time	Eligible for self-certification
Assessment component			
Coursework Worksheets and examples sheets	100%		No
Reassessment component			
Exempt from reassessment. Learning Outcomes tested elsewhere.			No

	Weighting	Study time	Eligible for self-certification

Tutorial sessions cannot be rerun.

Feedback on assessment

Personal tutors and examples class tutors

Availability

Courses

This module is Core for:

- UPXA-F300 Undergraduate Physics (BSc)
  - Year 1 of F300 Physics
  - Year 1 of F300 Physics
  - Year 1 of F300 Physics
- UPXA-F303 Undergraduate Physics (MPhys)
  - Year 1 of F300 Physics
  - Year 1 of F303 Physics (MPhys)
  - Year 1 of F303 Physics (MPhys)
  - Year 1 of F303 Physics (MPhys)
- UPXA-F3F5 Undergraduate Physics with Astrophysics (BSc)
  - Year 1 of F3F5 Physics with Astrophysics
  - Year 1 of F3F5 Physics with Astrophysics
- Year 1 of UPXA-F3FA Undergraduate Physics with Astrophysics (MPhys)
- Year 1 of UPXA-F3N2 Undergraduate Physics with Business Studies