12998-342(8) Electromagnetism and Relativity (1½ ℓ, 1½ p)

2014

Course summary:

Polarisation and magnetisation of materials, electromagnetic waves and their transitions between different media. Theory of relativity.

Continuous assessment.

PP Physics 224, 254
P Mathematics 244

Outcomes of course:

This course prepares the student for more advanced applications of electromagnetism, particularly in a medium. The student is also equipped with a working knowledge of special relativity. This course forms the foundations of a number of more advanced courses in electromagnetism, optics, as well as advanced courses founded on relativity.

Lecturer:

Dr CM Steenkamp
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Course content:

Formal lectures
We will conduct a theoretical study of the effect of electric and magnetic fields on matter, due to the charges and magnetic dipole moments that exist in atoms. This is relevant to the understanding of magnetism, electricity and the propagation of light. We will use Maxwell's laws to describe light, especially the behaviour of light at the interface between different media (i.e. phenomena such as reflection and refraction). The study of electromagnetic waves on this level leads to the theory of special relativity. We will study the principles and a number interesting applications of Einstein's theory of special relativity.

Laboratory work
A demonstration of some of the optical phenomena discussed in the theory.

Practical (Tutorials):

The tutorials are learning opportunities during which the students enhance their understanding of the theory covered in the lectures by applying the theory to the exercises and problems provided. The lecturer is present for questions and informal discussions.

Study material:

DJ Griffiths ***"Introduction to Electrodynamics"*** 3 rd edition, Prentice Hall, London (1999) Notes

Learning opportunities:

Tutorials, self-study opportunities and demonstrations in optics.

Assessment:

Methods of Assessments
Continuous assessment is used.
Tests, homework and self-study projects all contribute to the final mark.

Venue and time of assessment opportunities
Details will be communicated to students at start of module.

Availability of marks:
1 Week after assessment.

Calculation of final mark for the module:
Self study assignments 20%
Homework assignments: 30%
Test 1: 25%
Test 2: 25%