

Course Title: Electromagnetism
Course Lecturer: Dr Gary Tupper
Course credits: 1
Lecturer contact hours: 24
Tutorial/practical hours: 6

1) Course overview:

A complete, self-contained course on electromagnetism. Material is aimed to be accessible to someone with first year physics background. Emphasis will be on aspects having relevance in astronomy/astrophysics.

2) Course breakdown/syllabus:

Tools of vector field calculus; Electrostatics; Magneto-statics; Electrodynamics; Energy & Momentum; Electromagnetic waves (vacuum); Sources & fields in electrodynamics; Electromagnetic radiation; Antennas; Effects of matter; Electromagnetic waves in matter; Refraction; Frequency dependence; Electromagnetic waves in plasmas; MHD primer; Radiative processes; Relativity and electrodynamics.

3) Resources:

PDFs of the lecture slides will be available. Reference texts are: D. J. Griffiths, *Introduction to Electrodynamics*; G. L. Pollack & D. R. Stump, *Electromagnetism*.

4) Breakdown of practicals/tutorials:

Problem solving in electromagnetism

5) Additional skills to be developed during the course:

Numerical problem solving/plotting

6) Assessment

6 tutorials: 50%

Final exam: 50%

NQF Level 8 (Honours) Descriptor Checklist

Descriptor	Course aspect/s matching descriptor
a) Scope of Knowledge:	<i>Tutorials/test/exam</i>

Student is able to demonstrate knowledge of and engagement in an area at the forefront of a field, discipline or practice; an understanding of the theories, research methodologies, methods and techniques relevant to the field, discipline or practice; and an understanding of how to apply such knowledge in a particular context.	
b) Knowledge literacy: Student is able to demonstrate the ability to interrogate multiple sources of knowledge in an area of specialisation and to evaluate knowledge and processes of knowledge production.	<i>Reading assignments</i>
c) Method and procedure: Student is able to demonstrate an understanding of the complexities and uncertainties of selecting, applying or transferring appropriate standard procedures, processes or techniques to unfamiliar problems in a specialised field, discipline or practice.	
d) Problem solving: Student is able to demonstrate the ability to use a range of specialised skills to identify, analyse and address complex or abstract problems drawing systematically on the body of knowledge and methods appropriate to a field, discipline or practice.	<i>Tutorials</i>
e) Ethics and professional practice: Student is able to demonstrate the ability to identify and address ethical issues based on critical reflection on the suitability of different ethical value systems to specific contexts.	
f) Accessing, processing and managing information: Student is able to demonstrate the ability to critically review information gathering, synthesis of data, evaluation and management processes in specialised contexts in order to develop creative responses to problems and issues.	
g) Producing and communicating information: Student is able to demonstrate the ability to present and communicate academic, professional or occupational ideas and texts effectively to a range of audiences, offering creative insights, rigorous interpretations and solutions to problems and issues appropriate to the context.	<i>Tutorial write-ups</i>
h) Context and systems: Student is able to demonstrate the ability to operate effectively within a system, or manage a system based on an understanding of the roles and relationships between elements within the system.	
i) Management of learning: Student is able to demonstrate the ability to apply, in a self-critical manner, learning strategies which effectively address his or her professional and ongoing learning needs and the professional and ongoing learning needs of others.	

j) Accountability: Student is able to demonstrate the ability to take full responsibility for his or her work, decision-making and use of resources, and full accountability for the decisions and actions of others where appropriate.	
--	--

Descriptors taken directly from “The South African Qualifications Authority: Level Descriptors for the South African National Qualifications Framework” document, November 2012.