

General Course Information

PHYS313 – 2026 S2

Advanced Electromagnetism and Materials

Second Semester

Professor Mike Reid (Course Coordinator)

Julius von Haast 616

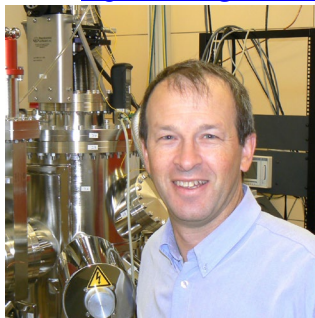
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General Physics and Astronomy Information

Please consult the document General Information for Physics and Astronomy Students

<https://static.canterbury.ac.nz/ucommunity/science/phys-chem/PHYS%20-%20Course%20Outlines/General.PDF>

Course Content

Electromagnetism. Mike Reid (Term 3)

- Development of the Maxwell equations in differential form.
- Propagation of electromagnetic waves in vacuum, dielectrics, and conducting media.
- Wave behaviour at dielectric and metallic interfaces.
- Production from radiating sources.

Advanced topics in modern Materials science. Roger Reeves (Term 4)

- Development of the electronic theory of solids.
- Band-structure calculations
- Band-structure engineering in quantum architectures.
- Advanced semiconductor physics including devices in modern opto-electronics.

Textbooks

There is no required textbook for PHYS313 but some that can assist you are:

Materials Science:

J.R. Hook and H.E. Hall, Solid State Physics.

Electromagnetism:

D.J. Griffiths, Introduction to Electrodynamics, Fourth Edition.

The course will cover most of Chapters 7-9 and will largely follow the notation of this book.

Assessment

20% Homework Assignments. There will be six homework assignments. Homework will be due approximately every two weeks, with the first assignment due in week 3.

Collaboration on assignments is allowed and encouraged. However, you remain responsible for understanding all work that you submit.

Credit for assignment work is conditional on a brief oral follow-up. When collecting your assignment, you will be asked to explain some of your answers. The purpose of this is to verify that you understand the solutions you have submitted. If you cannot demonstrate adequate understanding of a submitted answer, the mark for that question will be zero.

20% Test covering the first four weeks of the E&M section. In an Evening of Week 6. Date TBA. One hour.

60% Final Examination. Three Hours. Date TBA.

You must achieve 40% in the final exam to pass the course.

Generative AI tools cannot be used to answer the assignment questions

In this assessment, you are strictly prohibited from using generative artificial intelligence (AI) to generate any materials or content related to the assessment. This is because students are expected to solve problems and demonstrate knowledge and understanding without the assistance of AI. The use of AI-generated content is not permitted and may be considered a breach of academic integrity. Please ensure that all work submitted is the result of your own human knowledge, skills, and efforts.