School of Physics

Course Outline 2022

1. Staff

Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor	Rajib Rahman	rajib.rahman@unsw.edu.au	Please email lecturers only for urgent matters and arranging a consultation time. Questions about course related matters should be posted on the appropriate Moodle Discussion Forum	
Lecturer	Oleg Sushkov	sushkov@unsw.edu.au		
Laboratory Staff	Tamara Reztsova	t.reztsova@unsw.edu.au	Higher Year Lab 142 OMB	(02) 9385 4577

- Ohm’s law and electromotive force
- Electromagnetic Induction
- Kirchhoff ’s laws, Complex impedance
- Maxwell’s equations. Poynting’s vector.
- Skin effect, Foucault’s currents (Eddy currents).
- Vector potential and gauge invariance.
- Electromagnetic waves.
- Polarization of electromagnetic wave.
- Fresnel Eqs. for reflection/refraction.
- Radiation of electromagnetic waves.
- Retarded potentials.

Communication in a scientific/technical context
Collaborative and management skills Information literacy

2.4 Relationship between course and program learning outcomes and assessments

Course learning outcomes are assessed in the three assessment tasks. These assessments are largely of a critical-thinking nature designed to determine students' ability to deploy acquired knowledge to new situations, which is a key graduate attribute for successful university graduates.

3. Strategies and approaches to learning

3.1 Learning and teaching activities

Assumed Knowledge

Pre-requisite(s): PHYS1221 or PHYS1231 or PHYS1241, plus MATH2069 or MATH2011 or MATH2111

Timetable

Lectures: 1x 2hr plus 2x 1hr lectures per week (Weeks 1-5, 7-10)

Tutorial: 1hr per week (Weeks 1-5, 7-10)

Laboratory: 2 x 3hr per term

Lecture Timetable

Day	Time	Location	Weeks
Monday	10:00-12:00	OMB G31	1-2, 4-5, 7-10 (there will be no lecture on Monday Queen's Birthday)
Wednesday	9:00-10:00	OMB 230	1-5, 7-10
Thursday	11:00-12:00	OMB G31	1-5, 7-10

Lecture Information

Lecture: This course is taught by two lecturers teaching 18 hours each. Lectures will be recorded, so students are able to attend lectures online if they are unable to come to campus. Please see Moodle for more details.

Tutorial: Friday 9:00-10:00 in Keith Burrows Theatre, Weeks 1-5, 7-10. Tutorials will be run both face to face and online, so any students who cannot come to campus are still able to participate. Please see Moodle for more details.

Laboratory Information

Laboratory Information Two experiments need to be conducted during the term. The laboratory component o

Topic 10: Electric charge conservation. Maxwell's equations. Energy conservation and Poynting's vector. Maxwell's equations in dielectric matter: the linear approximation. Skin effect in a metal. Foucault's currents (= Eddy currents). Scalar and vector potentials, gauge transformation and gauge invariance, Maxwell's Eqs. written in terms of potentials.

Topic 11: Electromagnetic waves. Plane wave. Partial and full polarization. Polarization density matrix and Stokes parameters. Fresnel Eqs. For reflection/transmission.

Topic 12: Radiation of electromagnetic waves. Retarded potentials in Lorentz gauge. Spectral decomposition of retarded potentials. Fields in the wave zone (Far field). Radiated power. Electric dipole radiation (E1-radiation).

(Note: Chapter references to Griffiths 4th edition)

5. Assessment

5.1 Assessment tasks

Course assessment comprises assignments, in-session test, laboratory and final examination.

Assessment task	Length	Weight	Mark	Due date
Assessment 1: Assignment		20%		Wednesday 13th July (Week 7)
Assessment 2: Laboratory		20%		See above note regarding lab classes
Assessment 3: Final Exam	2 hours	60%		See Exam Schedule - TBA

Information about Special Consideration is available from

Marks will be deducted for late assignments, at a rate of 5% of the maximum possible mark for the assignment per day. A weekend will count as two days. An assignment submitted after the solutions have been posted will automatically receive 0%.

5.4. Feedback on assessment

Please see Moodle for details on how feedback will be provided for each assessment task

6. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage.[1] At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and plagiarism can be located at:

- The Current Students site student.unsw.edu.au/plagiarism, and
- The ELISE training site subjectguides.library.unsw.edu.au/elise

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: student.unsw.edu.au/conduct.

7. Readings and resources

Recommended Text:

Introduction to Electrodynamics, 4th Ed, David J Griffiths, ISBN-13 9780321856562, Pub. Pearson Education

Other reference textbooks on Electromagnetism used in this course:

"Foundations of Electromagnetic Theory" Reitz, Milford, & Christy, 4th Edition "Modern Electrodynamics", Andrew Zangwill.

Other Resources

The PHYS2114 lecture notes will be posted to Moodle. Additional resources such as articles, papers, websites, other published material will be referred to during lectures and listed at the Moodle site.

8. Administrative matters

Communications
Students should check their UNSW email account regularly as all official university communication will be sent to that address. Students should use their university email account when writing to UNSW staff and should always include their name and student number.

Health and Safety

[1] International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

The School of Physics is actively committed to the health, safety and welfare of its staff and students. Information on relevant UNSW Occupational Health and Safety policies and expectations is available at: www.ohs.unsw.edu.au and