



## UNSW Course Outline

# ZPEM1502 Physics 1B: Electromagnetism and Modern Physics - 2024

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## General Course Information

Course Code : ZPEM1502

Year : 2024

Term : Semester 2

Teaching Period : Z2

Is a multi-term course? : No

Faculty : UNSW Canberra

Academic Unit : UC Science

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : UNSW Canberra at ADFA

Campus : UNSW Canberra

Study Level : Undergraduate

Units of Credit : 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

Students will be introduced to some of the fundamentals of contemporary physics through a

selection of topics spanning important areas such as electromagnetism, optics, relativity, quantum physics, atomic and nuclear physics. The course includes a laboratory program relating to and supplementing the lecture material.

## Course Aims

Physics 1B is a 6 UOC course which develops physical principles that underpin your future studies in science. The course comprises 3 times 1-hour lectures designed for guidance, overview and conceptual learning, a 1 hour tutorial, for problem solving, and several laboratories arranged for the practical application of knowledge and concepts (spread out during the semester with about one every fortnight).

This course provides an introduction to the physics of charges, currents and fields; electromagnetism and light; and relativity, atoms and the nucleus. It underpins further study that should be taken as part of the Physics or Oceanography BSc major programs.

## Relationship to Other Courses

Physics 1B is a 6 UOC course in which many physical principles that underpin your future studies in science are developed. While in Physics 1A covered classical physics, largely that with roots in times from the Renaissance and back to ancient Greece, etc. Physics 1B has a focus on far more contemporary topics. Although electromagnetism is epitomised by Maxwell's equations which stem from the 1870's, our knowledge of the quantum nature of the world and relativity only started to take shape in the twentieth century.

This course provides an introduction to the physics of charges, currents and fields; electromagnetism and light; and relativity, atoms and the nucleus. It underpins further study as part of the Physics, Oceanography and Mathematics majors in the BSc.

## Course Learning Outcomes

Course Learning Outcomes
CL01 : Mastered the key concepts in the topic areas of electromagnetism, optics and modern physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.
CL02 : Demonstrate the ability to solve problems relating to electromagnetism, optics and modern physics readily and efficiently.
CL03 : Demonstrate experimental and practical skills, via the practice of logbook recording of measurements when conducting laboratory experiments. In addition develop skills in team work and scientific communication with peers.
CL04 : Develop an appreciation of how the basic Physics in the areas of electromagnetsim, optics and modern physics is intimately linked to the modern technological world.

Course Learning Outcomes	Assessment Item
CLO1 : Mastered the key concepts in the topic areas of electromagnetism, optics and modern physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.	<ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Class Test</li> <li>• Final one hour Examination</li> </ul>
CLO2 : Demonstrate the ability to solve problems relating to electromagnetism, optics and modern physics readily and efficiently.	<ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Class Test</li> <li>• Final one hour Examination</li> </ul>
CLO3 : Demonstrate experimental and practical skills, via the practice of logbook recording of measurements when conducting laboratory experiments. In addition develop skills in team work and scientific communication with peers.	<ul style="list-style-type: none"> <li>• 15-hours laboratory program</li> </ul>
CLO4 : Develop an appreciation of how the basic Physics in the areas of electromagnetsim, optics and modern physics is intimately linked to the modern technological world.	<ul style="list-style-type: none"> <li>• 15-hours laboratory program</li> <li>• Final one hour Examination</li> </ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360

## Learning and Teaching in this course

The course will be delivered using a blended learning style. In addition to frequent reference to the prescribed textbook, an extensive repository of online support is available, including sample questions with answers, illustrations, videos and interactive applets. In the course you will be directed to study appropriate pre-reading material and introductory exercises, and are expected to complete this work before scheduled classes on the material.

Following your preparation, tutorials are designed to allow you to develop your conceptual and problem-solving skills with tutor- and peer-support.

Lectures will give overviews, guidance, highlight important points of interest, and further illustrate the core material via demonstrations and interactive activities.

Laboratory activities are designed to foster experimental and practical skills, in addition to providing practical insight of the theory. The laboratory program thus runs in parallel with the

coursework, but it is not directly tied to it.

It is anticipated that all class components of this course, lectures, tutorials and laboratory, will be face to face. The online delivery will include video recording of lectures and a repository of the lecture slides tutorials and other problems etc. Enrolment in this course or participation in any activity that is recorded constitutes consent to be recorded during tutorial and other teaching sessions. The day to day flow of information, both technical and administrative will be largely based on content and activities accessed via the online learning management system, Moodle.

This is a 6 UoC course, for which the University expects 150 to 180 hours of work, during both the intensive and post-intensive phases. This means students are expected to complete a considerable amount of time on their studies outside of classes, principally reviewing content, mastering problems and in laboratory preparation.

## Additional Course Information

### The Learning Management System

Moodle is the Learning Management System used across all of UNSW. *All courses have a Moodle site which will become available to students at least one week before the start of semester.*

## Assessments

### Assessment Structure

Assessment Item	Weight	Relevant Dates
15-hours laboratory program Assessment Format: Individual	20%	Start Date: week 2 of semester Due Date: Not Applicable
Quizzes Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: Not Applicable
Class Test Assessment Format: Individual	15%	Start Date: 22/08/2024 01:10 PM Due Date: 22/08/2024 02:00 PM
Final one hour Examination Assessment Format: Individual	40%	Start Date: TBA Due Date: TBA

## Assessment Details

### 15-hours laboratory program

#### Course Learning Outcomes

- CL03 : Demonstrate experimental and practical skills, via the practice of logbook recording

of measurements when conducting laboratory experiments. In addition develop skills in team work and scientific communication with peers.

- CL04 : Develop an appreciation of how the basic Physics in the areas of electromagnetsim, optics and modern physics is intimately linked to the modern technological world.

#### **Detailed Assessment Description**

The laboratory program counting 20% towards the final course mark, is considered a very important component of any study in physics as it provides students with physics insight into topics discussed in lectures. Each student should complete 8 x 2 hour lab classes with a short proformer lab report to be completed during the class. For each of the laboratory activities there is also an online (Moodle) prelab exercise which should be completed prior to the relevant laboratory class. Each prelab quiz contibutes to a total of 5% (out of the 20%) for lab. The remaining 15% is based on the best 7 out of 8 lab reports.

The lab schedule for each timetable group varies depending on opetational requirements, public holidays etc. so students need to consult the detail Phsyics 1B lab schedule on Moodle to determine the specific weeks for lab attendance.

#### **Assessment Length**

8 classes of 2 hours

#### **Submission notes**

Pre-lab quizzes to be completed before lab class. Lab reports due at end of each class.

#### **Assessment information**

For the lab schedule and other details information about laboratory including pre-lab reading and quizzes and lab scripts please refer to laboratory folders on Moodle.

#### **Assignment submission Turnitin type**

Not Applicable

### **Quizzes**

#### **Assessment Overview**

Short quizzes (5 quizzes, 5% each) to be held approximately every 2 weeks, so the instructor can determine to what degree the students are keeping up with course material.

#### **Course Learning Outcomes**

- CL01 : Mastered the key concepts in the topic areas of electromagnetism, optics and modern physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.

- CL02 : Demonstrate the ability to solve problems relating to electromagnetism, optics and modern physics readily and efficiently.

#### **Assessment Length**

3 quizzes each done in a lecture period.

#### **Submission notes**

In class quizzes handed in on paper at end of the class periods, respectively.

#### **Assignment submission Turnitin type**

Not Applicable

### **Class Test**

#### **Assessment Overview**

One class test to be held before mid-way through semester.

#### **Course Learning Outcomes**

- CL01 : Mastered the key concepts in the topic areas of electromagnetism, optics and modern physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.
- CL02 : Demonstrate the ability to solve problems relating to electromagnetism, optics and modern physics readily and efficiently.

#### **Detailed Assessment Description**

A class test worth 15% on the electromagnetism section of the course will be held in the lecture period on 22 August. This Test will be paper based and 50 minutes in duration. Allowed test materials are a non-programmable calculator (Casio FXAu or equivalent) and a single double sided A4 sheet of handwritten notes. Further information will be made available on Moodle.

#### **Assessment Length**

50 mins (one lecture period).

#### **Submission notes**

Hand in a end of class.

#### **Assessment information**

Additional information on format and content will be posted on Moodle.

#### **Assignment submission Turnitin type**

Not Applicable

# Final one hour Examination

## Assessment Overview

Not specified

## Course Learning Outcomes

- CL01 : Mastered the key concepts in the topic areas of electromagnetism, optics and modern physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.
- CL02 : Demonstrate the ability to solve problems relating to electromagnetism, optics and modern physics readily and efficiently.
- CL04 : Develop an appreciation of how the basic Physics in the areas of electromagnetism, optics and modern physics is intimately linked to the modern technological world.

## Detailed Assessment Description

2-hour final invigilated exam worth 30% to be held in the examination period. This exam will be paper based, read from paper question sheets and written in exam booklets. Non-programable scientific calculators (Casio FXAU or equiv.) and a single double sided sheet of handwritten notes (plus pens and pencils and rulers) are the allowed aides. Some formulae and data sheets will be provided with the question paper.

The exam will cover the entire course but with more focus on the second half of the course (that content not assessed in the class test).

## Assessment Length

2 hour paper

## Submission notes

Complete during set exam time.

## Assessment information

Detailed information on format and coverage of the exam will be posted on Moodle.

## Assignment submission Turnitin type

Not Applicable

# General Assessment Information

Quizzes and the test will be during scheduled lecture periods and conducted in the lecture room (unless notified otherwise). All quizzes and the test will require students to demonstrate their ability to solve physics problems via conceptual reasoning, algebraic manipulation, graphical

interpretation and numerical calculation.

Note that all marks issued during the session are provisional, and may be subject to change. The only official mark is the final course mark, issued by the University after the examination period.

It is also prohibited to use any software or service to search for or generate information or answers in this course, either in tests or lab reports. If its use is detected, it will be regarded as serious academic misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion.

### Grading Basis

Standard

### Requirements to pass course

The assessment for the course has been designed so that an overall mark of 50% or greater indicates that the student has unambiguously demonstrated satisfactory completion of each learning outcome. For this reason, and consistent with the UNSW policy of abolishing the Pass Conceded grade, students who receive less than 50% overall for the course will receive a fail grade.

**Missed Assessment:** Students who miss assessment tasks must contact the appropriate academic (course coordinator or lecturer in charge of quiz) at the earliest practicable date to discuss the absence. If the student provides written evidence of the reason for their absence (e.g. a medical certificate, or a note from a Divisional Officer explaining why the absence was necessary), and if the reason for the absence is deemed acceptable, an alternative assessment date will be arranged. Otherwise, a mark of zero will be awarded for that task. When absences are foreseeable, students must advise the relevant academic in advance of the absence, and seek formal approval for the absence. In most circumstances of missed assessment, a formal application for special consideration may be appropriate.

## Course Schedule

### Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings. Students are indeed expected to attend all lectures, tutorials, laboratory sessions and assessments unless their absence has been approved by the course coordinator. Students who have missed assessments or a laboratory, or expect to miss such a requirement, must inform the course coordinator by email at the earliest practicable date:

In typical circumstances of missed assessments, a formal application for Special Consideration via the prescribed University procedure may be appropriate. Alternative assessment can then be arranged. Otherwise, in the case of absence a mark of zero will be awarded for the assessment. Further information is available under 'assessments'.

## General Schedule Information

Course Schedule (lectures, tutorials and quizzes)

Wk#	Starts on	Mon lecture	Tues lecture	Thurs lecture	Tuts (Fri)
1	15 Jul	Intro	E-1	E-2	ET1
2	22 Jul	E-3	E-4	E-5	ET2
3	29 Jul	E-6	E-7	Quiz #1	ET3
4	5 Aug	E-8	E-9	E-10	ET4
5	12 Aug	E-11	Lost (Fri)	E-12	ET5
6	19 Aug	E-14	E-15	Test	No classes
Mid-Semester Break					
7	9 Sep	ET6	L-1	L-2	LT1
8	16 Sep	L-3	L-4	L-5	LT2
9	23 Sep	L-6	L-7	Quiz #2	LT3
10	30 Sep	L-8	Q-1	Q-2	QT1*
11	9 Oct	Public hol.	Q-3	Q-4	QT2
12	16 Oct	Q-5	Q-6	Quiz #3	QT3
13	23 Oct	Q-7	Q-8	Q-9	QT4

\*Tutorial QT1 will include content on relativity.

E: Electromagnetism; 16 lectures and 6 tutorials, covering material from chapters 21-26 and

28-32 of Halliday's.

L: Light and relativity, 8 lectures and 3.5 tutorials, covering material from chapters 33, 35-37 of Halliday's.

Q: Quantum, atomic and nuclear physics, 9 lectures and 3.5 tutorials 38-40 and 42-43 of Halliday's.

Quiz #1: will cover lectures Intro through E-6 and will be worth 8.33%

Test: will cover lectures E-1 through E-13 and will be worth 15%

Quiz #2: will cover lectures E-14 through L-5 and will be worth 8.33%

Quiz #3: will cover lectures L-6 through Q-5 and will be worth 8.33%

Laboratory: There will be 8 laboratory classes, (first of which will be in semester week 2 in the timeslot allocated by your UNSW timetable). Weeks and days for all 8 scheduled classes will be detailed in the laboratory schedule on Moodle.

## Course Resources

### Prescribed Resources

#### Resources for Students

The prescribed textbook is Halliday's *Fundamentals of Physics*, 1<sup>st</sup> Australian/NZ Edition, by Jearl Walker, published by Wiley. Companion online material is available to those who have purchased access to the text. This is the same text as used in Physics 1A.

A specific calculator without stored memory is prescribed for this course: the Casio *fx-82 AU*. Only this type of calculator will be allowed in tests and the exam.

Other useful reference material, such as lecture slides, tutorial questions and solutions, and study guides, will be distributed through Moodle.

### Recommended Resources

Be sure to make use of the PSP and other questions, in addition to the tutorial and lecture examples.

In addition to the recommended textbook, a number of other equally good introductory University Physics texts are available in the academy library and the in level 1 Physics labs. There are many useful online resources available to, so long as the viewer is discerning.

### Physics Support Program (PSP)

Students whose performance in the course is of concern are mandated to engage in extra support. The aim of the PSP is to provide these students with extra assistance in problem-solving and general mastery of the course content.

Others may seek to participate in these additional help sessions by enrolling.

## Course Evaluation and Development

Student evaluative feedback on this course is gathered via UNSW MyExperience, Science student staff liaison meetings and, most importantly, direct informal discussions between students and staff. Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback.

***Important note:** Students are reminded that any feedback provided should be constructive and professional and that they are bound by the Student Code of Conduct Policy*

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Wayne Hutchison		Room G22, Building 26	VOIP: 02 5114 5040	Most days during normal working hours; by appointment to be sure.	No	Yes
Lecturer	Warrick Lawson		Room 136, Building 26	VOIP: 02 5114 5233	Via email or appointment	No	No