PHYS143

Physics IB

S1 Day 2019

Dept of Physics and Astronomy

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General Information

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Unit convenor, Lecturer and Laboratory Convener
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By appointment

PHYS100-level Laboratory Manager
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Tutor
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Credit points
3

Prerequisites
PHYS140

Corequisites

Co-badged status

Unit description

This unit, following on from PHYS140, provides an overview of physics, covering a broad range of topics suitable for engineering students or those majoring in any of the sciences. This unit completes the theory of electromagnetism studying the origin and effects of magnetic fields and electromagnetic induction, and describes oscillations and waves including light. The unit then moves on to look at some of the theories of modern physics that influence the way that we view the natural world, and the fundamental laws that govern it. An introduction is given to molecular kinetic theory and the important universal laws of thermodynamics, the latter valid for everything from the boiling of a kettle to exploding black holes. Einstein's theory of special relativity and its counter-intuitive views on space and time, the uncertain world of quantum physics, and what the latter tells us about the structure of atoms and nuclei, conclude the unit. Regular guided laboratory work enables students to develop experimental skills, investigating the phenomena discussed in the lectures, using modern techniques in a well-equipped laboratory.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Students will be able to explain Physics concepts, within the topics listed in the unit guide, in terms of their underlying physical principles, and describe them in terms of concise mathematical models.

Students will be able to analyse the description of a physical problem, be able to break the problem into component parts relating to different areas of physics, identify known quantities and apply mathematical models to arrive at a numerical value for an unknown quantity.

Students will be able to analyse real-world problems, be able to develop physical problems based on this analysis, and interpret how numerical results relate to the physical world.

Students will be able to record experimental data, display data graphically, analyse data, and present their conclusions in a clear, concise, and systematic manner.

Students will be able to identify sources of uncertainty in physical measurements, be able to propagate these uncertainties through calculations, and express results in a meaningful way.

Students start to acquire the skills required to investigate real-world problems, and interpret how numerical data and predictions relate to the physical world.

General Assessment Information

In order to pass PHYS143, students must acheive an overall grade of at least 50%, as well as passing all hurdles.

Assessment Tasks

Name	Weighting	Hurdle	Due
Weekly tutorial participation	0%	Yes	Full tutorial each week
Tutorial Quiz	20%	No	during each tutorial class
Laboratory sessions	25%	Yes	During each lab class
Looking deeper into magnetism	15%	No	Week 9 and week 11
Final exam	40%	Yes	Exam Period

Weekly tutorial participation

Due: **Full tutorial each week**
Weighting: **0%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Students must participate meaningfully and actively in at least 10 tutorials, including submitting the quiz for that tutorial and completing a Learning and evaluation form each week.

The tutorial material will usually build on concepts that were presented in the previous lectures.**Students should prepare for tutorials by reading the relevant sections of the textbook (see iLearn and/or lecture slides), attending the lectures (strongly preferred) or watching them online, and completing any homework.** The tutorial materials will be made available on ilearn in advance and you may wish to attempt the questions prior to the tutorials. Solutions to the tutorial questions will be posted on iLearn at the end of each week.

On successful completion you will be able to:

- Students will be able to explain Physics concepts, within the topics listed in the unit guide, in terms of their underlying physical principles, and describe them in terms of concise mathematical models.
- Students will be able to analyse the description of a physical problem, be able to break the problem into component parts relating to different areas of physics, identify known quantities and apply mathematical models to arrive at a numerical value for an unknown

quantity.

- Students will be able to analyse real-world problems, be able to develop physical problems based on this analysis, and interpret how numerical results relate to the physical world.
- Students start to acquire the skills required to investigate real-world problems, and interpret how numerical data and predictions relate to the physical world.

Tutorial Quiz

Due: **during each tutorial class**
Weighting: **20%**

There will be a marked quiz of approximately 15 minutes duration in each tutorial from week 1 to week 13. Typically the tests will comprise questions based on material covered in lectures and tutorials. The quiz is closed book. The Quiz in week 1 is for practice and will not be marked. The other quizzes will be marked and returned to you. Your quiz marks will contribute to your marks for the unit. If you have missed your scheduled tutorial quiz, due to unavoidable circumstances, you should apply for special consideration.

Please bring a suitable (non-programmable) scientific calculator to all tutorials. Mobile phones may not be used.The final exam will also require the use of scientific calculators.

Students should have prepared for the quiz by reviewing the work covered in the previous tutorial, by reading the relevant sections of the textbook, and reviewing the material presented in the lectures preceding the previous tutorial.

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- Students will be able to analyse real-world problems, be able to develop physical problems based on this analysis, and interpret how numerical results relate to the physical world.
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Laboratory sessions

Due: **During each lab class**

Weighting: **25%**

This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Satisfactory completion of laboratories is a **hurdle requirement.** You **must** attend **all ten** laboratory sessions. The **first lab session is in WEEK 1** and includes work health and safety information. Students may also be assigned to lab groups and computer access will be checked. It needs to be attended by all students regardless of whether this is their first Physics unit or not. It will be a little bit shorter than the other sessions, but attendance is absolutely mandatory – you can't do subsequent lab sessions if they don't attend the introductory one. The **next 9 lab sessions** involve experimental work and will be assessed. **You must obtain a mark of at least 40% for each of the laboratory sessions in order to pass the unit.**

Preparation is required for each of the lab sessions 2-10. You will find the **Prelab activities** in the Laboratory Resources section of iLearn. Your prelab work will account for some of the marks for each laboratory session.

If you miss a session or fail to achieve at least 40% for any lab session, you must complete a **"Request to schedule a Catch-up laboratory session"** form, which can be found on iLearn. Read the sections below for full details about catch up classes and when they are scheduled. **No more than 3 catch ups are allowed for missed labs/lab hurdles**, except where Special Consideration has been approved. If you fail to attend a catch-up class then that will count as one of the 3.

Laboratory catch-up classes will be held during the mid-semester break and in week 13. The dates and times of the catch up classes will be advertised on iLearn.

On successful completion you will be able to:

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- Students will be able to record experimental data, display data graphically, analyse data, and present their conclusions in a clear, concise, and systematic manner.
- Students will be able to identify sources of uncertainty in physical measurements, be able to propagate these uncertainties through calculations, and express results in a meaningful way.
- Students start to acquire the skills required to investigate real-world problems, and interpret how numerical data and predictions relate to the physical world.

Looking deeper into magnetism

Due: **Week 9 and week 11**
Weighting: **15%**

The applications of magnetic fields and magnetic forces are expanding every year. This project will give you an opportunity to work within a group to explore aspects of magnetism that relate to contemporary applications. Students are expected to increase their understanding of magnetism by relating what they have learnt in class to the topic they explore.

A list of topics for will be given out in week 4. Students will be asked to form groups of 3-4, and will choose their topic by week 5. Students will be asked to make a 5 minute video that explores their selected topic. The video will be graded based on the content and clarity of their presentation and not on their skills at video recording. Groups will be asked to upload their video to iLearn.by the end of week 9. The video presentations will be made available to all students in the class, and students will be asked to critique the work of other groups. This part of the assessment will be due in week 11. Full details about the project, including marking guidelines will be posted on iLearn and students will have the opportunity to discuss their progress during a tutorial,

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Final exam

Due: **Exam Period**
Weighting: **40%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable (a link will be posted on iLearn).

The final examination will be three hours long and will cover all content in the unit.The examination is closed book. A resource sheet of relevant equations and physical constants will be provided. The use of calculators in examinations for this unit is permitted but, in accordance with the Science Faculty's policy, calculators *with a full alphabet* on the keyboard
are not allowed.

The final examination is a hurdle requirement. You must obtain a mark of at least 40% in the final exam to be eligible to pass the unit. If your mark in the final examination is between 30% and 39% inclusive, you may be a given a second and final chance to attain the required level of performance; the mark awarded for the second exam towards your final unit mark will be capped at 40%, and you will be allowed to sit the second exam only if this mark would be sufficient to pass the unit overall.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the week of July 15-26 2019. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

If you are given a second opportunity to sit the final examination as a result of failing to meet the minimum mark required, you will be offered that chance during the same supplementary examination period and will be notified of the exact day and time after the publication of final results for the unit.

On successful completion you will be able to:

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Delivery and Resources

General Information

Important instructions and Study materials are hosted on the iLearn webpage for the unit as are all announcements http://ilearn.mq.edu.au Please refer to it frequently!

Asking for help

A number of people can assist students while they undertake PHYS143. For any inquiry please use this e-mail address:

PHYS143@mq.edu.au instead of using people's personal e-mails. This will insure that the best answer to your question is obtained.

Unit textbook and textbook resources

The textbook for this unit is "Fundamentals of Physics" by Halliday, Resnick, & Walker, Extended 10th edition. It is essential that you obtain a copy (digital or physical) of this textbook, as we will be following it closely and you will find it an invaluable resource. The same textbook is used for

PHYS140 and PHYS143.

Print versions of the textbook are available from the CoOp bookshop (hard- and soft-cover) and digital options are available through http://au.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002531.html . Students may also wish to sign up to the Wiley Plus website to make use of the extended learning resources available there - including interactive problem solving resources.

FANTASTIC NEWS! The Library has purchased a 3 user access license to **Fundamentals Of Physics Extended 10th ed.** It is recommended that you access the book online by clicking on this link. Click and identify portion(s) of the book you require. Then click on to print/save to PDF a reasonable portion of the book. Note: printing allowances refresh after 24 hours. **Promptly close the browser to exit the eBook. By doing this, you free up the title for other students**. For more information, please see our libguide, eBooks@Macquarie .

Technology

Audio recordings and copies of slides from lectures will be available in iLearn through the Echo360 system. By virtue of the activities that occur in a physics lecture (demonstrations, problem solving) making use of these resources is not equivalent to attending. These resources are good for review and revision.

The use of calculators in the laboratory classes, when completing quizzes, in the in-session exam and in the final examination for this unit is usually necessary. In accordance with the Science Faculty's policy, calculators *with a full alphabet* on the keyboard are not allowed in the quizzes, in-session exam or the final examination.

Personal electronic devices such as smart phones, tablets, or laptops will be used for self assessment quizzes and other learning enhancement classroom activities.

Lectures, tutorials and laboratory sessions

This unit consists of three different formal types of activity:

1. Lectures, in which new material is presented, discussed and illustrated by examples and demonstrations.

Attending lectures is an important part of studying physics since it allows you to gain an insight into the subject matter that reading the textbook alone cannot provide. The lecturers can explain the concepts from several points of view, can point out and explain the most important aspects of the material and, very importantly, can illustrate the relationships and connections between the different concepts that are studied in PHYS143 – no subject in physics stands on its own.

2. Weekly tutorials

In tutorials examples illustrating the material are presented for discussion (with fellow classmates and tutors) and problem-solving methods are practised. Each tutorial will include a 15 minute quiz, based on the content covered in the previous tutorial. Tutorials form an important learning component of PHYS143 and are therefore compulsory. **We require effective participation in tutorials, entailing a focused work effort and attendance for the full session. If you do not participate effectively in a given week, for example arriving late or leaving the tutorial early without extenuating circumstances, you will be deemed not to have participated,**

and this will be grounds for receiving a score of zero for that week's quiz.

Students are expected to prepare for tutorials by reading the textbook, attending (or listening to) lectures and completing any homework given, prior to attending their tutorial.

3. Laboratory sessions

The laboratory component is an essential component of your studies and so counts for an appreciable fraction of your final assessment. You will be introduced to some of the basic skills and techniques required of practicing physicists, scientists and engineers. **You will be issued with a Laboratory Notebook in week 1,** provided with instructional material in the form of **Laboratory Notes** which can be found in the Laboratory Resources section of iLearn, and assisted in the laboratory by a team of demonstrators. For each laboratory session, except in week 1, you are required to complete some preparatory work (**Pre-Lab**) before attending your nominated Lab session. To figure out which Prelab to do, please consult the **Laboratory Schedule** on iLearn.

Location: The PHYS143 laboratory is located on level 2 of **building 14 SCO (formerly E7B), room 254.**

Laboratory Safety: You are required to follow all safety guidelines given in the first Lab session, your lab notes, and the lab staff. Food and drink cannot be consumed and students without suitable covered footwear will be refused admission.

Unit Schedule

Lectures:

A more detailed week-by-week schedule will be placed on iLearn. The unit is taught in two halves:

Waves, Magnetic Fields and Induction, Light: will be taught by Dr Cormac Purcell in Weeks 1-6: Chapters 16, 17, 32-36 of Fundamentals of Physics (Extended 10th edition)

Heat & Thermodynamics, Modern Physics: will be taught by Prof Helen Pask in weeks 7-13. Chapters 18-19, 37-38, 42-43 of Fundamentals of Physics (Extended 10th edition)

Lecture times are Monday 1-2pm and Tuesday 1-2pm, and students are strongly encouraged to attend in person.

Laboratory sessions:

Each student will attend 10, 3-hour long laboratory sessions, starting in week 1.

Tutorials:

Each student will attend 13, 2-hour long tutorials, starting in week 1.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and

Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Undergraduate students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Students will be able to explain Physics concepts, within the topics listed in the unit guide, in terms of their underlying physical principles, and describe them in terms of concise mathematical models.
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- Students will be able to analyse real-world problems, be able to develop physical problems based on this analysis, and interpret how numerical results relate to the physical world.
- Students will be able to identify sources of uncertainty in physical measurements, be able to propagate these uncertainties through calculations, and express results in a meaningful way.
- Students start to acquire the skills required to investigate real-world problems, and interpret how numerical data and predictions relate to the physical world.

Assessment tasks

- Weekly tutorial participation
- Laboratory sessions
- Looking deeper into magnetism

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

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- Students will be able to explain Physics concepts, within the topics listed in the unit guide, in terms of their underlying physical principles, and describe them in terms of concise mathematical models.
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Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

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Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

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Assessment tasks

- Weekly tutorial participation
- Tutorial Quiz
- Laboratory sessions
- Looking deeper into magnetism
- Final exam

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

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Assessment tasks

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- Laboratory sessions
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- Final exam

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

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Learning outcomes

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- Students start to acquire the skills required to investigate real-world problems, and interpret how numerical data and predictions relate to the physical world.

Assessment tasks

- Weekly tutorial participation
- Tutorial Quiz
- Laboratory sessions
- Looking deeper into magnetism

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

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Learning outcomes

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Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- Students will be able to analyse real-world problems, be able to develop physical problems based on this analysis, and interpret how numerical results relate to the physical world.
- Students will be able to record experimental data, display data graphically, analyse data, and present their conclusions in a clear, concise, and systematic manner.

Assessment tasks

- Weekly tutorial participation
- Laboratory sessions

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- Students will be able to analyse real-world problems, be able to develop physical problems based on this analysis, and interpret how numerical results relate to the physical world.

Assessment tasks

- Weekly tutorial participation
- Laboratory sessions