PHYS130

Foundations of Physics

S2 Day 2017

Dept of Physics and Astronomy

Contents

General Information

Unit convenor and teaching staff
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Credit points
3

Prerequisites
MATH130 or HSC Mathematics Band 4

Corequisites

Co-badged status

Unit description
This unit is an introduction to basic physics for students who did not take HSC physics or who need to improve their understanding and facility in physics before progressing to more advanced physics units (either PHYS140/PHYS143 or PHYS106/PHYS107). The unit provides an introduction to the techniques by which the basic physical phenomena of our world and universe are described and understood. The material covers the concepts of vectors and the description of motion using Newton's Laws, electrical and magnetic forces and phenomena, elementary atomic structure and introductory quantum physics. A mathematical approach to physics is central but the content is covered without the use of calculus in preparation for further 100-level units which do use calculus. An emphasis is placed on developing problem-solving skills by which physical problems are mapped to mathematical representations which can then be solved to understand the system. These skills include the development of abilities in interpreting visual representations of physical data.

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 concerning mechanics and electricity in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.
Students will understand how real-world problems can be interpreted by physical models.

General Assessment Information

Macquarie University uses a standards-based assessment system.This unit has a hurdle requirement, specifying a minimum standard that must be attained in an aspect of the unit. To pass this unit you must obtain a mark of at least:

50% in the unit overall

as well as

at least 40% in the final examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Tutorial quizzes	40%	No	Tutorial class
Final Examination	40%	Yes	See Examination Timetable
Group project	20%	No	weeks 10 and 11

Tutorial quizzes

Due: **Tutorial class**
Weighting: **40%**

During each tutorial, in weeks 2-13, you will work on a set of *assigned problems* based on that week's lecture topics. The week following, in your registered tutorial class, you will complete a quiz based on these assigned problems. These quizzes will be marked and returned with feedback. The weighted average of your best 8 quiz scores will contribute a total of 40% to your

final mark.

In weeks 2,3,5,6,8,9,11,12 you will do a mini-quiz for 10 minutes out of 5 marks. In weeks 4,7, 10, 13 you will do a major quiz for 20 minutes worth 10 marks with more challenging questions.

On successful completion you will be able to:

- Students will be able to explain Physics concepts concerning mechanics and electricity in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.

Final Examination

Due: **See Examination Timetable**
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 the final examination at the time and place designated in the University examination timetable (http://www.timetables.mq.edu.au/exam/). The timetable will be available in draft form approximately eight weeks before the commencement of examinations and in final form approximately four weeks before the commencement of examinations.

If you apply for Disruption to Study for your final examination, you must make yourself available for the week of December 11 – 15, 2017. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

The use of calculators in examinations for this unit is permitted but, in accordance with the Faculty policy, calculators *with a full alphabet* on the keyboard are not allowed.

The final examination will have a 2 hour duration, and is worth 40 % of the final mark for the unit.

Satisfactory performance in the final examination is a hurdle requirement. You must obtain a mark of at least 40% in the final examination to pass the unit. If your mark in the final examination is between 30% and 39% inclusive, then you will be offered a second and final chance to attain the required level of performance.

On successful completion you will be able to:

- Students will be able to explain Physics concepts concerning mechanics and electricity

in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.

Group project

Due: **weeks 10 and 11**
Weighting: **20%**

The purpose of the group project is to stimulate students to learn how to apply the physics within the unit to real world situations that occur in everyday life. Students (in groups of 3 or 4), will work in collaboration with the lecturers to identify a suitable “explorer project” whose physical operation is closely related to one or more of the topics covered in the unit. The group will research this explorer project, either through a basic construction/exploration, or via pre-constructed equipment available within the Department, or via a computer simulation. Each student will write a short report explaining how their explorer project demonstrates some of the physical principles taught in the unit. Each group will make a 10-minute presentation to the class based on their analysis during weeks 8 and 9 of the semester. Further details will be available during the semester. Each student's individual report will be 10% of their final mark, and the group presentation will be 10% of the final mark. In total, the group project is worth 20% of the final mark.

On successful completion you will be able to:
- Students will be able to explain Physics concepts concerning mechanics and electricity in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.
- Students will understand how real-world problems can be interpreted by physical models.

Delivery and Resources

Unit Resources

Khan Academy. www.khanacademy.org

Unit Reference

An additional reference for this unit is "Fundamentals of Physics" by Halliday, Resnick, & Walker, Extended 10th edition. This is the textbook for PHYS140 and PHYS143. Print versions are available from the Co-Op bookshop and digital options are available through http://au.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002531.html .

Technology

Audio recordings and copies of slides from lectures will be available in iLearn through the Echo360 system. Because we do demonstrations and problem solving in our physics lectures, we recommend that you attend the lectures. The online resources are good for review and revision.

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

Lectures and Tutorials

This unit consists of two 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. 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 in this unit.

2. Weekly tutorials, in which examples illustrating the material are presented for discussion (with fellow classmates and tutors) and problem-solving methods are practised. Tutorials form an important learning component of PHYS130. During tutorials in weeks 2-13, we will hold quizzes, based on the assigned problems issued the previous week.

Lecture and tutorial times - See your timetable.

Information

Study material is hosted on the iLearn webpage for the unit http://ilearn.mq.edu.au

Unit Schedule

A more detailed week-by-week schedule will be placed on iLearn, however the basic format of the unit is that it is taught in two halves:

• Mechanics, Prof Jason Twamley, Weeks 1-6:

• Electricity, Prof Judith Dawes, Weeks 7-12:

Week 13- revision.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/student_conduct/

Results

Results shown in *iLearn*, 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.

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

Numeracy Centre

The numeracy centre is located in E7B G.88, and offers one-on-one or small class assistance

with mathematics and statistics. Students are welcome to attend the drop-in centre or specially organised workshops.

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

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 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 with appropriate units.
- Students will understand how real-world problems can be interpreted by physical models.

Assessment task

- Group project

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:

Learning outcomes

- 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 with appropriate units.
- Students will understand how real-world problems can be interpreted by physical models.

Assessment tasks

- Tutorial quizzes
- Group project

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 outcome

- 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 with appropriate units.

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

- Students will be able to explain Physics concepts concerning mechanics and electricity

in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.
- Students will understand how real-world problems can be interpreted by physical models.

Assessment tasks

- Tutorial quizzes
- Final Examination
- Group project

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.

This graduate capability is supported by:

Learning outcomes

- Students will be able to explain Physics concepts concerning mechanics and electricity in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.
- Students will understand how real-world problems can be interpreted by physical models.

Assessment tasks

- Tutorial quizzes
- Final Examination
- Group project

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.

This graduate capability is supported by:

Learning outcomes

- Students will be able to explain Physics concepts concerning mechanics and electricity in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.
- Students will understand how real-world problems can be interpreted by physical models.

Assessment tasks

- Tutorial quizzes
- Final Examination
- Group project

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.

This graduate capability is supported by:

Learning outcomes

- Students will be able to explain Physics concepts concerning mechanics and electricity in terms of their underlying physical principles, and describe them in terms of simple 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 with appropriate units.
- Students will understand how real-world problems can be interpreted by physical models.

Assessment task

- Group project

Changes from Previous Offering

The unit ran for the first time in 2016. Since that offering we have changed the arrangements for the group project. We have adjusted the tutorial quizzes so that some are longer than others and we have added a hurdle requirement to the final examination.

Changes since First Published

Date	Description
26/07/2017	I corrected an error in the description of the final examination.