PHYS1210
Physics for Life Sciences
Session 1, In person-scheduled-weekday, North Ryde 2024

School of Mathematical and Physical Sciences

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Disclaimer
Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.
General Information

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Credit points
10

Prerequisites
HSC Mathematics Standard 2 Band 5 and above or Mathematics Advanced Band 3 and above or Extension 1 or Extension 2 Band E2 and above

Corequisites

Co-badged status
Unit description
This unit develops a conceptual and quantitative approach to key physics topics including: waves, light and sound; electricity; forces and motion; and thermodynamics, with illustrations of these topics using medical, biological and technological applications. It teaches students to apply their knowledge of science to solve problems; to think and reason logically and creatively; and to communicate effectively. Students will practice the basic techniques of physical measurement, data analysis and verification of theoretical models. Written communication skills for documenting laboratory work and problem-solving techniques are emphasised throughout the unit.

For students who do not meet the mathematics prerequisite, please contact your course authority for details of a suitable Bridging Course.

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:

- **ULO1**: demonstrate knowledge of foundational physics concepts, principles and theories, by predicting outcomes of ‘thought experiments’ (conceptual answers) and by calculating outcomes in specific physical situations (numerical answers).
- **ULO2**: apply physics principles to solve real-world problems including those involving topics in the life sciences.
- **ULO3**: use the tools, methodologies, language, conventions of physics to test and communicate ideas and explanations.
- **ULO4**: collect experimental data with appropriate precision and uncertainties, using a range of measurement and data analysis tools, and interpret and report on your results.
- **ULO5**: demonstrate foundational learning skills including active engagement in your learning process.

General Assessment Information
This unit has two hurdle requirements.

1. **SGTA participation**. Assessment Type: Quiz/Test Indicative Time on Task: 0 hours Due: weekly, at the end of the SGTA Weighting: 25% This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Details: Quizzes are taken at the end of each SGTA. To take the quiz you must participate in the SGTA itself. You must attend and participate in at least 9 (nine) of the 13 weekly quizzes to
pass this unit, which implies coming to the class on time and handing in your completed work for
the quiz. Your best 8 (eight) quiz scores will contribute to your overall quiz mark for the unit. If
you need to lodge special consideration (via https://students.mq.edu.au/study/my-study-program/
special-consideration), and this is granted, your average mark for quizzes will be worked out
based on the appropriately reduced number of quizzes. Do not lodge the application until you’ve
missed four quizzes. It is recommended that you work with the same group of people (at the same
table) for the entire duration. To participate in the quiz you must participate in the SGTA.
Student arriving 30 or more minutes late will not be allowed to take the quiz.

2. Completion of practical sessions.

Satisfactory completion of laboratories is a hurdle requirement. You must attend all nine 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, lab books will be handed out, 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 shorter than the other sessions, but attendance is mandatory – you can’t do subsequent lab sessions if you don’t attend the introductory one. The next eight 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. There will be supplementary lab session and you do not need to feel the Special Consideration request to join them.

Preparation is required for each of the lab sessions 2-9. 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. The dates and times of the catch-up classes will be available on the catch-up request form (these are often held in the mid-semester break or at the end of classes). 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 the catch-up class you are booked into, then that will count as another missed lab.

3. Final examination

Assessment Type 1: Examination Indicative Time on Task 2: 20 hours Due: S1 examination period Weighting: 50% A written 2h exam covers all content from the unit.

The 'estimated time on task' for each assessment item is an estimate of the additional time needed to complete each assessment outside of all scheduled learning activities. These estimates assume that you actively engage with all scheduled learning activities and spend an additional 38 hours of self-led study during the session.

If you receive special consideration for the final exam, a supplementary exam will be scheduled after the end of the normal exam period. 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.

All assessment tasks are at scheduled times. In case of illness or misadventure, please apply for Special Consideration.

See the following website: https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/assessment

To pass the unit you must fulfill all of the following:

1. Satisfy the lab hurdle [participate in all eight, receive at least 40% in each]
2. Satisfy the SGTA hurdle requirement [participate in 9 or more quizzes out of 13]
3. Obtain the final mark of at least 50 (out of 100), according the the task weighting that is given below

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>25%</td>
<td>Yes</td>
<td>weekly</td>
</tr>
<tr>
<td>Lab book</td>
<td>25%</td>
<td>Yes</td>
<td>after each lab</td>
</tr>
<tr>
<td>Final exam</td>
<td>50%</td>
<td>No</td>
<td>examination period</td>
</tr>
</tbody>
</table>

Quizzes

Assessment Type 1: Quiz/Test Indicative Time on Task 2: 0 hours Due: weekly Weighting: 25%

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

Short quizzes taken in the SGTAs.

On successful completion you will be able to:

- demonstrate knowledge of foundational physics concepts, principles and theories, by predicting outcomes of 'thought experiments' (conceptual answers) and by calculating outcomes in specific physical situations (numerical answers).
- apply physics principles to solve real-world problems including those involving topics in the life sciences.
- use the tools, methodologies, language, conventions of physics to test and communicate ideas and explanations.
- demonstrate foundational learning skills including active engagement in your learning process.
Lab book

Assessment Type 1: Lab book
Indicative Time on Task: 10 hours
Due: after each lab
Weighting: 25%
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Assessment of your in-lab record of practical activities, as well as any pre-lab preparation.

On successful completion you will be able to:

• collect experimental data with appropriate precision and uncertainties, using a range of measurement and data analysis tools, and interpret and report on your results.

Final examination

Assessment Type 1: Examination
Indicative Time on Task: 20 hours
Due: examination period
Weighting: 50%

Examination during the university exam period, covering all content from the unit.

On successful completion you will be able to:

• demonstrate knowledge of foundational physics concepts, principles and theories, by predicting outcomes of 'thought experiments' (conceptual answers) and by calculating outcomes in specific physical situations (numerical answers).
• apply physics principles to solve real-world problems including those involving topics in the life sciences.
• use the tools, methodologies, language, conventions of physics to test and communicate ideas and explanations.
• collect experimental data with appropriate precision and uncertainties, using a range of measurement and data analysis tools, and interpret and report on your results.

1 If you need help with your assignment, please contact:

• the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
• the Writing Centre for academic skills support.

2 Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.
### Assessment Tasks

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<tbody>
<tr>
<td>Final examination</td>
<td>50%</td>
<td>No</td>
<td>S1 exam period</td>
</tr>
<tr>
<td>Lab book</td>
<td>25%</td>
<td>Yes</td>
<td>@ labs</td>
</tr>
<tr>
<td>Quizzes</td>
<td>25%</td>
<td>Yes</td>
<td>weekly @ SGTA</td>
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### Final examination

Assessment Type 1: Examination  
Indicative Time on Task 2: 20 hours  
Due: S1 exam period  
Weighting: 50%

Examination during the university exam period, covering all content from the unit.

On successful completion you will be able to:

- demonstrate knowledge of foundational physics concepts, principles and theories, by predicting outcomes of 'thought experiments' (conceptual answers) and by calculating outcomes in specific physical situations (numerical answers).
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- use the tools, methodologies, language, conventions of physics to test and communicate ideas and explanations.
- collect experimental data with appropriate precision and uncertainties, using a range of measurement and data analysis tools, and interpret and report on your results.

### Lab book

Assessment Type 1: Lab book  
Indicative Time on Task 2: 10 hours  
Due: @ labs  
Weighting: 25%

This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)
Assessment of your in-lab record of practical activities, as well as any pre-lab preparation.

On successful completion you will be able to:

• collect experimental data with appropriate precision and uncertainties, using a range of measurement and data analysis tools, and interpret and report on your results.

Quizzes

Assessment Type: Quiz/Test
Indicative Time on Task: 0 hours
Due: weekly @ SGTA
Weighting: 25%

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

Short quizzes taken in the SGTAs.

On successful completion you will be able to:

• demonstrate knowledge of foundational physics concepts, principles and theories, by predicting outcomes of 'thought experiments' (conceptual answers) and by calculating outcomes in specific physical situations (numerical answers).
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• the Writing Centre for academic skills support.

2 Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation
Delivery and Resources

Contacts

For all unit-related inquiries email phys1210@mq.edu.au. Do NOT use personal emails of the staff unless it is a major emergency.

Structure

Lectures 2h/week | SGTA 2h/week | Labs 2.5h/week

All activities are in-person. The lectures will be recorded and available via iLearn. Additional video materials may be posted from time to time.

Required Text


Teaching Strategy PHYS1210 consists of lectures, tutorials, laboratory sessions and assessment including tutorial quizzes, laboratory reports and formal exams. You should spend an average of 9-10 hours per week studying for this unit (indicative only). This time is inclusive of all scheduled learning.

SGTA

2h sessions happen weekly, including week 1 [yes, they are scheduled before the lectures]

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, 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: There are two laboratories used for 1st year physics they are both in 14 SCO (formerly E7B). Labs start during week 1

Please check iLearn to see where your lab class will take place.

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 in the lab, and students without suitable covered footwear will be refused admission.

Topics covered in lectures (+ textbook chapters). Some
changes in assigned/recommended sections may occur

Kinematics (Chapter 1)

1.1 Introduction
1.2 Distance and Displacement
1.3 Speed and Velocity
1.4 Acceleration
1.5 Average Velocity or Speed
1.6 Change in Displacement Under Constant Acceleration
1.7 The Acceleration Due to Gravity

Forces and Newton’s Laws of Motion (Chapter 2)

2.2 The Concept of Force
2.2 Newton’s Laws of Motion
2.3 Kinds of Force
2.4 Newtonian Gravity
2.5 Fictitious Forces

Forces and Newton’s Laws of Motion (Chapter 2)

3.2 Description of Circular Motion  3.3 Circular Velocity and Acceleration  3.4 Centripetal Force
3.5 Sources of Centripetal Force

Rotational Statics (Chapter 4)

4.2 Equilibrium
4.3 Torque
4.4 The Principle of Moments

Energy (Chapter 5)

5.2 What is Energy?
5.3 Work
5.4 Kinetic Energy
5.5 Potential Energy
5.6 Conservative Forces
5.7 Conservation of Total Energy
5.8 Power
Momentum (Chapter 6)

6.1 Introduction 6.2 Linear Momentum 6.3 Newton’s Laws and Momentum 6.4 Collisions 6.5 Elastic Collisions Fluids (Chapters 11, 12, 14)

11.2 Pressure
11.3 Density
11.4 Pascal's Principle
11.5 Measurement of Pressure
11.6 Pressure and the Human Body
12.2 The Buoyant Force
14.1-14.2 Fluid Dynamics of Non-viscous Fluids
14.3 The Equation of Continuity
14.4 Bernoulli's Equation

Electricity (Chapters 26, 27, 28)

26.2 Charge
26.3 Conductors and Insulators
26.4 Charging of Objects
27.2 Coulomb’s Law
27.3 Superposition of Electric Forces
27.5 The Electric Field
28.3 Electrical Potential
28.4 Electrical Potential and Work
28.7 The Heart and ECG

Currents and Circuits (Chapter 30)

30.2 Electric Current
30.4 Direct Versus Alternating Current
30.5 Circuits and Circuit Diagrams
30.6 Power Sources
30.7 Resistance and Ohm’s Law
30.8 Resistors and Resistivity
30.11 Resistors in Series and Parallel
30.12 Power Dissipation
30.14 Electric Shock Hazards
30.15 Electricity in Cells

**Magnetism** (enrichment)

**Heat (Chapters 17, 19, 21)**
17.2 Thermal Equilibrium
17.3 Measuring Temperature
19.2 Phase Changes
19.3 Temperature Changes
19.4 Energy Conservation
21.2 Heat Transfer: Conduction
21.3 Convection
21.4 Radiation

**Thermodynamics (Chapters 22, 24)**
22.2 The First Law
22.3 Energy and the Body
24.2 The Second Law of Thermodynamics
24.3 Entropy
24.4 Heat Engines

**Waves and Sound (Chapters 8, 9)**
8.1-8.2 Nature of waves
8.3 Frequency, Wavelength, and Speed
8.4 The Form of the Wave
8.5 Types of Wave
8.6 Superposition and Interference
8.7 Beats
8.8 Reflection
8.9 Standing Waves
8.10 Waves and Energy
9.2 Sound Waves in Media
9.3 Pitch and Loudness
9.5 The Ear
9.6 The Doppler Effect

**Light (Chapter 32, 33, 34)**

- 32.2 Electromagnetic Waves
- 32.3 Reflection
- 32.4 Refraction
- 32.5 Dispersion
- 33.1 Geometric Optics
- 33.2 Ray Diagrams
- 33.3-33.4 Mirrors
- 33.6 Lenses
- 34.1-34.9 The eye and vision

**Wave optics (Chapter 35)**

- 35.2 Superposition and Interference

**Atoms and Atomic Physics (Chapter 38)**

- 38.2 Parts of the Atom
- 38.4 The Böhr Model of the Atom
- 38.6 Quantum Mechanics

**Nuclear Physics (Chapters 39, 40, 41, 42, 43)**

- 39.2 Nuclei and Isotopes
- 39.5 Nuclear Decay and Stability
- 40.2 Nuclear Decay Processes
- 40.3 Activity and Half-Life
- 42.3 Dose and Dose Equivalent*

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policies.mq.edu.au). 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
Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

**Student Code of Conduct**

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/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

**Academic Integrity**

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

**Student Support**

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

**The Writing Centre**

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader
- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the Academic Integrity Module
Student Services and Support

Macquarie University offers a range of Student Support Services including:

- **IT Support**
- **Accessibility and disability support** with study
- **Mental health support**
- **Safety support** to respond to bullying, harassment, sexual harassment and sexual assault
- **Social support including information about finances, tenancy and legal issues**
- **Student Advocacy** provides independent advice on MQ policies, procedures, and processes

**Student Enquiries**

Got a question? Ask us via AskMQ, or contact Service Connect.

**IT Help**

For help with University computer systems and technology, visit [http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/](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](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/). The policy applies to all who connect to the MQ network including students.

**Changes from Previous Offering**

Minor changes in the content: one more week of mechanics, one week less of waves

Partial changes in the teaching staff

Unit information based on version 2024.01R of the [Handbook](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).