UNSW Course Outline

ZPEM1501 Physics 1A: Mechanics, Waves and Thermodynamics - 2024

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General Course Information

Course Code : ZPEM1501
Year : 2024
Term : Semester 1
Teaching Period : Z1
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 the physics that underpins many science disciplines. The course syllabus includes the discussion of motion, forces, energy, oscillations, waves, temperature, heat and entropy, with examples related to real-life science problems. The course includes a

laboratory program relating to and supplementing the lecture material.

Course Aims

Physics 1A is a 6 UOC course which develops physical principles that underpin your future studies in Physics, Oceanography, or Atmospheric Physics/Meteorology. The theory component of the course combines 3 times 1-hour lectures designed for guidance, overview and conceptual learning with a 1-hour tutorial designed for assistance with problem-solving. The practical component of the course features several laboratory classes designed to teach you the fundamentals of experimental science in a context of physics knowledge and concepts.

This course provides an introduction to the physics of motion and energy, oscillations and waves, and thermodynamics. It underpins further study that might be taken as part of a Physics or Oceanography major in the BSc.

Relationship to Other Courses

Consult your major requirements - differenet majors will require different courses. This course is mandatory for those enrolled in a physics or oceanography major.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Mastered the key concepts in the topic areas of mechanics, oscillations, waves and thermal physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.
CLO2 : Demonstrate the ability to solve problems relating to mechanics, oscillations, waves and thermal physics readily and efficiently.
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.
CLO4 : Develop an appreciation of how the basic Physics in the areas of mechanics, waves and thermal physics is transportable to higher level physics study and study in related fields.

Course Learning Outcomes	Assessment Item
CLO1 : Mastered the key concepts in the topic areas of mechanics, oscillations, waves and thermal physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.	• Examination • Class Test • Quizzes
CLO2 : Demonstrate the ability to solve problems relating to mechanics, oscillations, waves and thermal physics readily and efficiently.	• Examination • Class Test • Quizzes
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.	• Laboratory program
CLO4 : Develop an appreciation of how the basic Physics in the areas of mechanics, waves and thermal physics is transportable to higher level physics study and study in related fields.	• Laboratory program • Examination

Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360

Learning and Teaching in this course

Effective learning in physics is best supported by a climate of enquiry in which students are actively engaged in the learning process. The key to success in this course is to make sure you understand everything in the lectures and the relevant book chapters, and work through problems during the tutorial sessions and in your own time.

The lectures give overviews, guidance, highlight important points of interest and further illustrate the core material via demonstrations and interactive activities. Students need to build on this foundation during their own private study and also focus on set problems. Research has shown that most students learn most effectively by taking notes in classes. Your effort of writing down material on your tablet or on paper and creating your own personal record of the physics presented and discussed is therefore very worthwhile.

In classes, do not distract others and yourself by looking at your phone. It is best switched off when in the classroom. Tutorials are the place to get assistance with misunderstandings and guidance with problem solving. Experience shows they tend to be the place where your understanding advances the most. So make the most of them, especially given the rapid pace of the intensive session.

This is a 6 UoC course, for which the University expects 150–180 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 doing problems.

Moodle is the Learning Management System used at UNSW Canberra. All courses have a Moodle site which will become available to students at least one week before the start of semester. Please find all help and documentation (including Blackboard Collaborate) at the Moodle Support page.

UNSW Moodle supports the following web browsers:

» Google Chrome 50+
» Safari 10+
** Internet Explorer is not recommended
** Addons and Toolbars can affect any browser's performance.
Operating systems recommended are:
Windows 7, 10, Mac OSX Sierra, iPad IOS10
For further details about system requirements click here.
Log in to Moodle here.

If you need further assistance with Moodle:

For enrolment and login issues please contact: IT Service Centre
Email: itservicecentre@unsw.edu.au
Phone: (02) 9385-1333

International: +61 2 9385 1333

For all other Moodle issues please contact: External TELT Support

Email: externalteltsupport@unsw.edu.au Phone: (02) 9385-3331
International: +61 2 938 53331
Opening hours: Monday – Friday 7:30am – 9:30 pm Saturday & Sunday 8:30 am – 4:30pm

Additional Course Information

Physics Support Program (PSP): Students whose performance in the course is of concern are provided with an extra hour per week of tutoring support. The aim of PSP classes is to provide those students with extra assistance in problem-solving, along with more time to ask questions of a dedicated tutor. Participation in the PSP is by invitation only. Attendance is expected. The invitations are based on your assessment results throughout the semester, and are re-evaluated regularly. Failure of participation in the PSP program is generally seen as a lack of dedication to the course and will be recorded.

Use of AI in Assessments: Though critical thinking without use of AI is strongly encouraged, generative AI tools are permitted for PLANNING ASSISTANCE purposes, when appropriate. If a particular problem involves some creative process, you are permitted to use software to generate initial ideas. However, you must develop or edit those ideas to such a significant extent that what is submitted is your own work, i.e. only occasional AI generated words or phrases may form part of your final submission. It is a good idea to keep copies of the initial prompts to show your lecturer if there is any uncertainty about the originality of your work.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Examination Assessment Format: Individual	40%	
Class Test Assessment Format: Individual	20%	Start Date: 26/04/2024 12:10 PM Due Date: 26/04/2024 01:00 PM
Laboratory program Assessment Format: Individual	20%	
Quizzes Assessment Format: Individual	20%	

Assessment Details

Examination

Course Learning Outcomes

- CLO1 : Mastered the key concepts in the topic areas of mechanics, oscillations, waves and thermal physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.
- CLO2 : Demonstrate the ability to solve problems relating to mechanics, oscillations, waves and thermal physics readily and efficiently.
- CLO4 : Develop an appreciation of how the basic Physics in the areas of mechanics, waves and thermal physics is transportable to higher level physics study and study in related fields.

Detailed Assessment Description

• A two-hour examination, held during the scheduled examination period, contributes 40% to the final course mark. Like the class test, the examination assesses “physics knowledge” and problem-solving skills by way of conceptual reasoning, algebraic manipulation, graphical interpretation, and numerical determination covering the whole breadth of the course.

Assessment Length

2 hours

Assignment submission Turnitin type

This is not a Turnitin assignment

Class Test

Assessment Overview

One class test to be held mid semester.

Course Learning Outcomes

- CLO1 : Mastered the key concepts in the topic areas of mechanics, oscillations, waves and thermal physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.
- CLO2 : Demonstrate the ability to solve problems relating to mechanics, oscillations, waves and thermal physics readily and efficiently.

Detailed Assessment Description

• 1 in-class test counts 20% in total. This 50 min test will be held during a scheduled lecture period and require students to demonstrate their ability to effectively solve physics problems via conceptual reasoning, algebraic manipulation, and numerical calculation under time pressure.

Assessment Length

50 minutes

Laboratory program

Course Learning Outcomes

- 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.
- CLO4 : Develop an appreciation of how the basic Physics in the areas of mechanics, waves and thermal physics is transportable to higher level physics study and study in related fields.

Detailed Assessment Description

• The laboratory program mark counts 20% towards the final course mark. Before each laboratory students are expected to complete the online pre-lab exercises, which aid with the understanding of the laboratory work and contribute towards the laboratory mark.

Assessment Length

8 lab classes each with a pre-lab exercise plus 2 hours in-class experiment

Quizzes

Assessment Overview

Short quizzes (4 quizzes, 5% each) to be held approximately every 2 to 3 weeks, so the instructor can determine to what degree the students are keeping up with course material.

Course Learning Outcomes

- CLO1 : Mastered the key concepts in the topic areas of mechanics, oscillations, waves and thermal physics, demonstrated by the ability to discuss, describe and answer fundamental questions about the topics.
- CLO2 : Demonstrate the ability to solve problems relating to mechanics, oscillations, waves and thermal physics readily and efficiently.

Detailed Assessment Description

• 12 equally weighted class quizzes (online on Moodle). We count the best 10 attempts (lowest 2 are dropped) for 20% in total (2% each). These quizzes are held outside of scheduled lecture periods. The quizzes are designed to provide ongoing assessments and test the students' understanding of the recently covered material and may contain quantitative as well as qualitative types of questions.

Submission notes

Moodle quizzes

Assignment submission Turnitin type

This is not a Turnitin assignment

General Assessment Information

All marks obtained for assessment items during the session are provisional. The final mark as published by the university following the assessment review group meeting is the only official mark.

In some circumstances of missed assessments (including but not limited to the test and final exam), a formal application for special academic consideration via the prescribed procedure may be appropriate. Otherwise, in the case of absence, a mark of zero will be awarded for that particular assessment.

Assessments and laboratory sessions are compulsory. Staff must be informed by email in the case of missed assessments or if missing an assessment is anticipated: in the case of anticipated missed lectures - please email the course convener and lecturer (if not the same person). In the case of anticipated missed tutorials, please let your tutorial leader know. In the case of an anticipated missed lab, please let both your lab demonstrator and the lab coordinator know.

Use of Generative AI (e.g. ChatGPT) during assessments: It is prohibited to use any software or service to search for or generate information or answers. 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. However, you are free to use such software as part of your own learning outside of assessments. For example: guidance with approaching tutorial or textbook problems during self- or peer-group study.

Grading Basis

Standard

Requirements to pass course

Active participation in the weekly tutorials and your consequent and comprehensive revision of problems presented in class is considered an essential preparation for the in-class tests and the final examination.

The assessment for the course has been designed so that a combined final 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.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 26 February - 1 March	Lecture	Measurement, motion along a straight line (motion in 1D). Feb 26 Feb 28 Mar 1
	Tutorial	Measurement, motion along a straight line (motion in 1D). Feb 29
Week 2 : 4 March - 8 March	Lecture	Vectors, vector operations and motion in 2D (and 3D) Mar 4 Mar 6 Mar 8
	Tutorial	Vectors, vector operations and motion in 2D (and 3D) Mar 7
	Laboratory	Refer to your individual lab schedule.
Week 3 : 11 March - 15 March	Lecture	Newton's laws and friction Mar 13 Mar 15
	Tutorial	Newton's laws and friction Mar 14
	Laboratory	Refer to your individual lab schedule.
Week 4 : 18 March - 22 March	Lecture	Work, Energy and Power Mar 18 Mar 20 Mar 22
	Tutorial	Work, Energy and Power Mar 21
	Laboratory	Refer to your individual lab schedule.
Week 5 : 25 March - 29 March	Lecture	Energy conservation, CoM, momentum & collisions Mar 25 Mar 27
	Tutorial	Energy conservation, CoM, momentum & collisions Mar 28
	Laboratory	Refer to your individual lab schedule.
Week 6 : 1 April - 5 April	Lecture	Rotation, torque, angular momentum, moment of inertia April 3 April 5
	Tutorial	Rotation, torque, angular momentum, moment of inertia April 4
	Laboratory	Refer to your individual lab schedule.
Week 7 : 22 April - 26 April	Lecture	Simple harmonic motion and oscillations April 22
	Assessment	Class test - on weeks 1-6 inclusive April 26
	Laboratory	Refer to your individual lab schedule.
Week 8 : 29 April - 3 May	Lecture	Waves I April 29 May 1 May 3
	Tutorial	Waves I May 2
	Laboratory	Refer to your individual lab schedule.
Week 9 : 6 May - 10 May	Lecture	Waves II (including sound) May 6 May 8
	Tutorial	Waves II (including sound) May 9
	Laboratory	Refer to your individual lab schedule.
Week 10 : 13 May - 17 May	Lecture	Fluids May 13 May 15

		May 17
	Tutorial	Fluids May 16
	Laboratory	Refer to your individual lab schedule.
Week 11 : 20 May - 24 May	Lecture	Temperature and heat May 20 May 22 May 24
	Tutorial	Temperature and heat May 23
	Laboratory	Refer to your individual lab schedule.
Week 12 : 27 May - 31 May	Lecture	Kinetic theory of gases May 29 May 31
	Tutorial	Kinetic theory of gases May 30
	Laboratory	Refer to your individual lab schedule.
Week 13 : 3 June - 7 June	Lecture	Kinetic theory continued; entropy June 3 June 5 June 7
	Tutorial	Kinetic theory continued; entropy June 6

Attendance Requirements

Students are 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 appropriate staff member(s) below **by email** at the earliest practicable date:

- **Laboratory:** email the laboratory coordinator
- **Tutorial:** email the tutor and copy the lecturer
- **Quiz or Test:** email the lecturer and copy the course coordinator
- **Final Examination:** email the lecturer and copy the course coordinator

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

General Schedule Information

Three lecture hours per week: Mondays, Wednesdays, and Fridays. Tutorials are every week on Thursdays, but please check your schedule for holidays and military training days. Refer to Moodle for your lab schedule.

Course Resources

Prescribed Resources

The textbook Halliday's Fundamentals of Physics is the mandatory text for the course (see below). You can obtain the e-book version only (cheaper), or the hardcopy. The hardcopy version is recommended, and typically it comes with an e-book access code.

Compulsory text information: “Halliday’s Fundamentals of Physics” (First Australian and New Zealand Edition). Publisher: John Wiley and Sons, Australia. ISBN: 978-0-730-38286-7 The printed book version is recommended, but not required. ISBN: 978-0-730-38287-4

Students are also required to have a non-graphic and non-programmable scientific **calculator** such as the Casio fx-82AU or similar. Smart-phone calculator applications are not recommended.

For online (i.e. Moodle) tests performed in-class or during the exam period, students must bring their own charged device (laptop or tablet) and be ready to access Moodle. In addition, usually a mobile phone is required to take photos of your work for uploading/grading.

Recommended Resources

Some useful conceptual explanations can be found here: https://www.animations.physics.unsw.edu.au/

Useful online resources include the hyperphysics webpages or the free introductory textbooks and extensive problem sets made available by Crowell and Shotwell at http://www.lightandmatter.com/

Additional Costs

Course Evaluation and Development

One of the key priorities in the 2025 Strategy for UNSW is a drive for academic excellence in education. One of the ways of determining how well UNSW is progressing towards this goal is by listening to our own students. Students will be asked to complete the myExperience survey towards the end of this course.

Students can also provide feedback during the semester via: direct contact with the lecturer, the “On-going Student Feedback” link in Moodle, Student-Staff Liaison Committee meetings in schools, informal feedback conducted by staff, and focus groups. Student opinions really do make a difference. Refer to the Moodle site for this course to see how the feedback from

previous students has contributed to the course development.

Student feedback is highly valued. Lecturers welcome feedback on lectures, tutorials, and labs, positive or negative. We strongly encourage students to complete the MyExperience survey toward the end of the course.

Student Code of Conduct Policy https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Ashley Ruiter		B26 (G18)	+61 2 5114 5036	By email, zoom or in person	No	Yes
Lecturer	Paul Fraser		B26			No	No
Lab director	Wayne Hutchison		B26			No	No

Other Useful Information

Academic Information

Course Evaluation and Development

One of the key priorities in the 2025 Strategy for UNSW is a drive for academic excellence in education. One of the ways of determining how well UNSW is progressing towards this goal is by listening to our own students. Students will be asked to complete the myExperience survey towards the end of each course.

Students can also provide feedback during the semester via: direct contact with the lecturer, the "On-going Student Feedback" link in Moodle, Student-Staff Liaison Committee meetings in schools, informal feedback conducted by staff, and focus groups (where applicable). Student opinions really do make a difference. Refer to the Moodle site for your course to see how the feedback from previous students has contributed to the course development.

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.

https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf

Equitable Learning Services (ELS)

Students living with neurodivergent, physical and/or mental health conditions or caring for someone with these conditions may be eligible for support through the Equitible Learning Services team. Equitable Learning Services is a free and confidential service that provides practical support to ensure your mental or physical health conditions do not adversely affect your studies.

Our team of dedicated **Equitable Learning Facilitators** (ELFs) are here to assist you through this process. We offer a number of services to make your education at UNSW easier and more equitable.

Further information about ELS for currently enrolled students can be found at: https://www.student.unsw.edu.au/equitable-learning

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. All students are expected to adhere to UNSW's Student Code of Conduct. Find relevant information at: Student Code of Conduct (unsw.edu.au)

Plagiarism undermines academic integrity and is not tolerated at UNSW. It is defined as using the words or ideas of others and passing them off as your own, and can take many forms, from deliberate cheating to accidental copying from a source without acknowledgement.

For more information, please refer to the following:

https://student.unsw.edu.au/plagiarism

Submission of Assessment Tasks

Special Consideration

Special Consideration is the process for assessing and addressing the impact on students of short-term events, that are beyond the control of the student, and that affect performance in a specific assessment task or tasks.

Applications for Special Consideration will be accepted in the following circumstances only:

- Where academic work has been hampered to a substantial degree by illness or other cause;
- The circumstances are unexpected and beyond the student's control;
- The circumstances could not have reasonably been anticipated, avoided or guarded against by the student; and either:

(i) they occurred during a critical study period and was 3 consecutive days or more duration, or a total of 5 days within the critical study period; or

(ii) they prevented the ability to complete, attend or submit an assessment task for a specific date (e.g. final exam, in class test/quiz, in class presentation)

Applications for Special Consideration must be made as soon as practicable after the problem occurs and at the latest within three working days of the assessment or the period covered by the supporting documentation.

By sitting or submitting the assessment task the student is declaring that they are fit to do so and cannot later apply for Special Consideration (UNSW 'fit to sit or submit' requirement).

Sitting, accessing or submitting an assessment task on the scheduled assessment date, after applying for special consideration, renders the special consideration application void.

Find more information about special consideration at: https://www.student.unsw.edu.au/special/consideration/guide

Or apply for special consideration through your MyUNSW portal.

Late Submission of assessment tasks (other than examinations)

UNSW has a standard late submission penalty of:

- 5% per day,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Electronic submission of assessment

Except where the nature of an assessment task precludes its electronic submission, all

assessments must be submitted to an electronic repository, approved by UNSW or the Faculty, for archiving and subsequent marking and analysis.

Release of final mark

All marks obtained for assessment items during the session are provisional. The final mark as published by the university following the assessment review group meeting is the only official mark.