UNSW Course Outline

PHYS9120 Mechanics for Teachers - 2024

Published on the 28 Jan 2024

General Course Information

Course Code : PHYS9120
Year : 2024
Term : Term 1
Teaching Period : T1
Is a multi-term course? : No
Faculty : Faculty of Science
Academic Unit : School of Physics
Delivery Mode : Online
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This is an online course covering mechanics. Lecture material and tutorial problems will be presented online. This is the second course in the graduate certificate for physics teachers. The course will cover classical Newtonian mechanics and special relativity. Classical mechanics is

used to describe the motion of bodies under a system of forces. Special relativity is needed to describe the motion of bodies traveling with high speeds. Students will watch short video lectures online and solve problems related to the material. This course includes laboratory exercises that are completed at home and submitted online.

Assumed Knowledge: Students need to be able to differentiate and integrate polynomials to complete this courses. A good understanding of HSC level extension 1 mathematics is recommended.

Course Aims

This course gives students an introduction to mechanics and how to effectively teach mechanics concepts to students.

Relationship to Other Courses

This is the second course in the Graduate Certificate in Physics for Science Teachers. PHYS9110 is a pre-requisite for this course.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Safely plan and conduct mechanics experiments using high school equipment, include reliable estimates of the uncertainties in the results.
CLO2 : Design experimental activities related to mechanics to use with high school students.
CLO3 : Use appropriate mathematical techniques, including calculus, to solve problems involving mechanics.
CLO4 : Apply critical thinking skills, applying either energy or force approaches, in a range of conceptual physical situations.
CLO5 : Draw and interpret graphs and diagrams related to the motion of bodies to describe physical phenomena

Course Learning Outcomes	Assessment Item
CLO1 : Safely plan and conduct mechanics experiments using high school equipment, include reliable estimates of the uncertainties in the results.	• Experiments
CLO2 : Design experimental activities related to mechanics to use with high school students.	• Experiments
CLO3 : Use appropriate mathematical techniques, including calculus, to solve problems involving mechanics.	• Final Examination • Online tests
CLO4 : Apply critical thinking skills, applying either energy or force approaches, in a range of conceptual physical situations.	• Final Examination • Online tests
CLO5 : Draw and interpret graphs and diagrams related to the motion of bodies to describe physical phenomena	• Final Examination • Online tests • Experiments

Learning and Teaching Technologies

Moodle - Learning Management System | Openlearning

Learning and Teaching in this course

This course consists of asynchronous, online content with activities for you to complete along the way to ensure your understanding. Your lecturer will check the forums regualarily and answer any questions you have. Asynchronous was chosen in order to make this easier to fit around your work schedule. Please make sure that you do set aside enough time each week to work through the material.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Final Examination Assessment Format: Individual	50%	Start Date: Exam period
Online tests Assessment Format: Individual	20%	
Experiments Assessment Format: Individual	30%	

Assessment Details

Final Examination

Assessment Overview

You will sit a two hour open-book exam with five questions assessing the theory taught during the course. The exam will consist of a combination of conceptual and calculation based questions. You will sit this exam at your school or another location approved by course staff.

Course Learning Outcomes

- CLO3 : Use appropriate mathematical techniques, including calculus, to solve problems involving mechanics.
- CLO4 : Apply critical thinking skills, applying either energy or force approaches, in a range of conceptual physical situations.
- CLO5 : Draw and interpret graphs and diagrams related to the motion of bodies to describe physical phenomena

Assessment Length

2 hours, 5 questions

Online tests

Assessment Overview

You will complete three online tests based on the theory covered in lectures. Each test will typically consist of six three-part questions. Most questions will focus on calculations. You may attempt these tests as many times as you want with your highest mark counting. The tests will be available for a week, during weeks 4, 7 and 10. You will be given feedback about incorrect answers.

Course Learning Outcomes

- CLO3 : Use appropriate mathematical techniques, including calculus, to solve problems

involving mechanics.
- CLO4 : Apply critical thinking skills, applying either energy or force approaches, in a range of conceptual physical situations.
- CLO5 : Draw and interpret graphs and diagrams related to the motion of bodies to describe physical phenomena

Assessment Length

6 questions in each test

Experiments

Assessment Overview

You will be expected to complete three laboratory experiments (each weighed equally) using high school lab equipment during the course. You will develop a worksheet for high school students related to each of these experiments. These experiments will be due after the relevant content has been covered in the online lectures.

Course Learning Outcomes

- CLO1 : Safely plan and conduct mechanics experiments using high school equipment, include reliable estimates of the uncertainties in the results.
- CLO2 : Design experimental activities related to mechanics to use with high school students.
- CLO5 : Draw and interpret graphs and diagrams related to the motion of bodies to describe physical phenomena

Assessment information

These are due at the end of weeks 5, 8 and 9.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

General Assessment Information

Please note that the marks in Moodle are raw marks and may be subjected to moderation in order to calculate your final mark.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Topic	Vectors
Week 2 : 19 February - 25 February	Topic	Motion
Week 3 : 26 February - 3 March	Topic	Forces
Week 4 : 4 March - 10 March	Topic	Work and Energy
	Assessment	Online test 1 is due at the end of this week.
Week 5 : 11 March - 17 March	Topic	Collisions and Momentum
	Assessment	First experiment on "Coefficient of static friction" is due at the end of this week.
Week 6 : 18 March - 24 March	Topic	Rotation and Torque
Week 7 : 25 March - 31 March	Topic	Universal gravitation
	Assessment	Your second online test is due at the end of this week.
Week 8 : 1 April - 7 April	Topic	Special relativity 1
	Assessment	Your second experiment on collisions and car crashing is due at the end of this week.
Week 9 : 8 April - 14 April	Topic	Special relativity 2
	Assessment	Your third and final experiment on projectile motion is due at the end of this week.
Week 10 : 15 April - 21 April	Topic	Lagrangians and Hamiltonians (not assessed)
	Assessment	Your third and final online test is due at the end of this week.

Attendance Requirements

Not Applicable - as no class attendance is required

General Schedule Information

Each week you should work through the module containing relevant videos and activities on Openlearning.

Course Resources

Recommended Resources

Halliday, D., Resnick, R., & Walker, J. (2014). Fundamentals of Physics, John Wiley & Sons.

Note: the library has an eBook subscription to this. The link is provided on the Moodle site. The book can be purchased from the publisher here: http://www.wileydirect.com.au/buy/fundamentals-of-physics-10th-edition/

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Facilitator	Elizabeth Angstmann					Yes	Yes

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the UNSW Student Code of Conduct Website.

Academic Honesty and Plagarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.
Further information about referencing styles can be located at https://student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.
Further information about academic integrity, plagiarism and the use of AI in assessments can

be located at:

- The Current Students site,
- The ELISE training site, and
- The Use of AI for assessments site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

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

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

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

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: https://student.unsw.edu.au/special-consideration

Important note: UNSW has a "fit to sit/submit" rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination

or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- The Current Students Gateway
- Student Support
- Academic Skills and Support
- Student Wellbeing, Health and Safety
- Equitable Learning Services
- UNSW IT Service Centre
- Science EDI Student Initiatives, Offerings and Guidelines