School of Information and Physical Sciences

PHYS1200: Introductory Physics for the Life Sciences

Callaghan
Semester 1 - 2024

Physics underpins most aspects of modern technology including those with application to the life sciences and medicine. Two examples include the development of electromagnetic wave theory, which led to electric power, radio and television; and atomic physics, which resulted in electronics, microchips and computers, nuclear medicine and radiation treatment of cancers. This course provides an overview of topics in physics that are of particular importance to the life and medical sciences. The course is non-calculus based and covers mechanics (units, motion, biomechanics, and energy), electricity and magnetism, heat, nuclear physics, fluids, and waves.

COURSE OUTLINE

www.newcastle.edu.au
CRICOS Provider 00109J

OVERVIEW

Course Description

Physics underpins most aspects of modern technology including those with application to the life sciences and medicine. Two examples include the development of electromagnetic wave theory, which led to electric power, radio and television; and atomic physics, which resulted in electronics, microchips and computers, nuclear medicine and radiation treatment of cancers. This course provides an overview of topics in physics that are of particular importance to the life and medical sciences. The course is non-calculus based and covers mechanics (units, motion, biomechanics, energy), electricity and magnetism, heat, nuclear physics, fluids, and waves.

Academic Progress Requirements

Nil

Requisites

This course has similarities to PHYS1150, PHYS1210, or PHYS1205. If you have successfully completed any of these courses you cannot enrol in this course.

Assumed Knowledge

HSC Mathematics with a result in Bands 5 or 6, or a pass in MATH1002 or equivalent.

Contact Hours

Callaghan
Laboratory *
Face to Face On Campus
3 hour(s) per week(s) for 6 week(s)

Lecture
Face to Face On Campus
3 hour(s) per week(s) for 13 week(s) starting Week 1

Tutorial *
Face to Face On Campus
1 hour(s) per week(s) for 13 week(s) starting Week 1

* This contact type has a compulsory requirement.

Unit Weighting Workload

10

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan
Dr Joshua Williams
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Consultation: Email to make an appointment.

Teaching Staff

Dr Xiaojing Zhou
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School Office

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9am-5pm (Mon-Fri)

SYLLABUS

Course Content

A non-calculus based course aimed at providing students with a basic understanding of the main principles and concepts in physics.

- Basic Mechanics: units of measurement and unit conversions; concentrations and volumes; laws of motion; mechanical equilibrium and biomechanics; rotational dynamics; work & energy; human energy use and efficiency.
- Electricity: electric charges, forces and fields; voltage - cell membranes and separation of DNA; capacitance; electric current and electrical power; electric circuits.
- Magnetism: forces on electric charge and current in magnetic fields; transformers; applications of magnetism in life sciences; nuclear magnetic resonance (NMR).
- Thermal Physics: temperature; thermal expansion; ideal gas law; heat, specific heat and calorimetry; human activity and heat; heat transfer.
- Nuclear Physics: nuclear structure; radioactivity; radiocarbon dating; biology and ionising radiation; isotopes and DNA.
- Fluid Mechanics: density, pressure and viscosity; Archimedes principle; flow rate and diffusion, equation of continuity; Bernoulli's principle; laminar and turbulent flow; Poiseuille's equation; surface tension.
- Waves: SHM and resonance; types of wave motion; reflection, transmission, superposition and interference; EM Spectrum; optical instruments; fluorescence and biology.

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Explain the basic principles and concepts underlying a broad range of fundamental areas of physics;

2. Connect their knowledge of physics to everyday situations and to life sciences and medicine;

3. Solve qualitative and quantitative problems using basic mathematics and principles of physics;

4. Perform experiments using scientific equipment and interpret the results in terms of the basic concepts in physics;

5. Contribute to team and group work for scientific investigations and for the process of learning.

Course Materials

Lecture Materials:

- Lectures are recorded and should be available on Canvas soon after the lecture has finished. The Centre for Teaching and Learning are responsible for lecture recordings. Lecture notes are available for download from the course Canvas site.

Recommended Text:

- Introduction to Biological Physics for the Health and Life Sciences. K. Franklin et al., Wiley.

Required Reading:

- **Laboratory Workbook. Students must purchase the PHYS1200 Laboratory Workbook from the Print Centre and bring it to the first laboratory session.** You need to order online via the Uni-print website, and collect from UoN Print from the 19th Feb 2024 (O-week) or select delivery at check out and have it sent straight to their home address. No readers are kept on hand at the University, they are all printed to order to minimise wastage.

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

- Laboratory Induction Requirement – Students must attend and pass the induction requirements before attending these sessions. In order to participate in this course students must complete a compulsory safety induction.
- Tutorial Attendance Requirement – Students must attend more than 80% tutorial sessions for this course.

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Mechanics	Lectures/Tutes	
2	4 Mar	Mechanics	Lectures/Tutes/Lab	
3	11 Mar	Waves	Lectures/Tutes	
4	18 Mar	Optics	Lectures/Tutes/Lab	Lab Report 1
5	25 Mar	Electricity	Lectures/Tutes	
6	1 Apr	Electricity	Lectures/Tutes/Lab	Lab Report 2
7	8 Apr	Revision	Mid-Semester Test	Mid-Semester Test
Mid-Semester Recess				
Mid-Semester Recess				
8	29 Apr	Magnetism	Lectures/Tutes/Lab	Lab Report 3
9	6 May	Thermal	Lectures/Tutes	
10	13 May	Fluids	Lectures/Tutes/Lab	Lab Report 4
11	20 May	Nuclear	Lectures/Tutes	
12	27 May	Nuclear	Lectures/Tutes/Lab	Lab Report 5
13	3 Jun	Revision		
Examination Period				
Examination Period				

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Laboratory Exercises	Through the semester	Individual	30%	3, 4, 5
2	Mid-semester test	in Week 7	Individual	30%	1, 2, 3
3	Final examination	During formal exam period	Individual	40%	1, 2, 3

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Laboratory Exercises

Assessment Type Tutorial / Laboratory Exercises
Purpose Individual and Team Lab Report
Description Collect and analyse data and write a Lab Report
Weighting 30%
Due Date Through the semester
Submission Method In Class
Collected at end of Lab
Assessment Criteria Specified in Lab Manual
Return Method In Class
Feedback Provided Returned Work.

Assessment 2 - Mid-semester test

Assessment Type In Term Test
Purpose Mid-semester test (During normal lecture time)
Description MCQ's and Short Answer Questions covered from Week 1 to Week 6
Weighting 30%
Due Date in Week 7
Submission Method In Class
Papers collected at end of test
Assessment Criteria Specified on test
Return Method Online
Feedback Provided In Person. Students to see Course Coordinator for individual feedback

Assessment 3 - Final examination

Assessment Type Formal Examination
Description MCQ's and Short Answer questions
Weighting 40%
Due Date During formal exam period
Submission Method Formal Exam
Papers collected at end of exam
Assessment Criteria Specified on paper
Return Method Not Returned
Feedback Provided In Person. Students to see Course Coordinator for individual feedback

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Attendance

Attendance/participation will be recorded in the following components:

- Tutorial (Method of recording: Students register attendance myUni app. A minimum of 80% attendance is required for tutorials in all 1000 level courses.)

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.

Adverse Circumstances	The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where: 1. the assessment item is a major assessment item; or 2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system; 3. you are requesting a change of placement; or 4. the course has a compulsory attendance requirement. Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236
Missed Labs and Assessments	If you miss a lab or quiz, you must submit a "Missed/Late Assessment Form" immediately by email to CESE-SIPS-Admin@newcastle.edu.au with supporting documentation as per the Adverse Circumstances Policy which can be viewed here.
Important Policy Information	The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.