

# PHYS 101 – 22S2

## ENGINEERING PHYSICS A: MECHANICS, WAVES AND THERMAL PHYSICS

**PHYS101** is a 15-point course that meets the Physics requirement for Engineering Intermediate, and is required to advance in Physics and Astronomy.

### COURSE INFORMATION

Your first reference for all matters related to PHYS101 should be this document (the course outline) which is available on LEARN. The document may be updated if necessary e.g. if changes are required as the covid situation evolves.

**All classes will be run in person in S2.** You are **expected to** wear a mask and physically distance as much as possible. If you are unable to attend in person classes due to vulnerability or a medical exemption, you should email the PHYS101 account and we will attempt to arrange an alternative online session.

**If you are ill you must stay away from all in-person classes and activities.**

### QUERIES, QUESTIONS, ISSUES

We aim to support your learning in as many ways as possible, and we provide weekly drop-in classes and helpdesks, in addition to tutorials - see below for details on each of these. These should be the first places you look for support if you have questions about the *course material*.

If you have a problem with the laboratories or the tutorials, in the first instance you are expected to see Cliff Franklin (see labs section below) or your tutor respectively. If you have questions about any other matter, such as administrative issues, the answers are almost certainly in this document, or on LEARN. Please check the discussion forums on the LEARN pages (see LEARN section above) and ask general questions in those forums.

If you have checked the course outline **and** LEARN and you **still** have a query, you may email your question to

[physics101@canterbury.ac.nz](mailto:physics101@canterbury.ac.nz)

You should make the subject line of your email informative enough so that the issue is immediately clear, so that your question can be answered promptly by the appropriate person. **All correspondence should be sent to this email address: do NOT email the course lecturers directly.**

Note that while we aim to be as helpful and supportive as possible, **we find that many enquiries relate to information which has already been provided** in this document or on LEARN. With more than 500 students in the class such enquiries are frustrating, and distract resources and attention from students who have genuine issues, and so they **may not be answered**.

## CHECKLIST – things to do BEFORE the course starts

This is a summary of initial tasks, as described below, it is not a substitute for reading this document.

- Read the course outline (this document) carefully
- Explore LEARN
- Read through the week 1 Activities on LEARN, and do the required pre-reading
- Check you can access slido and do the first slido question
- Use MyTimetable to choose your lab **and** tutorial times and check the times you chose are showing correctly in your MyTimetable. Tutorials start in Week 1 for all students. Dependent on your laboratory stream you may have a lab in the first week.
- Purchase a red or green laboratory notebook from the University Bookshop.
- Make a start on the maths problems that you are required to hand in at the first tutorial.

## LEARN

This course will make extensive use of LEARN <http://www.LEARN.canterbury.ac.nz/>. LEARN is a web-based resource. All course announcements and handouts will be via LEARN.

There is a separate ‘Section’ (i.e. page on LEARN) for each week of the course. It describes the material to be covered and also provides a check list of work to be completed each week.

In order to receive important announcements, it is essential that you look at the LEARN site and look at your University email account **at least every few days**.

You should familiarise yourself with the layout of the LEARN site, and what each section contains. Start by looking at the News (announcements) on the homepage, then look at the Week 1 section to find out **what you need to do before the first lecture**, take a look at the tests and exams section to see what kinds of questions you will need to answer, and then look at ECHO where the lecture recordings are posted.

## TEXTBOOK

The **required text** is Serway, Jewett, Wilson, Wilson and Rowlands, **Physics Vol 1. and Vol. 2 (2<sup>nd</sup> edition)** [Note that other editions are available, including the 1st edition by Serway, Jewett, Wilson and Wilson (SJW<sup>2</sup>)].

Some relevant but elementary sections of the text completed in NCEA level 3 (or equivalents) will not be covered. Chapters 1 and 2 are **assumed knowledge**. The chapters of the text **covered in PHYS 111 and/or NCEA level 3 and so largely assumed in PHYS 101** are 3-6, 8, 15. Please look at the textbook and check that you are familiar with these sections: allow yourself study time with the text to catch up on them if necessary.

## ILLNESS AND COVID

**If you are ill you must stay away from all in-person classes and activities.**

### Weekly classes

If you are required to self-isolate, or if you are ill, please do the following:

#### Lectures and Drop-in classes:

Simply watch the lectures online when you are well enough, either via the live stream or via ECHO.

#### Tutorials:

If you miss more than two tutorials because you are too sick to study, email the PHYS101 account and request an exemption for the specific tutorials. Note that if you only miss one or two tutorials you will not lose any marks as you are only required to do 10 of the 12 tutorials.

If you are well enough to study, use MyTimetable to allocate yourself to one of the online tutorials that will be run on Zoom. Once you have allocated yourself to the zoom tutorial, you should be able to see a zoom link under the 'Tutorial' section of that Week's LEARN page which will enable you to join your online tutorial session. [Note that LEARN will take an hour or two to update your tutorial group.] When you are no longer isolating, you must then use in MyTimetable to reallocate yourself to your original in-person tutorial. **These online tutorials are only for people who are self-isolating or sick.**

#### Labs:

Email the PHYS101 account and request either an exemption or the chance to attend a lab session at an alternative date.

**Please remember:** when emailing [physics101@canterbury.ac.nz](mailto:physics101@canterbury.ac.nz) make sure to use a descriptive subject line. Include your tutor's or demonstrator's name if possible.

### Tests and exams

There are no 'resits' or alternative test times.

If you are ill and **miss any assessment item worth more than 10% of the course mark** (i.e. a test or the exam) you should submit an application for special consideration. Details of this process are available at: <https://www.canterbury.ac.nz/study/special-consideration/>

## CLASSES

### Lectures

	Lecture time	Location
Monday	09:00 – 10:00	Lecture Theatre C1
Wednesday	16:00 – 17:00	Lecture Theatre C1
Friday	10:00 – 11:00	Lecture Theatre C1

All lectures will be live streamed via a link on ECHO, which is accessed inside LEARN. Look for the ECHO symbol at right – it should be in the top right of the PHYS101 LEARN page. Live streams are indicated by a green “live” symbol.



Recordings of each lecture are also available via ECHO.

Note that the capacity of the lecture theatre is ~400, which is substantially fewer than the number of enrolments for this course. Since some students choose to watch online this will not usually be a problem. However, if you arrive at the lecture theatre and it is full, head to the live stream instead.

### Lecturers / topics

Simon Brown will teach the first five weeks of lectures, Alex Schudeboom will teach the next four weeks, and Martin Allen will teach the last three weeks.

Thermodynamics	Prof. Simon Brown Beatrice Tinsley Room 417  15 lectures
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This part of the course focuses on developing a fundamental understanding of how engines work. Topics covered include: work, heat and temperature; first law of thermodynamics; transfer of heat; heat engines; 2nd law of thermodynamics; entropy.

**Relevant text:** Vol.1 Chapter 16-18, 19 – 22.

Mechanics and Conservation Principles	Dr. Alex Schuddeboom Earnest Rutherford Room 502  12 lectures
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Coordinate systems; vectors; projectile motion; circular motion; Newton’s Laws; friction; potential and kinetic energy; Conservation of energy and angular momentum; Moment of Inertia

**Relevant text:** Vol. 1 Chapter 2-10, 13, 14

Electricity and Magnetism	A/Prof. Martin Allen Electrical Engineering Link Rm 303  9 lectures
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Electric Charge, Coloumb's Law, electric Fields, capacitors, metals, semiconductors, superconductors, magnetic fields and magnetic force. Electromagnetic induction and Faraday's Law.

**Relevant text:** Vol. 2 Chapter 23, 25-27, 30-31.

## Tutorials

**Senior Tutors:** Benjamin Haenraets and Morag Hills

PHYS 101 includes 12 tutorial sessions, **starting in Week 1**.

Standard tutorials will be in person small group sessions. **You need to allocate yourself to a tutorial stream** via MyTimetable. If you need help with your allocation please email [physics101@canterbury.ac.nz](mailto:physics101@canterbury.ac.nz).

**If you are a distance student** (i.e. if you are enrolled in PHYS101-22S1 (D), not PHYS101-22S1 (C)), you **will be** allocated to a dedicated online tutorial.

A tutor will guide your approach to solutions of the problems. Your participation in tutorials is essential – you LEARN physics by solving problems – and is important preparation for the test and exam. You will receive half of your participation mark for handing in an 'honest attempt' at two of the questions (provided the week before the tutorial), the other half is for participation in the tutorial. Any concern about tutorial grades should be taken up with your tutor initially. If you are still unsatisfied, you should contact the senior tutor or the course coordinator.



Photo to be added

## Helpdesks

Tutors will be available several times each week (times will be announced on LEARN) to help support student questions and provide support. They are there to help you, and we really hope you will make use of this opportunity to ask questions and personalized input.

You are welcome to discuss the weeks tutorial and online problems (but don't expect to be given the answers!) as well as the course material in general.

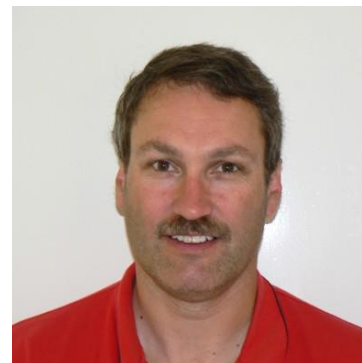
## Drop-in classes

To supplement lectures, we will also run an optional drop-in class at midday Thursday in Rehua 102 which will also be live-streamed. The aim of the Drop-in class is to give you an opportunity to ask questions about the content from the previous week and get the lecturer to go through worked problems and previous tutorial examples. This is **OPTIONAL**, but please take this opportunity if you feel you need extra support. Each Drop-in class will start with a review of material.

## Laboratories

**Supervisor:** Cliff Franklin, RRSIC 322.

The course includes 6 laboratory sessions of 3 hours each. Labs are in person and start in week one or two dependent on your stream. There are a number of streams to choose from. **You must allocate yourself to a stream before the course starts**, using MyTimetable. If you are a distance student (i.e. if you are enrolled in PHYS101-22S2 (D), not PHYS101-22S2 (C)), you will be allocated to a dedicated online lab. If you have any queries on your allocation please see Cliff Franklin.



The laboratory work complements the lecture material. Some experiments introduce you to particular experimental techniques. Others illustrate lecture topics. **Laboratory attendance is compulsory and satisfactory performance in the laboratory work is required to pass the course as a whole.**

**Before attending this first session**, purchase a red or green laboratory notebook from the University Book Shop. If you already have one from a previous course you can use that, as long as it is less than half full. Lab manuals are provided at the first lab, free of charge by the department. Bring your manual and your notebook to the introductory laboratory session.

If you are **unable to attend** in person because you are self-isolating due to COVID-19 or other illness, you should email the PHYS101 account and request either an exemption or the chance to attend a lab session at an alternative.

5% of the course credit is based on checkpoint marks assessed by the demonstrators for your laboratory notes which will be marked during your session. Two formal reports based on these weekly notes will also be required to be handed in. The best mark from the two reports is worth another 10% of the course credit. Special sessions will be held to guide you in the format and style expected for these formal reports.

**Lab exemption:** An exemption from the lab component of the course will be granted to students who have passed the laboratory component of an identical or comparable course with above average grades, but failed the course on other grounds. Since laboratory work is designed to reinforce the lecture content as well as teach practical skills, exempted students are encouraged to participate in any labs from which they feel they could benefit. Laboratory course credit can only be used to gain one consequent exemption.

## ASSESSMENT

### Course credit

A satisfactory performance in the laboratory, tutorials and homework are required for a passing grade in this course.

- 5% Prior to class questions via SLIDO (you need to do at least 30 out of 36 questions to get full marks). Half marks are given for participation and half for the correct answer.
- 10% Tutorials. Marks will be assigned for BOTH *active* participation in your tutorial stream AND for ‘honest attempts’ at a subset of the assigned tutorial questions. The maximum grade can be achieved for participation in 10 out of the 12 sessions. Pre-tutorial work in Week 1 will be accepted after the session.
- 20% Online Term Tests (10% each)  
Test A in Week 5  
Test B in Week 9  
**Check your timetable for the exact day / date.**
- 15% Laboratory (5% lab book checkpoint marking/laboratory participation; 10% two laboratory reports assessment grade based on your highest marked attempt)
- 50% Final examination.

Times and dates for the tests and exam will be announced in due course, but should appear in your timetable automatically.

The following numbers should be considered as a guide to the expected grades under normal circumstances. The School reserves the right to adjust mark/grade conversions, if necessary.

Please note that for the exam failure to obtain a mark of at least 40% will result in a final grade no higher than an R at 100 and 200 level, and a C- at 300 level.

Grade:	A+	A	A-	B+	B	B-	C+	C	C-	D	E
Minimum mark %:	90	85	80	75	70	65	60	55	50	40	0

### Final examination

The final examination will be an in person exam: date/time/place to be advised. This will count 50% toward your final mark in the course. It tests your grasp of the lectures, problems completed in tutorials, and reading material. Previous years exam and test papers are downloadable from the library website and are available (in many cases with solutions) on LEARN in the ‘Tests and Exams’ folder.

You will need a calculator for the exam and for the tests. **Calculators need to be of an approved type and you must ensure it has the appropriate sticker** – for details see [General Course Information \(PDF 163KB\)](#).

## Term tests

There will be two Term test. These tests will take place in person, in the evening and be 60 minutes long, and will each be worth 10% of the course grade. The key goal of these tests is to provide you with feedback on the status of your understanding. Further information will be given in lectures.

## Slido

To ensure you are doing the required pre-reading **for each lecture**, you are required to do a short problem **before** each class using 'slido'.

Simply

- go to [www.sli.do](http://www.sli.do)
- Enter the event number provided on that week's LEARN page. This is typically something like #SBL1P1.
- Sign in with your UC username. **You will NOT get credit for your work if you do not this!** Your UC username is in the form abc24 - it is on your Canterbury card.

## Tutorials and labs

See full descriptions above.



## GENERAL INFORMATION

The department has general policies that apply to all courses regarding such matters as Dishonest Practice, Allowed types of calculators, Marks and Grades boundaries, Late Work, Academic Liaison, Assistance for Students with Disabilities, Reconsideration of Grades, Aegrotat Applications, Missing of Tests etc. For details click on the following link:

[General Course Information \(PDF 163KB\)](#)

### Expectations and requirements of student participation in physics and astronomy courses

An important principle operating in all our courses is

#### LEARNING THROUGH ACTIVE PARTICIPATION.

This means that you must be prepared to attend all the lectures, laboratories and tutorials and attempt all the homework assignments and tests.

### Reading, homework and study

You will get as much out of this (or any) course as you put in to it. **Here are some ways you can best help yourself.**

- **Reading.** *Read* the relevant part of the text before each lecture. (A reading and problem list will be circulated.) You will understand and enjoy it more, and LEARN much faster.
- **Problem-solving.** Nothing teaches more thoroughly than solving problems. *Attempt* the set work, especially the homework, as well as past exams, and go over it with your tutor.
- **Study.** *Work over* your lecture notes with the text and problems. *Write a digest* of your notes, summarizing key points in your own way on one sheet of paper for each lecture. These summaries are invaluable in problem solving, in laboratories and in revising.

### Required preparation for this course

The course is for students who have a good level of physics and mathematics preparation. Students who do not have 14 NCEA credits in *both* level three physics *and* maths with calculus (or equivalent) are required to do PHYS111 before attempting PHYS101.