PHYS 101 – 20S2

ENGINEERING PHYSICS A: MECHANICS, WAVES AND THERMAL PHYSICS

15 points, Semester 2 [Terms 3-4] 2020

PHYS 101-20S2 is a second semester course in advancing Physics. An equivalent course, PHYS 101-20S1, is offered in the first semester. Either meets the 15-point physics requirement for Engineering intermediate courses, and contributes to the advancing requirement for Physics, Astronomy and Engineering intermediate students.

TEXTBOOK

The **required text** is Serway, Jewett, Wilson, Wilson and Rowlands, **Physics Vol 1**. **and Vol. 2 (2nd edition)** [Note that other editions are available, including the 1st edition by Serway, Jewett, Wilson and Wilson (SJW^2)]. Some relevant but elementary sections of the text completed in NCEA level 3 (or equivalents) will not be covered. Allow yourself study time with the text to catch up on these. The chapters of the text which are **assumed to be known for PHYS 101/111** are *1* and *2.* 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.*

COURSE INFORMATION AND QUERIES

Your first reference for all matters related to PHYS101 should be this document (the course outline) this is available on LEARN and the Course Information System and will be updated as information becomes available throughout the course. You should also examine the discussion forums on the course web pages (see LEARN section in this document) and ask general questions in those forums.

Any queries about information not covered in this course outline should be directed to the email address below, please email only that address as this helps to ensure that your questions are answered by the appropriate person. You should make the subject line of your email informative enough so that the issue you have can be identified from that subject line.

EMAIL: physics101@canterbury.ac.nz

COURSE SUPERVISOR

We want you to benefit from this course as much as possible, and your personal feedback is welcome at all times. Please come and see me if you have any problems. Note, however, that 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.

Prof. Adrian McDonald,
Room 317 Beatrice Tinsley,
Course supervisor

LECTURES

Lecture times and locations are identified below.

	Lecture time	**Location**
Monday	5:00pm – 6:00pm	Lecture Theatre A1
Tuesday	11:00am – 12:00pm	Lecture Theatre A1
Wednesday	4:00pm – 5:00pm	Lecture Theatre A1

CREDIT

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

5%	Prior to class electronic tests (30 out of 36 for full marks)
10%	Tutorial. Marks for *active* participation and an 'honest attempt' at two of the assigned questions before the session. Maximum grade can be achieved for participation in 10 out of the 11 sessions.
20%	Term Tests 10% each Test A in Week 4 (Date/time to be announced) Test B in Week 8 (Date/time to be announced)
15%	Laboratory (5% lab book checkpoint marking; 10% Two laboratory reports assessment grade based on your highest marked attempt)
50%	Final examination three hours. Date to be announced

FINAL EXAMINATION

The final examination will be a three-hour written 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. Bring your own calculator. Calculators must be approved – look out for announcements on how to get this done.

A satisfactory performance in the Exam is required for a passing grade in this course.

Previous years exam papers are downloadable from the library website and available on LEARN.

TERM TESTS

Over the course of PHYS101 there will be two Term tests to be completed on campus. These tests will be one hour long and in total will be worth 20% of the course grade. The key goal of these tests is to provide you with feedback on the status of your understanding. These tests are planned to occur in Week 4 and 8 of the Semester. Further information will be given in lectures.

LECTURERS / TOPICS

As noted above PHYS101 is taught in two streams. Adrian McDonald will teach four weeks of lectures in Term 1, Simon Brown will teach the next five weeks of lectures and Martin Allen will teach the last three weeks of lectures.

Mechanics, Conservation principles, Fluids.	Prof Adrian McDonald Beatrice Tinsley Room 317, Phone x92064 12 lectures (Term 3)

Coordinate systems; vectors; projectile motion; circular motion; Newton's Laws; friction; potential and kinetic energy; Conservation of energy and angular momentum; Moment of Inertia; Fluid statics; Fluid Dynamics.

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

Thermodynamics	Prof. Simon Brown Rutherford Room 610, phone x94255 15 lectures (Term 3 and 4)

Simple harmonic motion; reflection and transmission of waves; sound waves; superposition of waves; interference; 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.***

Electricity and Magnetism	Associate Prof. Martin Allen Electrical Link Rm 303 phone x95634 9 lectures (Term 4)

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.***

DROP-IN CLASSES

To supplement lectures, we also run an optional Drop-in class at 4pm Thursday in Rehua 528. 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.

LEARN

This course will make extensive use of *Learn*: http://www.learn.canterbury.ac.nz/. *Learn* is a web-based learning resource. All course announcements and handouts will be on *Learn*.

In order to receive important announcements it is essential that you look at the Learn site and look at your University email account regularly.

TUTORIALS

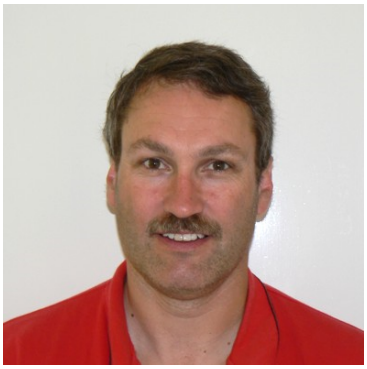
PHYS 101 includes 12 tutorial sessions, **starting in Week 1.**

Standard tutorials will be small group parallel sessions. Students can find their allocation by downloading their timetable from UC Student Web ("MyTimetable"). If you need to change your allocation please see **Cliff Franklin** in RRSIC 322.

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. Note that your tutor will judge whether you have made an 'honest attempt' based on a set of instructions from the lecturer available on the LEARN web page. Any appeal against these decisions, which will only be considered in exceptional circumstances, need to be addressed to the current lecturer.

LABORATORIES

Supervisor: Cliff Franklin, RRSIC 322.



The course includes 7 laboratory sessions of 3 hours each.
Labs start in week four. There are a number of streams to choose from. Students will have been allocated a stream before the course starts. They can change their lab stream by downloading their timetable from UC Student Web. 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. **Satisfactory performance in the laboratory work is required to pass the course as a whole.**

The laboratories are situated on level three of RRSIC, rooms 319 and 320. The first session will start with an introductory talk about times, partners etc, and to provide information on the format and structure of your lab write-ups, before we start on experiment one.

Before attending this first session, purchase a red or green laboratory notebook from the Copy Centre in the Main Library. 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 free of charge by the department. Bring your manual and your notebook to the introductory laboratory session.

5% of the course credit is based on checkpoint marks assessed by the demonstrators for your laboratory notebook during the laboratory. Up to two **formal reports** based on these weekly notes will also be required to be handed in. The best mark from the two is worth another 5% of the course credit. Special sessions may 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.

HELPDESK

Tutors will be available in the tutorial rooms on the second floor of the physics building for two periods each week (times will be announced in lectures). They are there to help you, and we really hope you will make use of this opportunity to ask questions and get input on model solutions throughout the semester.

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.

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. Please consult the department website for details:

www.phys.canterbury.ac.nz/courses/PhysicsCourseGeneralInformation.pdf

EXPECTATIONS AND REQUIREMENTS OF STUDENT PARTICIPATION IN PHYSICS AND ASTRONOMY COURSES

An important principle operating in all our courses will be that of

***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 all course tests. If you are unable to meet all these commitments, then you may not be well suited to studying physics.

The only exceptions to full participation in all aspects of the course will be

- students who have been issued with a written laboratory exemption;
- students who produce a doctor's certificate (or other evidence) to the Laboratory Supervisor (in the case of missed laboratory work) or to the Course Coordinator (in case of missing other work).

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.

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. There will also be a preparation quiz in Week 1 to identify students that might require more help.