PHYS/ASTR 381
Advanced Experimental Physics and Astronomy

Course Coordinator:
Dr Alex Schuddeboom
Julius von Haast 7th floor
Email: alex.schuddeboom@canterbury.ac.nz

Lab Demonstrator:
Dr Adam Hyndman
Email: adam.hyndman@canterbury.ac.nz

Lab Manager/ Technician:
Mr Cliff Franklin
Email: Cliff.Franklin@canterbury.ac.nz

Introduction

Welcome to the PHYS/ASTR 381 course in advanced experimental physics and astronomy. These co-coded courses are both 15-points and run concurrently in the second semester. Those wishing to include more than 15 pts of course work are encouraged to consider PHYS/ASTR 391, which are further individual research projects supervised by a staff member (you are encouraged to go and talk to any staff if you are interested in undertaking a project in their research area).

The emphasis in this course is on skills that are useful in further study/research and are also industry relevant. Specifically, you will gain experience in:

1. using computers for instrument control and data acquisition;
2. using the Python programming language to complete advanced data analysis;
3. producing a formal written report on a research project; and
4. completing oral presentations in a variety of situations,

You will also develop a deeper understanding of the differences and similarities between Mātauranga Māori and Western Science, enhancing your bicultural competence.

Assessment summary

The course is marked out of 100. Since it is a 15-point course the nominal workload is approximately 150 hours over the semester, i.e. 12.5 hours per week. The assessment is distributed as follows:

Practice Oral Presentation	5 %
Introduction to Data Analysis using Python 1	10 %
Introduction to Data Analysis using Python 2	10 %
Data acquisition and Instrumental Control	10 %
Mātauranga Māori – Mihi and Summary	15 %
Project report	35 %
Project Presentation	15 %

Practice Oral Presentation: Week 3 and Week 4
5% Oral presentation: This assessment item focusses on developing oral presentation skills. Each student will complete a 5-minute oral presentation detailing a popular science subject or discussing the limitations of a pseudo-scientific concept. These presentations will occur in Week 3 and 4. These presentations are marked via student peer assessment, but guided by a marking rubric available on LEARN. The purpose of this assessment is to prepare you for your project presentation later in the semester.

Python Data Analysis Laboratories:

10 % Introduction to Data Analysis using Python 1	Submission deadline 1st August
10 % Introduction to Data Analysis using Python 2	Submission deadline 19th September

Note that both data analysis labs will be marked in real-time in class. However, marks will be provisional until you have submitted your python code via the LEARN page and it has passed through plagiarism scanning software.

Data acquisitions Laboratories:

10 % Python Data acquisition and Instrumental Control	Submission deadline 19th September

These laboratories will provide you with experience of using data acquisition hardware and develop your ability to interact with scientific instruments using Python.

The Python code you create in class needs to be submitted by the end of Week 8 (19th September). Note that both data acquisition labs will be marked in real-time in class. However, marks will be provisional until you have submitted your code via the LEARN page and it has passed through plagiarism scanning software.

Mātauranga Māori:

As part of developing your bicultural competence:

- You will complete a session where you will be guided by the Faculty of Science Kaiārahi to develop or further develop your mihimihi. This will include a period to practice your mihimihi in front of your classmates. You will also be expected to complete your mihimihi as part of oral presentation assessments.
- You will also be given the opportunity to review documents created by Māori scholars which will allow you to gain a deeper understanding of some element of Mātauranga Māori and/or its relationship to Western Science

Project

A 6-week research project. Projects will be available for selection in Week 4 of semester and start in Week 6. The report for this project is due to be handed in by 5:00 pm Friday 17th October. Offered projects will be made available around week 4 and a showcase will be used for the academics to present you their projects. The assessment breakdown for this project is:

35 % A 12-page report in the style of a scientific paper, which will be marked by both your academic supervisor and one of the course

15% An oral presentation on your research project (The exact Time/Date in Week 11 and 12 is still TBD)

Generative AI Policy

The following shall apply for all assessments in this course, except where a lecturer has specifically stated otherwise in written instructions for an assessment. **Use Prohibited for Specified Reasons: Generative AI tools must not be used within this assessment due to specific considerations, which will be clearly communicated to students.**

In this course, you are strictly prohibited from using generative artificial intelligence (AI) to generate any materials or content related to the assessment. This is because students are expected to solve problems and demonstrate knowledge and understanding without the assistance of AI. The use of AI-generated content is not permitted and may be considered a breach of academic integrity. If you have any questions or concerns about the usage of any AI-related tools, contact the course instructors for clarity.

Halo South Campaign

This year the 381 course overlaps with a major international field campaign operating out of Christchurch called Halo South. Taking advantage of this opportunity, every student will be able to travel to the campaign site and participate in the measurement process. It is the expectation that to pass this course, each student will take part in this field campaign.

ASTR381/PHYS381 Schedule

Term 3		
Week	Session Type/ Location/ Day-Time	Content
Week 1 (week starting Monday 14th July)	Lecture / A5 Lecture/ Wednesday 1500-1800 Computer Laboratory/ Ernest Rutherford 464 / Thursday 1500-1700	Course Introduction Report Writing Skills Presentation Skills Data Analysis Lab 1
Week 2 (week starting Monday 21st July)	Lecture / A5 Lecture/ Wednesday 1500-1800 Computer Laboratory/ Ernest Rutherford 464 / Thursday 1500-1700	Building Bicultural Competence Data Analysis Lab 1 **SUBMISSION ORAL PRESENTATION POWERPOINT**
Week 3 (week starting Monday 28th July)	Lecture / A5 Lecture/ Wednesday 1500-1800 Computer Laboratory/ Ernest Rutherford 464 / Thursday 1500-1700	Student Oral Presentation Drop-in support for Data Analysis Lab 1 (OPTIONAL IF YOU NEED EXTRA TIME ON THIS EFFORT) **SUBMISSION DATA ANALYSIS LAB 1**
Week 4 (week starting Monday 4th August)	Lecture / A5 Lecture/ Wednesday 1500-1800 Computer Laboratory/ Ernest Rutherford 464 / Thursday 1500-1700	Student Oral Presentations/ Project presentations from Supervisors TBD Drop-in support for Data Analysis Lab 1 (OPTIONAL IF YOU NEED EXTRA TIME ON THIS EFFORT) **SUBMISSION MĀTAURANGA MĀORI ASSESSMENT**
Week 5 (week starting Monday 11st August)	Computer Laboratory/ Ernest Rutherford 313 or Ernest Rutherford 464 / Thursday 1500-1700 Laboratory/ Ernest Rutherford 313 or Ernest Rutherford 464 / Friday 0800-1100	Data Analysis Lab 2 OR Introduction to Python instrument control and data acquisition
Week 6 (week starting Monday 18th August)	Computer Laboratory/ Ernest Rutherford 313 or Ernest Rutherford 464 / Thursday 1500-1700 Laboratory/ Ernest Rutherford 313 or Ernest Rutherford 464 / Friday 0800-1100	Data Analysis Lab 2 OR Introduction to Python instrument control and data acquisition

Term Break (8th September to 17th October)		
Term 4		
Week	Session Type / Location / Day-Time	Content
Week 7 (week starting Monday 8th September)	Laboratory/ Ernest Rutherford 313/ Friday 0800-1100	Drop in support for Data Analysis Lab 2 OR Introduction to Python instrument control and data acquisition
Week 8 (week starting Monday 15th September)	Laboratory/ Ernest Rutherford 313/ Friday 0800-1100	Drop in support for Data Analysis Lab 2 OR Introduction to Python instrument control and data acquisition **SUBMISSION DATA ANALYSIS LAB 2** **Completion of Python Instrument control assessments**
Week 9 (week starting Monday 22nd September)	Laboratory/ Ernest Rutherford 313/ Monday 0800-1100	Drop-in support/ Laboratory access period (Assessments should be submitted by now, these sessions are listed if needed for those given permission to delay)
Week 10 (week starting Monday 29th September)	Laboratory/ Ernest Rutherford 313/ Monday 0800-1100	Drop-in support/ Laboratory access period (Assessments should be submitted by now, these sessions are listed if needed for those given permission to delay)
Week 11 (week starting Monday 6th October)	Presentations / A5 Lecture/ Wednesday 1500-1800 Second set of Presentations if required	Project Presentations
Week 12 (week starting Monday 13th October)	Presentations / A5 Lecture/ Wednesday 1500-1800 Second set of Presentations if required	Project Presentations

Herenga Akoranga | Academic Policies (e.g. special consideration, dishonest practice):
The School of Physical and Chemical Sciences 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 School website for details.