

General Course Information

July 2024

ASTR211-24S2 – Observational Astronomy

0.125 EFTS 15 Points Second Semester Course

Lecturer/Course Coordinator

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Lecturer

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General Overview

In this hands-on course, students will participate in computer labs and carry out all of the assessment by way of practical assignments. The syllabus will include: photometry, spectroscopy, image and spectrum processing methods, telescopes, CCDs, coordinate systems, astrometry, and time. Students will undertake astronomy research that includes a field trip to the University of Canterbury Ōtehiwai Mt John Observatory (UCMJO) at which students are expected to use the instruments and telescopes to obtain scientific observations for the research projects.

Pre-requisites

(1) ASTR112; (2) COSC131 or COSC121; (3) PHYS285

Before the course begins, please revise PHYS285/COSC131/121 material. In particular, the use of Jupyter notebooks, and computation of measurement uncertainties.

Course Description

The aim of this course is to give students experience in practical observational astronomy. The course takes place during Semester 2. During the course students will acquire the skills to perform basic astronomical research using data obtained from optical telescopes. The course has 12 lectures and a weekly computer lab/tutorial during the first half of the semester, in preparation for the observing field trip to the UCMJO during the mid-semester break.

By the end of the first half of the semester the students will have:

- submitted data processing reports and final reduced data for archived: 1) photometric observations; 2) spectroscopic observations,
- become acquainted with the available telescopes and instrumentation at UCMJO, and associated data reduction software,
- identified at least one suitable observing project to be carried out at UCMJO,
- prepared an observation plan to be carried out at UCMJO, and
- written an observing proposal for the identified project.

The field trip runs during the mid-semester break. During the field trip the students will be trained and supervised in the use of the telescopes and instruments at UCMJO. They will obtain observational data across all the observing proposals in a queue-scheduled observing format.

During the second half of the semester there will be no lectures but there will be two computer lab sessions per week at which the lecturers and tutors will be available to help students reduce and analyse their observations. During this time the students are expected to complete their projects by:

- reducing and analysing the data obtained at UCMJO;
- preparing and presenting a poster related to their project towards the end of the semester;
- preparing a written report summarising the observations, analysis and results for their observational project, due at the end of the semester.

Learning Outcomes

After completing this course students should be able to:

- understand and solve appropriate problems in the reduction and analysis of archive photometric and spectroscopic data,
- plan and execute an observational project using the facilities available at UCMJO, including:
 - identify a science question and identify what is needed to do to answer that science question,
 - plan observations to answer the scientific question and justify the observations,
 - make appropriate use of the UCMJO astronomical instrumentation and telescopes to obtain scientific data,
 - demonstrate understanding and application of data reduction software on the observations using appropriate programs,
 - demonstrate understanding and application of the analysis of the reduced data using appropriate programs and developing any further software tools that are required,
 - answer the science question and present the results.
- work and interact positively in small teams with each member having a specific responsibility,
- develop scientific communication skills and be able to demonstrate these in a poster presentation (including oral explanation of poster) and a written report.

Assessment

10%	Photometry data reduction
10%	Spectroscopy data reduction
20%	Observing proposal
10%	Field trip
20%	Poster presentation
30%	Written report

Timetable

Semester 2 - Term 3

There will be a total of 12 lectures, all during the first term of semester 2. Check your personal timetables at <https://mytimetable.canterbury.ac.nz/aplus/apstudent> for scheduling of lecture times and venues, as these may change.

At the time of writing these were scheduled for:

- Tuesdays 10:00-11:00pm, A9 Lecture Theatre; and
- Fridays 11:00-12:00pm, Link 309 Lecture Theatre.

There will also be 6 computer labs/tutorials. During these, you will learn how to use some of the software required to accomplish your projects and there will also be time to discuss your observing project with the lecturers and tutors.

At the time of writing these are scheduled for:

- Thursdays 12:00-3:00, Ernest Rutherford 212 Computer Lab (*Check class/venue updates*).

Mid-semester break

Field trips to UCMJO will be organised between the 24th August and 5th September. The class will be split into several groups, and each group will go in turn to UCMJO for about 4 nights each. The exact dates will be confirmed at the start of the semester.

Semester 2 - Term 4

During this term there will be no lectures but you will reduce and analyse your project data, and prepare and present your poster and written report. There will be two weekly computer labs for you to get help with the data reduction and analysis.

At the time of writing these are scheduled for:

- Wednesdays 10:00-12:00 Ernest Rutherford 212 Computer Lab (*Check class/venue updates*).
- Thursdays 12:00-2:00, Ernest Rutherford 212 Computer Lab (*Check class/venue updates*).

Timetable

Term 3					
Session	Monday Date	Tues 10-11	Fri 11-12	Thur 12-3 Lab/Tutorial topic	Assessment due
Week 1	15 Jul	L1	L2	Introduction to observing proposals	
2	22 Jul	L3	L4	Introduction to analysing data	
3	29 Jul	L5	L6	Introduction to data reduction	
4	5 Aug	L7	L8	Reducing photometric data	Thu 3pm: Submit In-lab report and reduced data file
5	12 Aug	L9	L10	Reducing spectroscopic data	Thu 3pm: Submit In-lab report and reduced data file
6	19 Aug	L11	L12	Time Allocation Committee and results presentation	Mon 5pm: Submit observing proposal.

Lecture Break	24 Aug to 5 Sep	Field trip to UC Mt John Observatory in small groups
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Term 4			
Session	Monday Date	Wed 10-12, Thu 12-2 Lab/Tutorial topic	Assessment due
7	9 Sep	Project work	
8	16 Sep	Project work	
9	23 Sep	Project work	
10	30 Sep	Project work	
11	7 Oct	Project work	Poster: Friday 12pm
12	14 Oct	Poster Presentation Project work	Poster Presentation: Wed 10am-12pm (TBC) Written report: Sun 20th Oct 11:55 pm

General Physics and Astronomy Information

Please consult the document General Course Information for Physics and Astronomy students here: <https://apps.canterbury.ac.nz/1/science/phys-chem/PHYS%20-%20Course%20Outlines/General.PDF>