Astronomy and Astrophysics
School of Physical and Chemical Sciences

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

General Course Information

July 2021

ASTR211-21S2 – Observational Astronomy: Imaging the Universe

0.125 EFTS 15 Points Second Semester Course

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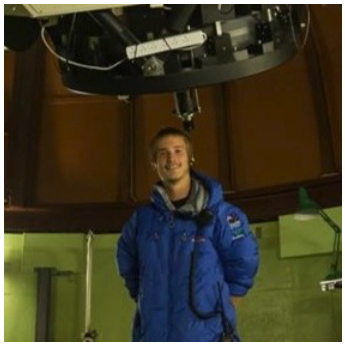

Tutors and Assistants (TBC)
Aayushi Verma, Tyler Brown

General Overview

A very hands-on course, with the participation of students in tutorials and all of the assessment by way of practical assignments. The syllabus will include: telescopes, CCDs, filters, general image processing methods, astrometry, coordinate systems and time, photometry and spectroscopy. Students will also be exposed to astronomy research, including a field trip to the University of Canterbury Mt John Observatory where students are expected to carry out their own practical observing projects.

Pre-requisites

(1) ASTR112; and (2) COSC131 or COSC121. RP: PHYS285

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 optical telescopes. The course will consist of 12 lectures and a weekly computer lab/tutorial during the first half of the semester, in preparation for an observing field trip to the University of Canterbury Mt John Observatory (UCMJO) during the semester break.

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

- identified at least one suitable observing project to be carried out at UCMJO;
- prepared an observation plan to be carried out at UCMJO;

- written an observing proposal related to the identified project; and
- become acquainted with the available telescopes and instrumentation and data reduction software.

The field trip will run during the mid-semester break. During the field trip the students will have access to the telescopes and instruments at the University of Canterbury Mt John Observatory in order to carry out their observing projects.

During the second half of the semester there will be no lectures but there will be a weekly tutorial/lab session 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 the UCMJO;
- preparing a short oral presentation to be delivered towards the end of the semester;
- preparing and presenting a poster related to their project towards the end of the semester; and
- 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:

- identify and plan a suitable observing project to be carried out using the facilities available at the UC Mt John Observatory;
- understand and demonstrate the appropriate use of astronomical instrumentation and telescopes at the UC Mt John Observatory;
- work and interact positively in small teams with each member having a specific responsibility;
- plan observations and solve appropriate problems in astrophysical research;
- develop and be able to demonstrate data reduction and analysis skills by using appropriate programs and writing software;
- develop scientific communication skills and be able to demonstrate these in a written report, an oral presentation and a poster presentation.

Assessment

20% Observing proposal
10% Field trip
20% Oral presentation
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

- Mondays 11:00-12:00, Erskine 121; and
- Tuesdays 9:00-10:00, Erskine 121

There will also be several computer tutorials/laboratories. 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 11:00-2:00, Rehua 008 *(but please check for class/venue updates)*

Mid-semester break

A field trip will be organised to the University of Canterbury Mt John Observatory during 28 August to 12 September. The class will be split into several groups, and each group will go to the observatory in turns for about 4 nights each, dates to be confirmed.

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 oral presentation, poster and written report. There will be weekly computer labs for you to get help with the data reduction and analysis. These are currently scheduled for

- Thursdays 11:00-2:00 Rehua 008 *(but please check for class/venue updates)*

Timetable

Term 3					
Session	**Monday Date**	**Mon 11-12**	**Tues 9-10**	**Thu 11-2 Lab/Tutorial topic**	**Assessment due**
Week 1	19 Jul	L1	L2	Python	
2	26 Jul	L3	L4	Aperture photometry	
3	2 Aug	L5	L6	Colour-Magnitude diagrams	
4	9 Aug	L7	L8	Spectroscopy	
5	16 Aug	L9	L10	Observing Proposal	**Observing Proposal due: Fri 20 August at 11:55 pm**
6	23 Aug	L11	L12	Talks, Posters and Reports	

Lecture Break	**28 Aug to 12 Sep**	**Field trip to UC Mt John Observatory in small groups**

Term 4			
Session	**Monday Date**	**Thu 9-12 Lab/Tutorial topic**	**Assessment due**
7	13 Sep	Project work	
8	20 Sep	Project work	
9	27 Sep	Project work	
10	4 Oct	Project work	
11	11 Oct	Talks	**Talks: Thursday 11-2 pm and ?? (TBC)**
12	18 Oct	Poster	**Poster: Thursday 11-2 (TBC)** **Written report: Fri 22 October 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