ASTR 329: Introduction to Observational Astronomy
Fall 2024

Territory Acknowledgement

We acknowledge and respect the Lək̓ʷəŋən (Songhees and Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ Peoples whose historical relationships with the land continue to this day.

General Course Information

Introduction to observational and data analysis techniques in Astronomy. Observational and practical work, directed reading.
Prerequisite: Completion of ASTR 250 - Introduction to Astrophysics.

Contact & Office Hours:

Instructor: Dr. Erica Franzmann
Office: Bob Wright Centre A115
Phone: 250-721-7750
Email: efranzmann@uvic.ca
Office Hours: 3 - 4 PM Mondays, or by appointment.
How to Contact: Please contact me via email for questions outside of class or office hours. Please note that unless your message is time-sensitive it is not likely that you will receive a reply after 9 pm. Office hours are, of course, drop-in. If you need to see me outside of office hours please contact me via email first.

Teaching Assistant: Bryn Lonsbrough
Email: blonsbrough@uvic.ca

When and Where:

Hours: 6:30 - 9:30 PM, Mondays & Thursdays

Course Credit: 1.5
Course Website: https://bright.uvic.ca/d2l/home/419868

The time will be mixed between lecture and lab work. Due to the time slot, if the weather allows we would be able to pivot to using the telescope on the 5th floor. However, if we end up observing it is very likely we will go over time (collecting the necessary calibration frames can take a while). However, it will not be *mandatory* to stay over time.

Communication

It is your responsibility to regularly check the course Brightspace page, as well as the inbox of the email address you have provided to Brightspace. These are the only methods we have to contact you.

Teaching and Assessment Modality

Lectures and Labs will be delivered face to face. You will require regular access to a computer outside of the lab (the lab classroom is a computer lab). We will have Linux laptops available on loan. If you require one, contact the course instructor.

Learning and Teaching Technologies

The ASTR 329 Brightspace page will function as the course website. Lab reports will also be submitted to the appropriate boxes on Brightspace.

There are two different ways that you can access and complete the lab work:

1. Use a personal computer to access the lab server (pcs1) through VNC (will likely require installing a VNC viewer, but otherwise minimal)
2. Install Python & other necessary software on your personal computer

You may use whichever approach you prefer. Information on both approaches is available on Brightspace. We will be using Jupyter Lab mainly as a local IDE rather than as a cloud-based hub. I encourage you to use method 2 if you can; too many people working on pcs1 at once causes it to hang.

Use of "AI" tools such as ChatGPT to compose any work to be submitted for grading in this course is prohibited. These tools are also not a reliable source for research as they have a habit of inventing information. If you use these tools to assist with research any information obtained *must be fact-checked* to determine its veracity.

Course Structure

The course consists of two 3 hour time slots per week, which will contain a mix of lecture and lab content. Depending on weather and class progression, we may also be able to use the telescope during class.

Lectures will cover topics and theory relevant to observational astronomy, while labs will provide practical hands-on data processing and analysis based on concepts learned in class. There will be four lab "Projects," with each project having a certain number of in-class lab sessions allocated to it before a lab report is due. .

Course Materials

Lecture slides and notes will be posted to the Content tab of Brightspace within an hour of the end of class. This will include links to any additional resources discussed in class. Lab exercises will be available prior to the relevant lab.

Topics

The course will cover the following topics (order subject to change)

- Astronomical Image Processing & Calibration
- AstroPy and the FITS format
- Research Databases and Catalogues
- Time and Coordinates
- Probability Distributions and Counting Statistics
- Imaging & Detectors
- Photometry
- Spectroscopy & Spectrographs
- Fourier Transform and Time Series Analysis
- Atmospheric Turbulence
- Adaptive Optics

Lab Projects

Timelines are rough and refer to approximate length from first lab session to lab reports being due.

1. Introduction to FITS and CCD Preprocessing with AstroPy (1 week)
2. Characterizing a CCD (2 weeks)
3. Photometry and the Point Spread Function (4 weeks)
4. Spectroscopy (4 weeks)

Course Outcomes

By the end of the course, you should have experience with collecting optical telescope data and the basic methods by which it is processed and analyzed. You will know where to look to find information on targets and how to find relevant research papers, and will have developed your skills in scientific writing through the composition of lab reports.

Essential Components

In order to pass the course you must:

- Complete and submit four lab reports prior to the final deadline
- Submit a final exam and achieve a minimum grade of 50% (10/20 points as defined by the course weighting)

Students who complete these components but have an overall average of less than 50% of the total will receive a grade of F. A failure to submit the final exam by the specified due date will receive a letter grade of N, regardless of their overall average in the course.

Assessments

Lab Reports: 80%

You will write a lab report for each of the four lab projects. These documents are free-form, but all except for the first exercise should follow the general format of a scientific paper. The first "project" is intended as an exploratory exercise to familiarize yourself with the FITS format and software tools, and so your report for this exercise can be less formal. The reports are weighted according to the following:

Lab 1:	10%
Lab 2:	20%
Lab 3:	25%
Lab 4:	25%

Late labs will be accepted for grading up to 48 hours after the initial deadline with a late penalty of 10% per day late.

The final deadline for you to submit any lab reports for credit will be **11:59 pm on December 6**. Concessions for late work will not be provided if you miss this deadline.

Final Exam: 20%

The final exam will be a take-home exercise modelled around the theme of constructing a research proposal for a modern observatory and what analysis you could perform with the data. More specific details on which observatory, the tools to use, and potential targets will be given out in early November so that you can begin to prepare.

You are welcome to use your own notes, research and the course resources while completing your exam. However, you will not be permitted to collaborate with other students during the exam. The exam will be distributed and submitted through Brightspace.

Academic Integrity

Students are required to abide by all academic regulations set as set out in the University calendar, including standards of academic integrity. Violations of academic integrity (e.g. cheating and plagiarism) are considered serious and may result in significant penalties. UVic Libraries has resources on **how to properly cite information**.

University Statements and Policies

Attendance and Absences

Medical documentation for short-term absences is **not required** as of the Spring 2021 term (approved by Senate). **Attendance is important.** Students who can not attend due to illness are asked to notify their instructors immediately. If illness, accident, or

family affliction causes a student to miss the final exam or to fail to complete any assignment by the end of the term students are required to submit a **request for academic concession**. Policies regarding undergraduate student academic concessions and deferrals are also detailed on the **Undergraduate Academic Calendar**.

Important Academic Dates and Deadlines

September 16 - Last day for 100% tuition reimbursement from dropped courses
September 19 - Last day for adding first-term courses
September 30 - Tuition deadline & National Day for Truth and Reconciliation (holiday)
October 7 - Last day to drop courses for 50% tuition fee
October 13 - Thanksgiving (university closed)
October 31 - Last date to withdraw without penalty
November 10 - 12 - Fall break
December 3 - Last day of classes
December 6 - First day of exams