

# Practical Astronomy: Instrumentation and Data Analysis

## ASTC02

### Fall 2022

Professor Hanno Rein

<b>Lecture</b>	Tuesdays 18:00 - 20:00
<b>Observing</b>	Tuesdays after sunset
<b>E-mail</b>	hanno.rein@utoronto.ca
<b>Website</b>	<a href="https://rein.utoronto.ca">https://rein.utoronto.ca</a>
<b>Book</b>	<p>A very good book is <i>Astronomy Methods</i> by Hale Brandt. I will sometimes assign you a chapter from this book to review.</p> <p>A useful reference is <i>Observational Astronomy</i> by Edmund C. Sutton; Cambridge University Press. The book is available as an ebook from the UTSC library website.</p> <p>A more practical resource including project ideas is the book <i>Remote Observatories for Amateur Astronomers</i> by Gerald R. Hubbell, Richard J. Williams, and Linda M. Billard; Springer International Publishing.</p>
<b>Office</b>	SW 504 C
<b>Office hours</b>	Online by appointment
<b>About this course</b>	<p>This course will operate similar to a laboratory course. The lectures prepare you for the practical part, i.e. taking observations with the UTSC telescopes and performing data analysis.</p> <p>We will use the UTSC telescopes every Tuesday after the lecture if the weather is good. Please come prepared and bring any food or clothing you might need. Depending on the weather throughout the term, we might have to schedule observations on other nights if the weather on Tuesdays is not allow us to take enough observations. Note that attending these observing sessions is mandatory and you</p>

**Final Exam**

The final exam will be an oral exam and will include some practical components. It will take place during the exam period. The exam may include, but is not restricted

- To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

Specifically to this course, please be reminded that you need to understand every solution that you submit. If you work together on an assignment, you still have to understand your submission.

There are other offences covered under the Code, but these are by far the most common. Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.

### **Learning outcomes**

The following is a list of learning outcomes that you should be familiar with by the end of the course. Note that this is not an exhaustive list but should merely be used as an indication of what the important aspects of this course are.

- You should be familiar with basic astronomical concepts such as coordinate systems, distances.
- You should be able to explain properties of stars, planets and galaxies.
- You understand basic concepts of taking astrophysical data using a telescope and a CCD camera. This includes stacking of images, dark frames, etc.
- You should be comfortable taking an observation with the UTSC telescopes by yourself and explaining the components of the telescope and their function.
- You can work with python based software to read in data, analyze and visualize it.
- You can draw informed conclusions from a given dataset, check for consistency and incorporate an error analysis.
- You should be able to write lab reports that are complete, concise, and easy to read by others.

**Tentative Class  
Schedule**

Week	Date	Topic
1	Sept 5	Introduction, getting familiar with the telescope
2	Sept 12	Coordinate systems
3	Sept 19	CCD Cameras
4	Sept 26	Electronics lab
5	Oct 3	Orbital motion of planets, asteroids and comets
	Oct 10	READING WEEK
6	Oct 17	Evolution of stars
7	Oct 24	Star clusters and galaxies
8	Oct 31	Distance measurements
9	Nov 7	Fitting and Markov Chain Monte Carlo
10	Nov 14	TBD
11	Nov 21	TBD
12	Nov 28	TBD