

## **ASTRONOMY 1400B, EXPLORING THE COSMOS WITH LAB**

**LECTURE:**              Section B        John Perry: Innovation 203  
   Office hours: 2 hours after each class  
   Email: john.perry@uvm.edu  
   (Section A James Cooney)

**4 credits.** Course materials will be posted on UVM Brightspace (Br) throughout the semester.

**Brief Course Outline:** Math is limited to basic arithmetic, appropriate for most non-science majors. But scientific logic is important, and some students may find the material challenging. We move quickly through many topics. Help sessions and office hours are available, and everyone is urged to use them. Class slides are posted on Brightspace the day after each class to assist with notetaking. But attendance in classes is important, to understand the concepts.

<u># classes</u>	<u>Subjects</u>
1	Course Introduction
1	Definitions of basic terms in physics
2	Optical and radio telescopes
1	Gravity and orbits
2	Earth motions, time, calendar, seasons and celestial Coordinates
2	Moon motions, eclipses, tides, surface and formation
1	Light and atomic structure, basic spectroscopy
3	Planets and their moons
1	Comets, meteors, solar wind, northern lights, solar system formation
1	Relativity and space-time
2	Stellar measurements, distance, magnitudes, H-R diagram
1	Stellar models and evolution: birth and prime of life
2	Death of low mass stars: white dwarfs and pulsars
2	Death of the high mass stars: stellar, galactic and cosmic black holes
1	Galaxies, spiral structure and Hubble's law; quasars
3	Cosmology: the Big Bang, dark matter, dark energy; exobiology

**Recommended text (not required):** Neil F. Comins, Discovering the Essential Universe. Sections will be noted on an extended outline on Br. There are no assigned readings or problems drawn from the text. It is **only recommended** for those who feel they need more backup material.

**Grade Structure:** **10 weekly assignments** worth 5% each, plus **three 40-minute exams**, worth 16.7% each. Approximate **letter grades** for each assignment and exam will be **derived from curves** and posted on Br the day after each due date. All numerical scores will be added together and a curve applied to the totals for the whole class to determine final course letter grades. There will be **no makeup** assignments or exams. But everyone's lowest assignment score will be dropped (not including the exams) to account for absences.

You can work with others on assignments if you want. But if you simply copy the answers, you will be poorly prepared for the exams, which are not 'open book'. Anyone seen copying their neighbor's papers or using a cell phone on exams will be reported, which usually results in automatic failure of the course.

**(Details subject to change for Spring '25)**

**LAB:** Faculty of record: James Cooney

**LAB SESSIONS: Innovation 330.** There are 9 projects, 6 of which will be done in the lab. The others will involve your own observations outdoors or online. In-lab work will be done in teams of 3 or 4. You will do the observing labs individually or with a partner. You will hand in your own individual lab report at the end of each session on the Report Form provided.

The lab sessions start **September 19**, so the lecture course topics can stay ahead of the lab projects. **Do not come to the lab until then.**

A team of TAs are present in every lab session to help you. They will provide their contact information to help with the labs you do on your own.

**GRADING:** Each project counts 10% for a total of 90% for the course.

**ABSENCES:** You are expected to attend each in-lab session, and the brief introductory sessions for the observing labs. If you must miss one, contact your TA in advance, and they will try to switch you into another section for that week only. If that can't be done, there will be a makeup session at the end of the semester.

**SUPPLIES:** Bring a pencil, and a simple calculator if you have one. The lab procedure, report forms and any photos or diagrams that you may need will be provided in the lab. Each project and a short help video for some will also be posted on UVM Blackboard ahead of each lab day, so you can become familiar with the project in advance.

**PROJECTS:**

- 1- *Lenses and Telescopes*
- 2- *Stellar Coordinates and Star Charts*
- 3- *Mountains and Craters on the Moon*
- 4- *Retrograde Motion of the Planets*
- 5- *The Lengths of the Solar and Sidereal Days ("Observing" Lab)*
- 6- *Interactive Online Star Chart ("Observing" Lab)*
- 7- *The Synodic and Sidereal Months ("Observing" Lab)*
- 8- *Star S2 and Our Galactic Black Hole*
- 9- *Atomic Spectra and the Hubble Law*