

ASTR 170B1: The Physical Universe

Professor Chris Impey
ILC 125: Mon & Wed 4:00-5:15pm

Teaching Team

Your instructor is Chris Impey, University Distinguished Professor in the Department of Astronomy. Email is a good way to reach us; we try to answer all messages within a day. You're welcome to see us outside office hours but it's best to make an appointment first, by phone or by email.

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Phone: 621-6522 Office Hours: 3:00-4:00PM Monday; 11:00-Noon Thursday

Course Coordinator Matthew Wenger: mwenger@email.arizona.edu, Steward Observatory Room 335. Phone: 621-2757. Office Hours: 1:00-2:00PM Tuesday; 11:00-Noon Friday

Graduate Student Teaching Assistant David Lesser: dhlesser@email.arizona.edu, Steward Observatory Room 302. Phone: 621-2494. Office Hours: 2:00-3:00PM Monday; 2:00-3:00PM Wednesday

Undergraduate Preceptors: Lindsey MacTaggart, Josh Ritter, Kara Terry, and Ross Eckley. Office hours to be announced on D2L.

Overview

ASTR 170B1 "The Physical Universe" is a Tier 1 course of the General Education program. It does not assume any prior knowledge of astronomy. Our class meets on Mondays and Wednesdays from 4:00-5:15pm in Room 125 of the Integrated Learning Center. We will broadly cover all aspects of astronomy, from planets to cosmology. This will be a "flipped" class, which means all the lectures are online and class time will be used for hands-on activities and group work. It's also a half-semester class, so the pace will be rapid. The study of our place in the universe is an amazing intellectual adventure so prepare to be challenged and stimulated!

Goals

This course has ambitious goals, but what is life without ambition? Very few of you will become scientists, but you all live in a world that is shaped and transformed by science. In this course, concepts will be more important than facts. The goals are to:

- Give a sense of the role of humans in the vast universe
- Show the small set of physical rules that govern nature
- Give a sense of the cutting edge of discovery in astronomy
- Use teaching methods that engage you in your own learning

Note that this last one involves you! Science does not happen through pure contemplation and learning does not happen by just listening. That's why all the lectures are online and class time will be used for dialog, writing, labs, and small group activities. For most of these activities you will be working in groups of three, and if it's a graded assignment all members of the group get the same score. There will be reading quizzes online, designed to make sure you have understood the content of the video lectures. The final component of the class is a project, which takes you through picking an astronomical object that you might want to observe, writing a proposal, doing background research, and gathering the results into poster that you will present at the end of the semester.

Class Materials

We'll use the UA course management system Desire2Learn (go to <http://d2l.arizona.edu> and follow the instructions for students). All class materials, including this syllabus, will be on D2L, and you will do reading quizzes and submit projects there. The video lectures for the class will be hosted outside the UA, at Udemy (go to <http://www.udemy.com> and look for the course "Astronomy State of the Art (Enhanced)"). You will need to set up a user account at Udemy but access to all the materials is free. The price of textbooks is a real burden on students, so for background information on any of the course topics, we will use the "Teach Astronomy" web site (go to <http://www.teachastronomy.com>), which has over 500 articles written by your professor that form the equivalent of an introductory astronomy textbook. To learn about positional astronomy and prepare for the project, we will be doing class activities using the free planetarium package "Stellarium" (for PC, Mac, and Linux at <http://www.stellarium.org>).

Structure and Grades

There are no in-class lectures, so you will be watching video lectures online at the Udemy web site, doing this ahead of time to be prepared for the following week's activities. Each

week there will be a D2L quiz based on the video lectures for that section. The quiz must be completed before 11am on Monday. Monday's class will usually start with an online Stellarium activity, followed by a Q&A session on the video lectures, then a short worksheet activity that you will do in groups of three. Wednesday's class will typically start with an individual writing assignment, then a worksheet-style lab activity designed to be done by a group of three. That activity will be handed in and graded, with everyone given the same score. There will be a semester-long project, described separately. **There are no exams or final in this class.** Grades are on a standard scale, with 90-100% an A, 80-90% a B, 70-80% a C, 60-70% a D, and below 60% a failing grade. The different categories of work will have similar mean scores. No late work will be accepted without a prior justification. There will be no make-ups for individual assignments in this class and no "extra credit." However, consistent participation will be rewarded for those who end up just below a final grade boundary. You will be eligible to get 1% added to their grade if they've completed all or all but one of the assignments in each of the following categories of work: video/reading quizzes, writing assignments, and in-class activity worksheets. You can get a second added 1% for completing all or all but one of the in-class lecture tutorials. The contribution of different types of work to the final course grade is:

<i>Type of Work</i>	<i>Total #</i>	<i>When Due</i>	<i>Total %</i>
Quizzes on Video Lectures	7	Monday by 11am	15%
Writing assignment	8	Tuesday in-class	15%
Activity group worksheets	8	Thursday in-class	40%
Observing Project	1	Various (see above)	30%

Observing Project

The observing project is a course-long final project that takes the place of a final exam. The goal is to produce a scientific poster that will be presented to your fellow students during the time of the scheduled final exam. The first component will be an observing "proposal" describing an object you wish to observe, the location and date from which you will observe it, the sky coordinates, and a description of why this object is significant or interesting. The second component will be submitting a draft version of the text for your "scientific poster." This should contain images and descriptions of your object, detailed descriptions of the "type" of object or phenomenon and information about the object itself and its discovery and history, as well as any other interesting or important information. The culmination of the project will be when you present it to the class, in poster form, just as at a scientific conference. Since there is no final, we'll use the time set aside for that to do the poster presentation: Wednesday, May 14, 3:30-5:30pm in our classroom, ILC 125.

Conduct

Please do not eat, drink, carry on conversations, surf the Internet, or read newspapers in

class. UA policy (see <http://deanofstudents.arizona.edu/academicintegrity>) prohibits all forms of academic dishonesty, including cheating, plagiarism, and fabrication; all students should be familiar with it and follow it in this class. Behavior is also governed by UA policy (see <http://deanofstudents.arizona.edu/disruptiveandthreateningstudents>). When you sign an activity on Thursday, you are stating that you were actually there for the whole activity. Each observing project should be unique and done individually.

Class Schedule

Week	Date	Topic	Assignments
1	March 10	Introductions and overview of the course	
	March 12	The scientific method	
2	March 24	Introduction to Stellarium; Telescopes	Video quiz on Udemy section 2
	March 26	Studying the spectrum of light	
3	March 31	Our solar system	Video quiz on Udemy section 3
	April 2	Planetary exploration	
4	April 7	Formation of our solar system; starting on final project	Video quiz on Udemy section 4
	April 9	Finding planets orbiting other stars	
5	April 14	Stars	Video quiz on Udemy section 5
	April 16	Properties of stars	Observing proposals due
6	April 21	Galaxies and our Milky Way	Video quiz on Udemy section 6
	April 23	Dark Matter; citizen science	
7	April 28	Cosmology and the "Big Bang"	Video quiz on Udemy section 7 Observing report rough draft due
	April 30	Our expanding universe	
8	May 5	History of life on earth	Video quiz on Udemy section 8
	May 7	Life in the universe	
FINAL EXAM	May 14	Final project presentations (NOTE: this is during the final exam time)	Final posters due on D2L

ENJOY THE CLASS!