

Astro 14 – Astrophysics: Solar System and Cosmology
Spring 2018
Prof. David Cohen

Course guidelines

The syllabus already has some information about the content and style of Astro 14, including the process of preparing ahead of time so that class time can be used efficiently and can include student-centered problem solving, discussion, and question-asking.

Here, I'd like to elaborate a little on the philosophy, plus also share with you my thoughts on student learning – the growth mindset – and equity and inclusion, as well as share some class rules and guidelines.

I am very happy to discuss any of these things with you, either collectively in class or one-on-one outside of class. Feel free to bring anything discussed here up with me, and I encourage you to talk with your classmates about it.

This class is for *you* and your own learning and intellectual growth. Students are responsible for their own learning, but Ms. Klassen and I are here – and dedicated – to help you.

You will be expected to constantly challenge yourself and interrogate your own understanding and be willing to ask questions and to make yourself go deeper into a concept or phenomenon, even when you have some understanding already. The goal of your participation in the course is to learn things – both facts, and bigger-pictures ways of thinking about science, concepts, and the universe. And to improve your skills in problem solving, applying math to physics, visualization and graphing, and communication.

Learning new things by definition means admitting (to yourself, especially, but to others, too) that you do not know important things now. Admitting/showing ignorance is not a sign of weakness or lack of intelligence...quite the opposite, in fact!

Related to this is a concept referred to as the *growth mindset*. Our abilities and skills can grow – they are not fixed. The ability to solve (astro)physics problems is not innate. As is true for almost any skill in life that is worth mastering, proficiency in astrophysics arises from practice, collaboration, and hard work (Johnson, A., et al. *The Physics Teacher*, 55 (6), 356-360 (2017)). The all-too-common stereotype of the scientist as “lone genius” is false, and it is damaging and limiting.

Because learning means growth, there may well be times in this course when you feel confused. That is a good thing. Confusion means progress. It means you are learning. And it means you are deeply engaged with the material, rather than skimming the surface. We will do all we can to make sure that the confusion is

productive confusion, and to facilitate the transition from confusion to clarity (and then into the next patch of confusion that inevitably awaits).

Science and learning are *human* endeavors and are best accomplished in a context where all people are valued and welcomed. The prevalent stereotype of the physicist as a white male skews our classroom communities, perpetuates institutional racism and sexism, and impedes our scientific progress. The physics community is struggling to overcome a legacy of elitism and demographic homogeneity, and we need your help – from all of you. Building an inclusive and equitable classroom environment serves *all* of us.

Classroom activities and their relation to preparation

- The textbook is NOT the guide for the class.
- It is incumbent on students to start learning before coming to class each time.
- A major impediment to learning is confusion about relative importance of new material - so, use my guidelines in each assignment and organize your own notes before each class, but also work on note taking, summarizing, and discussion in class.
- Class is for questions (and answers), working through confusion and difficult concepts, seeing connections.
- Expect to discuss and work on short problems in class with the students sitting near you.
- Expect to talk in class; expect to ask questions.

Classroom rules

- Students should take notes (and generally write) with pen/pencil on paper (no computers, though talk to me if you have concerns about this or if you have a disability accommodation that would make by-hand note taking prohibitive). This is partly because you will be writing equations and making sketches as well as writing text as you take notes, but also because studies have shown that by-hand note taking promotes understanding (compared to computer note taking), and generates better notes that are more useful when studying later. And computers are distracting (especially if multitasking is going on) to the user and to people sitting nearby. See the links below for some articles demonstrating these things.
- **No phones** out in class at all!
- Bring a calculator and your textbook to class.
- Be on time. Bring food and drink if you need, but keep your work area neat and uncluttered. And clean up at the end of class.
- Go to the bathroom ahead of time; no leaving the room during class without asking permission.

<http://www.chronicle.com/blogs/wiredcampus/taking-notes-by-hand-benefits-recall-researchers-find/51411>

<http://www.npr.org/2016/04/17/474525392/attention-students-put-your-laptops-away>

<http://www.sciencedirect.com/science/article/pii/S0360131512002254>