Astro 16 – Astrophysics: Stars, ISM, and Galaxies
Fall 2018
Prof. David Cohen

Course guidelines

The syllabus already has some information about the content and style of Astro 16, 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 your classmates).

The class is for you and your own learning and intellectual growth. Students are responsible for their own learning, but Prof. Jensen and I are here – and dedicated – to help you. You need to challenge yourself and interrogate your own understanding and be willing to ask questions and to make yourself go deeper, even when you have some level of understanding. 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. The goal is not to get a grade and not to please your teacher and not to impress other people.

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 professional scientist as "lone genius" is false.

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 man skews our classroom communities, perpetuates institutional racism and sexism, and impedes scientific progress. There is ample evidence for ongoing discrimination in science as well as in society at large and also evidence for the lack of fundamental differences among socially constructed groups of people. Acquiescing to discrimination is antithetical to the best qualities of science. The physics community is struggling to overcome a legacy of elitism and demographic homogeneity, and we need your help – all of you. Building an inclusive and equitable classroom environment serves *all* of us.

And although we are each responsible for our own learning and for interrogating our own knowledge and understanding and for asking questions and initiating discussions, learning is a collective activity. Helping our classmates improve their understanding, admitting we don't understand something and asking for help – these are vital activities that will make us each better students and scientists.

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 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 and even to sometimes go up to the board to solve problems.

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 have an impact on by-hand note taking). 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 phenomena.
- No phones out in class at all!

- Bring a calculator and your textbook to class as well as something to write with and something to write on.

- Be on time. Bring food and drink if you need, but keep your work area neat and uncluttered.

- 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