

# ASTB23H

## Astrophysics of Stars, Galaxies and the Universe

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### **COURSE DESCRIPTION:**

Officially: *Overview of astrophysics (except planetary astrophysics). Appropriate level for science students. Structure and evolution of stars, white dwarfs, neutron stars. Structure of Milky Way. Classification of galaxies. Potential theory, rotation curves, orbits, dark matter. Spiral patterns. Galaxy clusters. Mergers. Black holes in active galactic nuclei. Expansion of universe, dark energy.*

The focus of this course will be the distance ladder and understanding the objects which we use to determine distances. Selected other topics of interest will also be included. By the end of the term you should be able to: explain in detail how we determine distances to astronomical objects, and what sources of errors make such determinations uncertain; use a wide array of basic physics concepts to build basic models of how various astrophysical objects function; and educate lay persons about how said models work without resorting to mathematics.

### **COURSE TEXTBOOK:**

Officially, none, but I recommend you look at *An Introduction to Modern Astrophysics (2nd edition)* by Carroll and Ostlie.

### **COURSE WEBSITE**

Most material for the course will be available electronically via Blackboard. No lecture notes, however, since I will be using the chalkboard.

### **OFFICE HOURS:**

To be determined. If you cannot make them it will be possible to schedule office hours at different times. Please setup an appointment via e-mail, and expect it to take a few days (so don't wait until the day before a test to try to visit).

If you wish to ask questions electronically, please use the discussion board on the course site on Blackboard unless the issue is of a personal nature.

### **ASSESSMENT:**

**FINAL EXAM:** 50%  
**TERM TESTS (4):** 40%  
**PRESENTATION:** 10%

Note: if your final exam mark is better than your term mark (term tests + presentation), the exam will be worth 75% and your other grades will be halved.

## **PRESENTATION:**

You will have the opportunity to do a presentation for the class. Depending on class enrollment and available time you may have to do it in pairs or you might be allowed to do it by yourself. The grade is a simple pass/fail with a pass giving the full 10%.

The basic idea is that you pick (with my approval) a subject and give a 15 minute lecture on the material, immediately followed by a short time for questions and answers. If the class understands your lecture well enough then you pass. If you are part of a pair, you also need to appear to have done your fair share of the teaching in order to pass. As further incentive, if you pass then the final exam will (likely) have a question on it based on your lecture. Since you're the 'expert' on the topic, that should be good news for you.

It also means that you should pay attention to everyone else's lectures!

Students who wish to do so may submit a written outline of their lecture to me to review. I will return the outline with feedback and suggestions within two weeks, so please make sure you get this done early. My first suggestion is to keep the outline as short as possible, probably less than 5 pages, as a 15 minute talk is surprisingly short.

## **TESTS, ASSIGNMENTS AND TUTORIALS:**

There will be 4 tests. Each test will be held during tutorials. These will happen in weeks 4, 6, 8, and 10. The tests will take up all of the 1-hour tutorials.

Test questions will be based on the assignments. The assignments are not graded, instead they are practice for the tests. You should work hard to understand the assignments so that you can do well on the tests.

Tutorials in weeks 3, 5, 7, and 9 will involve class discussions of the assignment material. We will discuss difficult questions as time permits. Students will be allowed to volunteer to lead the discussions. If you so volunteer and do a good job on a question, you will be allowed to drop your worst question from one of the tests (past or future). I will try to keep track of volunteers so that everyone gets an approximately equal opportunity to volunteer.

The last two tutorials might be used for presentations if needed, otherwise they will be dedicated to question and answer periods focusing on the presentations (my preference is that they not be used for presentations). There will be no tutorial in week 2 of classes.

There will be no make-up tests. If you miss a test for an excusable reason (usually medical) the remaining tests will count for more to make up the grade.

## **EXAM:**

The final exam will cover **ALL** material, including material taught by the students.

## **NOTE:**

If you have concerns about your ability to do well in this course, *please* come visit me as soon as possible so we can discuss things. This applies to more than just concerns about public speaking. I will do my best to address any issues fairly.