

AST 358 - Galaxies and the Universe
Spring 2016 – Unique No. 46930
TTh 9:30 – 10:45 @ RLM 15.216

Professor: Steven Finkelstein	TA: Benny Tsang
Office: RLM 16.210	RLM 16.226AA
Phone: (512) 471-1483	(512) 232-3958
Email: stevenf@astro.as.utexas.edu	bhthsang@astro.as.utexas.edu
Office Hours: Th 1-2p or by appt	TBD

Course Description:

Galaxies and the Universe is an upper division course designed for majors in the physical sciences. This class will have an emphasis on galaxy evolution – how do galaxies evolve from the tiny clumps we can see in the distant universe to the beautiful, morphologically complex Milky Way we see today? We will start nearby, understanding our Milky Way, from its kinematics to its stellar populations, and then moving out to the nearby universe, studying the wide varieties of galaxies which exist today. We will then venture deep into the past, studying what galaxies looked like at a time not far removed from the Big Bang, and learning about the cosmology which shapes our universe as we do so. We will finish with an eye towards the future, and an understanding of the advances the next generation of observational facilities will bring. This class will be taught with an eye on how the observations we make allow us to learn about the universe, and how theoretical modeling allows us to learn about the underlying physics behind our observations.

Prerequisites and Core Requirements:

The class pre-requisites are upper-division standing, and one of the following: Physics301 and 303L; 301 and 316; 303K and 303L; or 303K and 316. A previous astronomy course, such as AST 307 or AST 352K is strongly recommended. A small amount of review will be done at the beginning of the semester, but if you have not taken a previous astronomy course, it is your responsibility to catch up on the material outside of class. This course will include work designed to develop skills in critical thinking, communication, quantitative analysis, and teamwork. This will involve such activities as peer-to-peer discussions and critical analysis of key concepts, written or oral presentations, and quantitative problem solving. Communication in the course will consist of student questions and subsequent classroom discussions during lecture and may also involve essay exams, and take-home assignments. Teamwork in the course may consist of working in small groups during help sessions and instructor-modeled problem solving that is guided by student decisions and group feedback. The course material will emphasize the synthesis of observation and theory to gain insight into the operation of the natural world, drawing on other fields such as physics, chemistry, geophysics, or biology.

Class Website:

This course will be primarily run through the Canvas system, at canvas.utexas.edu. All class communication will be done through Canvas.

Required Texts and Other Items:

This class has only one required text: *Extragalactic Astronomy and Cosmology*, Peter Schneider, 2nd edition. The text can be purchased at the Co-op, or through various online stores, but should you not want a physical copy you can download a free PDF of this text at:
<http://link.springer.com.ezproxy.lib.utexas.edu/book/10.1007/978-3-642-54083-7>

We will be using the Top Hat (www.tophat.com) classroom response system in class. You will be able to submit answers to inclass questions using Apple or Android smartphones and tablets, laptops, or via text message (SMS). You can visit <http://tinyurl.com/THStudentRegistration> for the Student Quick Start Guide which outlines how you will register for a Top Hat account, as well as providing a brief overview to get you up and running on the system. An email invitation will also be sent to your email account (if you don't receive this email, you can register by visiting our direct Top Hat course URL tophat.com/e/602102). Top Hat will require a subscription, which costs \$24 per semester (longer subscriptions are available to save you money if you anticipate using Top Hat in future semesters).

Occasional other reading will be required, and will be provided online or as printouts in class.

Class Structure: ---

Rather than a typical college course composed of solely lecturing, this course will combine short lectures with discussions and group activities. You will only learn if you participate, thus attendance and participation is **required!** A typical class day will be composed of the following:

- Question of the day – I will show you a recent observation, or pose a question, and you will get in groups and discuss, ending with a full class discussion.
- Brief synopsis of previous class; think-pair-share questions about concepts from previous class.
- 30–40 minute lecture (including breaks for discussion and think-pair-share questions).
- Occasional in-class activity in groups, followed by whole class discussion.

Grading Components and Policies: ---

You will receive the grade you earn. There will be no extra credit awarded at any time, so please be sure to put in the effort throughout the semester to earn the grade you want.

The composition of the course grade is:

- Midterm exam = 20%
- Final exam = 20%
- Homework = 30%
- In-class participation = 20%
- Class project = 10%

The average percentage in each of these grade components will be weighted by the above percentages to derive the final course grade, which will be assigned as follows, where the numbers represent the percentage of total points). As of now, this class will not be graded on a curve; I reserve the right to change this. Rounding will only occur in the second decimal place (i.e., 89.95 will be rounded up to 90.0, but 89.9 will not).

	93–100 = A	90–92.9 = A–
87–89.9 = B+	83–86.9 = B	80–82.9 = B–
77–79.9 = C+	73–76.9 = C	70–72.9 = C–
67–69.9 = D+	63–66.9 = D	60–62.9 = D–
	< 59.9 = F	

Exams: There will be one in-class midterm exam, and one final exam. The midterm exam will take place on either March 8th or 10th (to-be-determined soon). If an emergency occurs (death in the

family, hospitalization, etc.), you must contact me *prior* to the start of the exam. In only these extreme cases will I allow a make-up opportunity.

Homework: Homework will be assigned in class, and will cover material covered in class and in the reading. Late homework will lose 20% of the total number of points for each day it is late.

Participation: In-class activities play a big role in this class, and your **participation is required**.

Projects: There will be a term project, details TBD.

Approximate Course Schedule:

This course will roughly follow these topics in this order, though I reserve the right to change the order, and we may not get all the way through the list.

Overview of Extragalactic Astronomy

Preliminaries - astronomy you need to know

The Milky Way: structure, kinematics, stellar populations

Galaxies

Morphologies

Distance measures

Kinematics

Scaling relations

Stellar populations

Supermassive black holes

Distribution functions

Active Galaxies

Galaxy clusters

The High Redshift Universe

Selection techniques

Surveys

Physical properties

Evolution

Reionization

The First Stars

Cosmology

Upcoming observational facilities

Class Policies:

- The course webpage on the Canvas system will be updated with course announcements, reading assignments, and deadlines. It is **your responsibility to check these on a regular basis**. Please come to class prepared, having read the required reading assignments, also please be prepared to participate in in-class discussions and activities, this is for your benefit.

- Note that the professor is a professional astronomer who has research responsibilities and may be occasionally on travel in order to conduct research, present colloquia, and attend scientific meetings. In such cases, there may be a schedule change and an appropriate replacement lecture or other assignment will be scheduled.
- Do not pack up or leave class early unless you have talked to me in advance, as a consideration to me and your fellow students.
- To facilitate group-work, please sit together, and close to the front (probably not an issue given this class size).
- Phone: Phone use and texting during class will not be tolerated. Make sure your phones are off, and keep them put away during the class. Students using their phones will be asked to leave, and will not earn participation for that day.
- Laptops/Tablets: Though laptop and/or tablet use will not be a necessary part of the class, I acknowledge that some students prefer to take notes electronically, thus their presence will be permitted. I request that these students sit towards the back so that they do not distract other students. Students found to be using their computers for non-class activities will be a distraction to those around them, and will be asked to leave, and will not earn participation for that day. If laptop distraction becomes a problem, I reserve the right to reverse this policy.

Academic Dishonesty: _____

University of Texas Honor Code: The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Standards for Academic Integrity are posted at http://deanofstudents.utexas.edu/sjs/acint_student.php

Plagiarism: As a research university, the University of Texas at Austin takes plagiarism very seriously. Do not risk getting involved in a plagiarism infraction - the consequences simply aren't worth it. Always cite your sources, and when in doubt consult a professor or librarian. You may also read more about plagiarism at the Student Judicial Services website: <http://deanofstudents.utexas.edu/sjs/academicintegrity.html>

Documented Disability Statement: _____

Please notify me of any modification/adaptation you may require to accommodate a disability-related need. The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact Services for Students with Disabilities at 471-6259 (voice) or 232-2937 (video phone) or <http://www.utexas.edu/diversity/ddce/ssd>

Students with Children: —I recognize the difficulty of being a full time student with children. If you have children, please come see me to discuss any modifications of the course policies which will maximize your success in this course.

Email: _____

Email is recognized as an official mode of university correspondence; therefore you are responsible for reading your email for university and course-related information and announcements. Please check your email regularly and frequently.