Astro 358 (Unique 47935)/ Spring 2023
Galaxies and the Universe

Current Announcements

- Welcome to Astro 358 "Galaxies and the Universe" -- an upper division course designed for science and engineering majors, with a particular focus on astronomy and astrophysics majors. The instructor is Professor Shardha Jogee and the teaching assistant (TA) is graduate student Kay Yuchen Guo . This **class website is the one stop shop** where announcements and the vast majority of class materials (e.g., zoom links for class and office hours, video recordings of zoom lectures; homeworks and other assignments) will be posted, so please bookmark it and visit it regularly. You will need the id and password given in class to access some of the secure material on the website.

- As we are emerging from an unprecedented pandemic, we still face challenges in our learning, teaching, and research activities. Please remember that we are all in this together and that the classroom ia a community where we should all **show extra compassion, empathy and flexibility** while everyone navigates different individual challenges. As the professor in this class, I aim to support you in every way I can, so please do not hesitate to reach out to me (email: sj@astro.as.utexas.edu) or/and to the teaching assistant (TA) if you are facing challenges. **To help us provide safe in-person classes, please follow the Classroom Safety and COVID-19 Policy.**

- Below are some quick links for frequently accessed parts of this website:
  - Repository of Selected Material from Lectures & Assignments
  - Course Outline/Calendar
  - Course Prerequisites
  - Course Description and Goals

  - Office Hours, Accommodations, and Other Useful Resources
  - Class Attendance Policy
  - Classroom Safety and COVID-19 Policy
  - Course Assignments and Grading Policy
  - Zoom links for class and office hours
  - Course Syllabus (this is a printout of this website on the first day of class)
  - Extra Class Resources

- Check out the UT Press Release James Webb Space Telescope Reveals Milky Way-like Galaxies in Young Universe

- Check out the Astronomy Picture of the Day!

Course Overview

- **Course Prerequisites:** This is an upper division course designed for science and engineering majors, with a particular focus on astronomy and astrophysics majors. 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: if have not taken these courses, it is your responsibility to contact the professor or TA during the first week AND to make sure that you develop the required background knowledge by covering the astronomy background pre-requisite reading by the second week of class.

- **Course Description and Goals:** Astronomy 358, "Galaxies and the Universe" is an upper division course designed for majors in the physical sciences. It addresses the properties, contents, origin, and evolution of galaxies; their interaction and mass assembly history; the properties of their central black holes and starbursts; and the characteristics of the early Universe. The emphasis will be on using the laws of physics to interpret observations and understand how galaxies form and evolve. I will also discuss some of the current/upcoming exciting science from observations conducted or planned with current/next-generation telescopes. We will explore the evolution of galaxies over a wide range of epochs, from the present-day out to epochs when the Universe was a mere few percent of its present age. This class may be counted toward the quantitative reasoning flag requirement.

- **Course Calendar:** The course outline/calendar provides an approximate sequencing of topics to be covered in class. There may be schedule adjustments based on the learning curve of the class and circumstances tied to the pandemic. The course outline will be updated regularly and the most current version can be found on the class website at the above link.

Note that as outlined in the Memo to Undergraduate Astronomy Students regarding Astronomy Courses , the professor is a professional astronomer and researcher who has professional responsibilities and may be occasionally be away for reasons tied to these responsibilities (e.g., to participate in international scientific panels and meetings, to present research talks at conferences, etc). In such cases, there may be a schedule change and an appropriate replacement lecture or other assignment will be scheduled.

- **Textbook for Complementary Reading:** The lectures will include material drawn from a wide range of textbooks, as well as from published cutting-edge research results that have not yet made it to standard textbooks. When using textbooks for complementary reading, you can use the book's appendix to locate specific sub-topics covered in a given lecture. These sub-topics are often spread across several chapters in the books, so there is no one-to-one correspondence between the class lectures and the book chapters.

  The main book I recommend for complementary reading is "Extragalactic Astronomy and Cosmology" (EAC) by Peter Schneider (Publisher: Spinger, copyright 2006). Several desk copies of the textbook are on reserve for this class in the PMA library (on the 4th floor of PMA). As a UT student, you can also access a free electronic copy by going to the UT library catalog link and entering the book title. The UT PMA librarian indicates that students can download and print from this Springer book as the PDF files are digital rights management-free. If you want to purchase a hardcopy or electronic copy, please consider the purchase options below or contact local bookstores:

  - Google eBooks
  - Amazon (Kindle + Hardcopy)
  - Springer (Hardcopy + Electronic preview)

  Below are some books for additional reading. You can obtain online copies from the above UT library catalog link.
  - "Galactic Astronomy" (GA) by Binney and Merrifield (Publisher: Princeton University Press, copyright 1998),
  - "Galaxies in the Universe: An Introduction", by Sparke & Gallagher (Publisher: Cambridge University Press, copyright 2000)

Class Attendance Policy

This class will meet weekly in PMA 15.216B in-person (face-to-face) on **Tuesday and Thursday from 11:00 am to 12:30 pm**. Please be on time as we need to end sharply at 12:15 pm, as per UT policy. Our policies for class modality, class attendance, and class conduct are outlined below, with the caveat that UT protocols may change if the pandemic situation evolves.

1. This class will be held in person (face-to-face) in PMA 15.216B. Students will get the most from this class and benefit from class activities and a stronger supportive community by attending in person. The instructor **asks students to attend class in-person** unless they have a valid reason as outlined under point 2 below. We also ask everyone to provide a safe and effective learning environment by following the Classroom Safety and COVID-19 Policy.

2. Students may ask the instructor to allow them to **temporarily** attend the class over zoom or miss class if they have a valid documented reason. Valid reasons include the following:
   - Students who have a letter from the UT Austin office for Disability and Access allowing remote attendance or absences.
   - Students who need to miss class or attend remotely due to a critical situation and/or medical or family emergency *should ask Student Emergency Services (SES) to notify the instructor and they should let the instructor know that they have asked SES to provide a notification*. Note that students are not required to reveal or document their health status to the instructor when requesting accommodations for illness or other absences. Instead, SES will collect their confidential documentation and confirm without revealing protected details. Medical emergencies incude situations where a student has to self-quarantine or self-isolate due to COVID-19.

     If students have to **temporarily** take the class on zoom , they should turn the zoom camera on and attend the class **in synchronous mode** (i.e., at the time it is offered). We will take synchronous attendance in person and over zoom to reward participation.

3. To provide added flexibility, we plan to display the slides on zoom during in-person lectures and to post zoom-recorded lectures on the class repository. However, we stress that **these recordings will not capture the enriching in-class discussions and in-class activities** . Therefore, *zoom attendance should only be used temporarily and for one of the valid reasons* outlined under point (2) above.

4. If you miss class, please review the posted materials, recordings, and announcements on the class websites and contact the TA if you have questions.

5. Please turn off your cell phone before the start of class unless you are using it to zoom into the class.

6. As per UT Austin policy a student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible so

that arrangements can be made to complete an assignment within a reasonable period after the absence.

Office Hours, Accommodations, and Other Useful Resources:

1. We are here to support you, so do not hesitate to consult the professor or TA during the office hours listed below or by appointment if you have questions or/and need help. Beyond office hours, you can also email us but please allow **up to one business day** for a response and note that emails sent after business hours (Monday to Friday from 9:00 am to 5:00 pm when the University is open) or during the weekend may not receive an answer until the next business day.

Name:	Prof. Shardha Jogee	Kay Yuchen Guo
Hours:	PMA 15.326	PMA 17.308
Office:	Th. 1:00 to 2:00 pm (or by appointment)	Mon. 4:00 to 5:00 pm (or by appointment)
Email:	sj@astro.as.utexas.edu	kayguo98@utexas.edu

2. **You All Belong Here:** We are here to support, welcome, and educate each and every student. A climate conducive to learning and creating knowledge is the right of every person in our community, and as per the UT Austin non-discrimination policy, we are committed to providing an educational and working environment that is free of unlawful discrimination, including discrimination on the basis of race, color, religion, national origin, sex, pregnancy, age, disability, citizenship, veteran status, and genetic information. If you experience inappropriate conduct from anyone in this class or anywhere on the UT campus, please contact the professor and consider reporting your concerns to one or more of the following units: the Office of the Dean of Students, the title IX office (for sexual harassment and misconduct), or BCCAL.

3. Students with disabilities or special circumstances may request appropriate academic accommodations from the UT Austin office for Disability and Access. If you have an emergency, please contact Student Emergency Services (SES) in the office of the Dean of Students.

Classroom Safety and COVID-19 Policy

To promote **a safe in-person learning environment,** the university recommends the following practices:

1. COVID-19 vaccinations are widely available. The vaccines authorized by the U.S. Food and Drug Administration are safe, effective, and provide our best chance to have a safe in-person semester. The vaccines help protect against serious illness, hospitalization, and death, and reduce the risk of transmission to others. **All eligible**

UT students, faculty, and staff members are encouraged to get vaccinated and boosted.

2. Please take advantage of testing options on campus, such as the University Health Services Symptomatic COVID-19 Testing Center (UHS STC) (for those with symptoms of COVID-19) or UHS Proactive Community Testing (for patients who are feeling healthy). Tests are fast and free.

3. Students who feel sick, develop COVID-19 symptoms, or/and test positive for COVID-19 should stay home, inform University Health Services and/or the Nurse Advice Line at 512-475-6877, and follow the University Health Services Exposure Action Chart. They should also ask Student Emergency Services (SES) to notify the instructor and they should let the instructor know that they have asked SES to provide a notification. Note that students are not required to reveal or document their health status to the instructor when requesting accommodations for illness or other absences. Instead SES will collect their confidential documentationand confirm without revealing protected details.

4. Students who have had close contact with someone who tested positive for COVID-19 should follow the University Health Services Exposure Action Chart.

5. Your mental health and holistic well being are very important. If you need mental health services please do not hesitate to take advantage of the mental health resources for UT students and other services offered by the university Counseling and Mental Health Center.

6. Behavior Concerns and COVID-19 Advice Line (BCCAL) remains available as the primary tool to address questions or concerns from the university community about COVID-19.

7. We encourage everyone to help our UT community by using the Protect Texas App and visiting the Protect Texas Together site regularly.

Course Assignments and Grading Policy

Please submit your assignments on Canvas using the instructions provided . Your grades will be posted online on Canvas. Please note the following class policies:

1. I strongly recommend that you attend class in person as you will benefit from the lectures, discussions and class activities. We will take attendance in person and over zoom to reward and track participation.

2. The final grade will consist of:
   - 50% Homeworks
   - 17.5% First Midterm exam
   - 17.5% Second Midterm exam

- 15% In-class attendance, participation and activities (e.g., quizzes, talks) or equivalent). Class attendance accounts for 3% of the grade.

3. When converting your final numerical scores to letter grades, I will use the scheme below or one that is more lenient.

Letter Grade	Grade Points	Numerical Score (Rounded)
A	4.00	91% to 100%
A-	3.67	86% to 90%
B+	3.33	81% to 85%
B	3.00	76% to 80%
B-	2.67	71% to 75%
C+	2.33	66% to 70%
C	2.00	61% to 65%
C-	1.67	56% to 60%
D+	1.33	51% to 55%
D	1.00	46% to 50%
D-	0.67	41% to 45%
F	0.00	0% to 40%

4. Late homeworks will be accepted for partial credit provided that you have been granted an extension prior to the due date. In that case we will apply a 10% deduction for every 24 hours (e.g., a homework submitted 12 hours late will have a 5% deduction and receive 95% credit). Requests for correction or re-grade of an assignment (homework, exam or quiz) will be accepted at latest two weeks after it is handed back to you.

5. **Cheating will be severely punished** and I will consider filing a report to the Office of the Dean of Students for any student who cheats. If you submit work that is not primarily done by you or/and that you cannot explain, this will be considered as cheating. If you copy someone's assignment, exam, or quiz or if you let someone copy yours, both of you will receive zero credit and be responsible for cheating. In particular, note that **you must independently write up your assignments and you must be able to explain every step of your work if asked to do so.** You are encouraged to study with other students as long as you abide by this principle. If you use a private tutor to help you, please make sure that the bulk of each assignment is done by you. The TA and professor reserve the right to ask any student to explain his/her answers and methodology on any assignment before assigning a final score for that assignment.

6. **Sharing of Course Materials is Prohibited:** No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review

sheets, and additional problem sets, may be shared online or with anyone outside of the class unless you have the instructor's explicit, written permission. Unauthorized sharing of materials facilitates cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. UT is aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure in the course.

7. **Academic Integrity and the University Code of Conduct:** All students are expected to uphold academic integrity and abide by the core values of the university – learning, discovery, freedom, leadership, individual opportunity, and responsibility. Academic integrity expectations are outlined in Section 11-402 of the Institutional Rules on Student Services and Activities. Since academic integrity promotes the growth, development, and success of all students and the university, policies on academic integrity will be strictly enforced. Academic dishonesty includes but is not limited to cheating, plagiarism, unauthorized collaboration, falsifying academic records, misrepresenting facts, and any other acts that violate the basic standard of academic integrity. Consequences of academic dishonesty can be severe: grade-related penalties are routinely assessed, but students can also be suspended or even permanently expelled from the University for scholastic dishonesty.

Selected Material from Lectures/Assignments

The repository below will be updated throughout the semester with important class materials (e.g., video recordings of zoom lectures; pdf versions of powerpoint presentations made during the lecture; howeworks and other assignments). However, the posted materials do not capture the discussions, derivations on the board, worked examples, and other activities conducted in class. I therefore strongly recommend that you do not only rely on this posted material and do your best to attend class in-person so that you can optimally benefit from in-class discussions and activities.

- Course Syllabus on day 1 of class
- **Astronomy Prerequisite material that you need to know (covered in AST 307/352K)**
    - List of topics to review and example questions to study and figures and plots illustrating the key concepts

- Essential background material, including:
  - Electromagnetic Radiation; Radiative Transfer; Blackbody Radiation; The Magnitude Scale.
  - Properties of Stars; HR Diagram ; Structure, Evolution and Death of Stars.

  These extracts are based on Appendix A-C of "Extragalactic Astronomy and Cosmology"(EAC)by Peter Schneider (Publisher: Spinger, copyright 2006)]

- Due to past delays from suppliers selling the primary course textbook "Extragalactic Astronomy and Cosmology" (EAC) by Peter Schneider (Publisher: Spinger, copyright 2006) on time, we are providing the scanned versions of first few chapters:
  - Chapter 1
  - Chapter 2
  - Chapter 3

Extra Class Resources

Useful Links

- NED (NASA/IPAC Extragalactic Database) (with links to images and catalogs, such as RC3, ESO, UGC)
  - Notes on how to convert coded revised Hubble types in RC3
  - Original table from RC2 on how to convert coded revised Hubble types in RC3
- Atlas of Peculiar Galaxies (Halton Arp, 1966; Images and data on 338 peculiar galaxies).
- References for Handbooks of Mathematical Functions

Journal Articles and Popular Articles

- NASA ADS Abstract Services:
  - Public Link for Classic NASA/ADS form (This allows you to find papers and access abstracts, but you may not be able to download the full papers from journals that require subscriptions)
  - UT library subscription eproxy link for Classic NASA/ADS form (This allows you to find papers, access abstracts, and download full paper from journals for which UT has a subscription.)

- Astrophysics Preprint server
- Astrobites Daily astrophysical literature journal written by graduate students with the goal to present one interesting paper per day in a brief format that is accessible to undergraduate students in the physical sciences who are interested in active research.
