

# Astro 358 (Unique 46625)/ Spring 2019

## Galaxies and the Universe



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## Current Announcements

- Welcome to Astro 358 "Galaxies and the Universe" -- an upper division course designed for majors in the physical sciences.
- Useful quick links
  - [Selected Material from Lectures & Assignments](#)
  - [Course Outline/Calendar](#)
  - [Course Grade](#)
- Check out the [Astronomy Picture of the Day!](#)

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## Course Overview

- **Class and Office Hours:** This class meets Tuesday and Thursdays from 9.30 to 11.00 am in RLM (PMA) 15.216B. The instructor is Professor and Department Chair [Shardha Jogee](#) and the teaching assistant (TA) is Sydney B. Sherman. If you have any questions, please consult us during the office hours listed below, or by appointment, and we will be glad to help.

[Prof. Shardha Jogee](#)

Hours: Th. 11:00 to 12.00

[Sydney B. Sherman](#)

Mon. 11.00 to 12.00

Office: RLM (PMA) 15.214

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- **Course Description:** 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.
- **Pre-Requisites:** The class pre-requisites are two semesters of college physics (such as PHY 301/101L or 303K/103M and PHY 316/116L or 303L/103N) 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](#) before the second week of class.**
- **Course Calendar:** The [course outline/calendar](#) provides an approximate sequencing of topics to be covered in class. There may be small schedule adjustments based on the learning curve of, and feedback from, the class. 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 Department Chair) who has research and professional 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.

- **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 (RLM (PMA), 4th floor). As a UT student, you can also access a free electronic copy by going to the [UT library catalog link](#) and clicking the link that says "SpringerLink." 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](#)
- [Powell's Books \(eBooks\)](#)
- [Amazon \(Kindle + Hardcopy\)](#)
- [Barnes and Noble \(Nook + Harcopy\)](#)
- [Springer \(Hardcopy + Electronic preview\)](#)

For additional reading, I have put the following additional books on reserve in the PMA library (RLM (PMA), 4th floor):

- "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)
- **Course Grade:** Your grades will be posted online on [Canvas](#). I strongly recommend that you attend classes as assignments are primarily based on the lectures and your in-class participation count directly toward your final grade. The final grade will consist of
    - 45% Homeworks
    - 20% Midterm exam
    - 20% End-of-term exam
    - 15% In-class attendance, participation and activities (e.g., quizzes, talks)

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

| Letter Grade | Grade Points | Numerical Score |
|--------------|--------------|-----------------|
| 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%  |

## • **Class and University Policies:**

- **You All Belong Here:** A climate conducive to learning and creating knowledge is the right of every person in our community. Bias, harassment, and discrimination of any sort have no place here. If you notice an incident that causes concern, please contact the Professor, TA, and the [Campus Climate Response Team](#).
- Please turn off all cell phones before the start of class.
- If you have to miss a lecture, please email the TA and professor with a valid reason and present some official supporting document (e.g., a doctor's note for medical absences or a note from an academic administrator if your absence is related to participation in official UT events). It is your responsibility to catch up on missing material by getting the lecture notes from your classmates or visiting the professor's office to get a copy of some of the notes that can be copied.
- Late homeworks will be accepted for partial credit only if you have been granted an extension prior to the due date.
- 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.
- There will be no final comprehensive exam.
- There will be makeup exams only for students having a valid excuse and an official note from UT for the specific date and time of the missed exam. Makeup exams may be based on any part of the course.
- You are encouraged to study with other students, but you must write up your own homework, exams, and quizzes. Cheating will be severely punished: if you copy someone's homework/quiz/exam or let someone copy yours, both of you will receive zero credit, and I will consider filing a report to the Dean of Students.
- Students with disabilities may request appropriate academic accommodations from the [Division of Diversity and Community Engagement, Services for Students with Disabilities](#) (phone =512-471-6259).
- By UT Austin policy, you must notify the professor of a pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.
- **Academic Integrity and the University Code of Conduct:** A fundamental principle for any educational institution, academic integrity is highly valued and seriously regarded at The University of Texas at Austin. More

specifically, you and other students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work undertaken at the University.

The University Honor Code states: "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."

Academic dishonesty includes: cheating, plagiarism, unauthorized collaboration, falsifying academic records, misrepresenting facts, multiple submissions, and any other acts or attempted 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. Other potential consequences can be particularly far-reaching, such as the creation of a disciplinary record that may very well impact future opportunities. Furthermore, incidents of scholastic dishonesty diminish the overall value of scholastic achievements on this campus and reflect poorly on the University. Helpful resources:

- [Office of the Dean of Students:](#)
  - [Descriptions of plagiarism](#) and [Guide to Avoiding Plagiarism](#)
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- **Emergency Procedures:** In the event of an evacuation, follow the instruction of faculty or class instructors. Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Students requiring assistance in evacuation should inform their instructor in writing during the first week of class. Familiarize yourself with all exit doors of each classroom and building you may occupy and remember that the nearest exit door may not be the one you used when entering the building. Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office.
  - **Behavior Concerns Advice Line (BCAL):** The Behavior Concerns Advice Line is a service that provides The University of Texas at Austin's faculty, students and staff an opportunity to discuss their concerns about another individual's behavior. This service is a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP) and The University of Texas Police Department (UTPD). An individual can either call the line 512-232-5050 or report [online](#)

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## Selected Material from Lectures/Assignments

- The lecture extracts posted below only include **a small fraction** of the material covered in class, and they typically include figures, plots, tables, and qualitative descriptions. However, they **do not include the quantitative derivations, worked examples, discussions, and other activities conducted in class**. The latter material are typically written on the blackboard or document camera and will not be posted. It is therefore very important that you attend class. The best way to learn in this course is to combine the in-class notes and activities with the select material posted below, and do some supplementary reading using the books listed in the [textbook section](#) of the class website.
  - **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](#)
  - [Course Syllabus](#)
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## 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](#)
- [2-D galaxy fitting with GALFIT for Spiral and Irr galaxies](#)
- [Astronomy Picture of the Day](#)

## Internet Articles

- [NASA ADS Abstract Services](#)
- [Astrophysics Preprint server](#)
- [Space.Com](#)
- [CNN Space](#)
- [NY Times Science](#)
- [LA Times Science](#)
- [BBC Science](#)
- [Sky and Telescope](#)

## Classes and Contact information

- [Directory for the UT Astronomy Program](#)
  - [Canvas](#)
  - [Astronomy Courses for Astronomy Majors](#)
  - [UT Academic Calendar](#)
  - [CLIPS](#)
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