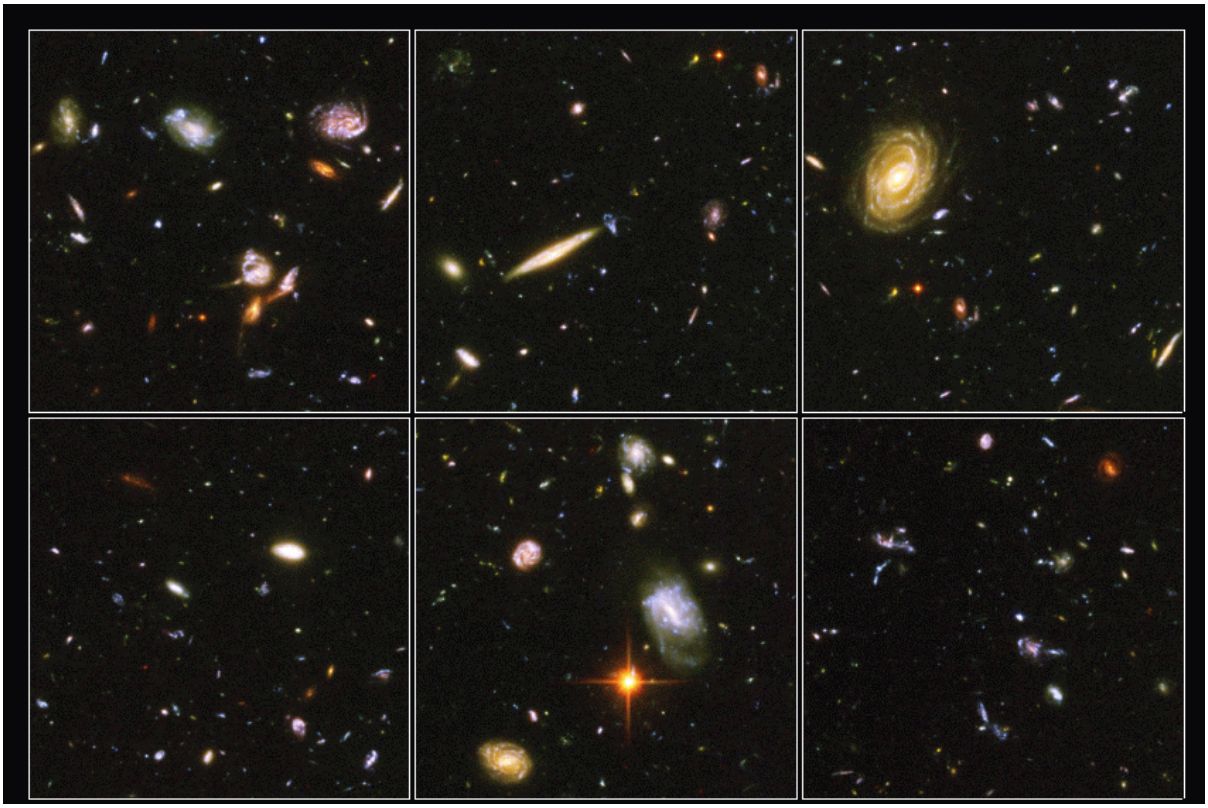
Astro 376R (Spring 2022, Unique 47074)
A Practical Introduction to Research



Current Announcements

- Welcome to Astro 376R, "A Practical Introduction to Research" -- a course designed for science and engineering majors. 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 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.

- We are in the midst of an unprecedented pandemic that is challenging our learning, teaching, and research activities. **To help us provide safe in-person classes, please follow the Classroom Safety and COVID-19 Policy.** Please also remember that we are all in this together and it is important that **we all show extra compassion, empathy and flexibility** while everyone navigates different individual challenges All students in this class: please know that we (the professor and teaching assistant of this class) are here to support you in every way we can. Please do not hesitate to reach out to Professor Shardha Jogee (email: sj@astro.as.utexas.edu) if you are having difficulties.

- Below are some quick links for frequently accessed parts of this website.
  - Repository of Selected Material from Lectures & Assignments
  - Office Hours, Accommodations, and Other Useful Resources
  - Zoom links for class and office hours.
  - Class Attendance Policy
  - Classroom Safety and COVID-19 Policy
  - Course Assignments and Grading Policy
  - Course outline/calendar
  - Course Syllabus (this is a printout of this website on the first day of class)
  - Course Prerequisites
  - Course Description and Goals
  - UT Austin COVID-19 Dashboard
  - Astronomy Picture of the Day!

Course Syllabus and Overview

Course Prerequisites: This class is restricted to science and engineering majors and class prerequisites are "Mathematics 305G or the equivalent". A prior introductory astronomy course, such as AST 307, is recommended, but not required. If you have not taken any introductory astronomy course, I recommend that you review an introductory level textbook on astronomy that covers the basics of astronomical units, stars, and galaxies, and I am happy to recommend or/and loan out such a textbook. While the course can be taken by any eligible student, we will give first priority to undergraduate majors in Astronomy and Physics who are in their Freshman and Sophomore years.

Course Description and Goals: Astronomy 376R, "A Practical Introduction to Research" is designed for science and engineering majors. It may be counted toward the quantitative reasoning flag and the independent inquiry flag requirements. This class aims to equip undergraduates with research and professional development skills required to get involved and make rapid progress in research projects in astronomy, physics, and other STEM fields, such as individual research projects in astronomy, research projects across departments in the UT College of Natural Sciences (CNS), the CNS Freshman Research Initiative (FRI) , and external Summer Research Experiences for Undergraduates (REU) funded by the National Science Foundation (NSF), the Department of Defense, NASA, and other agencies at institutions across the country. The skills and research experience students acquire in this class are also useful for graduate school and jobs in industry, national observatories, space science centers, etc. Topics to be covered in class include:

- **Navigating the Research Landscape** (e.g., Importance of Research, Types of Research, Research Funding, Roles of Different Research Team Members,

The Scientific Method, Ethical Considerations).

- **Practical Tips for Your Research Journey at UT Austin and Beyond.**
- **Mac OSX/Linux Operating System and Command Line Operations.**
- **Python Programming using scripts and Jupyter Notebooks** (e.g., Arrays, Functions, Reading and Writing Files, Control Statements, Plotting, Statistical Analyses, Astropy, etc). This programming module used to be taught in IDL, but we now teach it using the Python programming language.
- **How to Communicate Science Effectively:** Literature Search, Making Posters, Giving Different Types of Talks, and Writing Papers (including Research Notes for the AAS (RNAAS), conference papers, refereed papers).
- **Using LaTeX to Write Scientific Papers** (including Research Notes for the AAS and ASP conference papers).
- **UG Presentations on Research Journeys.**
- **Establishing Yourself as a Researcher** (Projects, Publications, CV, Networking, etc).
- **Careers in STEM** (inlcuding guidance from the UT Career Design Center & Career panels
- **Graduate School: What does it entail? Applying to US + European programs.**

Office Hours, Accommodations, and Other Useful Resources:

The instructor for this class is Professor Shardha Jogee and the teaching assistant (TA) is graduate student **Catherine Manea**. We are here to support you in every way we can, so please do not hesitate to get in touch and use the resources listed below if you need them.

1. Office hours will be held on zoom before January 31/2022 and in person afterward at the times listed below or by appointment.

Name:	Prof. Shardha Jogee	Catherine Manea
Office:	PMA 15.326	PMA 16.310
Hours:	Th. 2:00 to 3:00 pm (or by appointment)	Mon. 10:00 to 11:00 am (or by appointment)
Email:	sj@astro.as.utexas.edu	cmanea@utexas.edu

2. Beyond office hours, you can also email the TA or professor if you need help. 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.

3. **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 or TA, 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.

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

5. **Some Research Opportunities for Undergraduates**
   - The Freshman Research Initiative (FRI) website
   - Research Opportunities for Undergraduates in the Astronomy Department
   - EUREKA: Research/Career Opportunities across the College of Natural Sciences for Undergraduates.
   - Research and Career Opportunities for Undergraduates on and off campus (including national and global opportunities)
   - National Science Foundation (NSF) Summer Research Experience for Undergraduates (REU)
   - CNS Undergraduate Research Forum: Present a poster or/and a short oral presentation on your ongoing research project at the CNS Undergraduate Research Forum held every Spring on the UT campus.

6. **Research Talks and Papers,**
   - Calendar of Weekly Colloquia and Research Seminars (Undergrads welcome!)
   - Astrophysics Preprint server
   - NASA ADS Paper 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.)

7. **Popular Science Articles:** CNN Space, NY Times Science, BBC Science, Sky and Telescope

8. CNS Careers Services

Class Attendance Policy

This class will meet weekly on **Tuesday and Thursday from 12:30 pm to 2:00 pm.** Our policy for class attendance, class conduct, and class modality is outlined below, with the caveat that expectations may change if the pandemic situation evolves and UT adjusts its health and safety protocols.

1. As recommended by UT President Hartzell, this class and the associated office hours will be held **via zoom from January 18/2022 until January 31/2022.** Here are the zoom links for class and office hours.

2. **After January 31/2022, we plan to hold the class in person** in the UG computer lab PMA 15.201 with reduced social density and to **request in-person attendance from students** (unless they have a valid reason as outlined below). The reason we are requesting in person attendance after January 31/2022 is that this class is **a hands-on highly interactive class** where we have a large number of in-class activities and we walk round the room to help students with indvidual activities and coding assignments. Students will **get the most from this class and benefit from a stronger supportive community by attending in person.** We will do our best to support all students and provide a safe and effective learning environment by following the Classroom Safety and COVID-19 Policy.

3. After January 31/2022, students may ask the instructor to allow them to **temporarily** attend the class over zoom if they have a valid documented reason. Valid reasons include the following:
   - A student has a letter from the UT Austin Services for Students with Disabilities (SSD) allowing remote attendance.
   - A student has to self-quarantine or self-isolate based on the UT coronavirus exposure action chart or has another type of emergency. In these situations, students **must email Student Emergency Services (SES) in the office of the Dean of Students to inform SES of their situation and ask SES to notify the professor. SES will evaluate the situation and notify your professor if they decide it is appropriate to do so.** In addition, students should also notify the professor and TA

directly as soon as possible because SES may take several days to contact the professor.

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 attendance in person and over zoom to reward and track participation, which is part of the course grade.

4. 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** that happen as the TA and professor walk around the room to interact with students. Therefore, *zoom attendance should only be used temporarily and for one of the valid reasons* outlined under point (3) above.

5. To help us provide safe in-person classes after January 31/2022, we ask all students to please follow the Classroom Safety and COVID-19 Policy. In addition, we plan to use a socially distanced seating layout and to keep track of the seat numbers of students during every in-person lecture. In the previous semester (Fall 2021), students were asked to use the same seat for the whole semester in order to keep a stable seating chart that makes it easier for university health services to perform contact tracing. We are awaiting university guidance os to whether this practice is recommended for this semester as well.

6. To provide added flexibility during the COVID-19 pandemic, students in this class will not be using the hard-wired desktops in the UG computer research lab. Instead, the University is **loaning each AST 376R student a MacBook Pro laptop** on which software relevant for AST 376R has been pre-installed. The use of these laptops will enable greater flexibility in the event that a student has to temporarily attend class in virtual mode. The laptops will be distributed when the class meets in person after January 31/20222. **Please carefully read the instructions (to be) provided by the CNS IT team** on how to log on, use the laptop responsibly, and get help. It is **your responsibility to return the laptop back to UT Austin in good condition at the end of the semester.**

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

8. 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.

Classroom Safety and COVID-19 Policy

We are in the midst of an unprecedented pandemic that is challenging our learning, teaching, and research activities. Please remember that we are all in this together and it is important that **we all show extra compassion, empathy and flexibility** while everyone navigates different individual challenges To promote **a safe in-person learning environment,** the university recommends the following:

1. Please adhere to university mask guidance. While the University does not have a mask mandate, **masks are strongly recommended inside university buildings** for vaccinated and unvaccinated individuals, except when alone in a private office or single-occupant cubicle. According to the national Centers for Disease Control and Prevention (CDC) masks can help protect you from the COVID-19 coronavirus and prevent you from spreading it to others.

2. COVID-19 vaccinations are widely available, free and not billed to health insurance. 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.**

3. 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. Students who test positive (from on-campus or off-campus tests) should inform University Health Services or BCCAL.

4. If you develop COVID-19 symptoms or feel sick, stay home and contact the University Health Services' Nurse Advice Line at 512-475-6877. If you need to be absent from class, please contact Student Emergency Services (SES) in the office of the Dean of Students and SES will evaluate the situation and notify your professor if they decide it is appropriate to do so. If you have been had close contact with someone who tested positive for COVID-19, please follow the guidance on this University Health Services link.

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 UT Austin COVID-19 Dashboard and Protect Texas Together regularly.

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 or other emergency. 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 and Reading: There is no single textbook that covers the wide variety of topics, which this course will span. We will provide our own tailored tutorials and online background reading material, which will be posted on the class repository

Course Assignments and Grading Policy:

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

1. I strongly recommend that you attend class as the assignments are primarily based on the lectures and related activities. We will take attendance in person and over zoom to reward and track participation, which is part of the course grade.

2. There will be no exams and the final grade will consist of:
   80% Homeworks and Projects
   20% In-Class Activities and Participation (or equivalent)

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
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. I will offer at least ane extra credit option for students to improve their grades.

6. **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 and that you can explain every step of your work if asked to do so. 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.

7. **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.

8. **Academic Integrity and the University Code of Conduct:** Students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work undertaken at the University of Texas at Austin. 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.

Selected Material from Lectures/Assignments

The repository below will be updated throughout the semester with important class materials (e.g., a description of some of the pre-requisite materials you need to know; video recordings of zoom lectures; pdf versions of powerpoint presentations made during the lecture; scans of materials that would usually be handwritten on the blackboard or document camera; howeworks and other assignments). However, I strongly recommend that you do not only rely on this posted material and do your best to attend class in synchronous mode (i.e., at the time it is offered) so that you can benefit from in-class discussions or activities and get the most out of this course.

- Course Syllabus on day 1 of class
