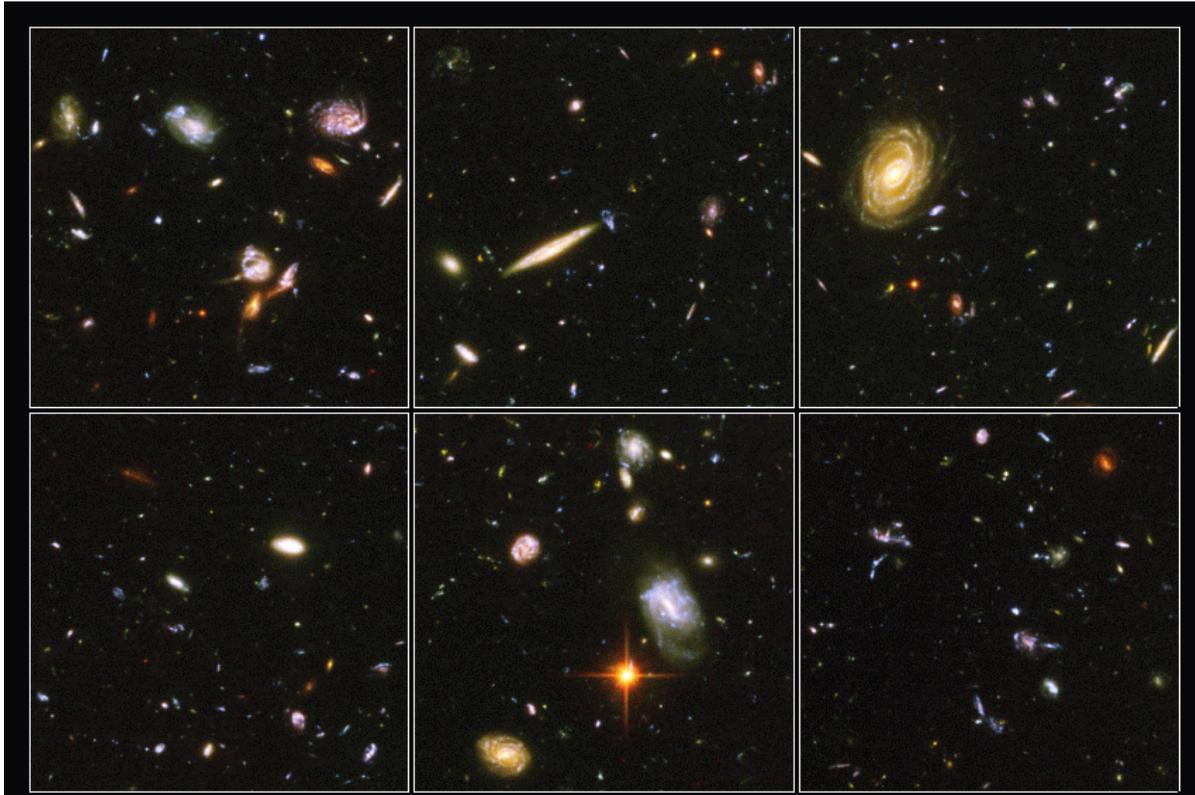


Astro 376R (Unique 48084)/ Spring 2021

A Practical Introduction to Research



Current Announcements

- Welcome to Astro 376, "A Practical Introduction to Research" -- a course designed for science and engineering majors. This **class website is the one stop shop** where the vast majority of class materials (e.g., video recordings of zoom lectures; copy of presentations; homeworks and other assignments) will be posted, so please bookmark it and visit it regularly. Below are some quick links for frequently accessed parts of this website. You may need the id and password given in class to access secure material.
 - [Zoom links to be used for class and office hours.](#) Please do not share these zoom links with anyone not taking this class.
 - [Repository of Selected Material from Lectures & Assignments](#)
 - [Class/Office Hours and Getting Help](#)
 - [Class Prerequisites](#)
 - [Course Outline/Calendar](#)
 - [Course Assignments and Grade](#)
 - [Class and University Policies](#)
- We are in the midst of an unprecedented pandemic that is adding challenges to our learning, teaching, and research activities. **We are all in this together and we will**

make it through this together. It is important that we all show extra compassion, empathy, and patience toward each other in these trying times.

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. We understand that different students may face widely different challenges during a pandemic. Please do not hesitate to reach out to [Professor Shardha Jogee](mailto:sj@astro.as.utexas.edu) (email: sj@astro.as.utexas.edu) if you are having difficulties. UT Austin COVID-19 resources for students can be found [here](#).

- Check out the [Astronomy Picture of the Day!](#)

Course Overview

- **Class and Office Hours:** During the COVID-19 pandemic, this class will be web-based and will meet weekly on **Tuesday and Thursday from 11.00 am to 12.30 pm** via zoom. Please see [this file for relevant zoom links](#) and please do not share these zoom links with anyone not taking this class. The instructor is [Professor Shardha Jogee](#) and the teaching assistant (TA) is graduate student **Jonathan Florez**. If you have any questions, please consult us during the office hours listed below, or by appointment, and we will be glad to help. Please allow up to one business day for a response and note that emails sent over the weekend or after business hours (Monday to Friday from 9:00 am to 5:00 pm when the University is open) may not receive an answer till the next business day.

| | | |
|--------|-------------------------------------|-------------------------------|
| Name: | Prof. Shardha Jogee | Jonathan Florez |
| Hours: | Wed. 11:00 am to Noon | Fri. 10.00 to 11.00 am |
| Zoom: | See this file | See this file |
| Email: | sj@astro.as.utexas.edu | jflorez06@utexas.edu |

- During the COVID-19 pandemic, this class will be web-based and you will not be able to access the UG computer research lab. UT Austin is therefore **loaning AST 376R students a MacBook Pro laptop on which software relevant for AST 376R has been pre-installed**. Astronomy academic coordinator Kalyn Williams (kalyn.williams@austin.utexas.edu) has sent [an email](#) to all registered students with instructions on **how and by when to pick up your laptop, how to log on, and your responsibilities with regards to the laptop**. Please contact Ms Williams (ccing Prof. Jogee and TA Jonathan Florez) as soon as possible if you have not received her email. **Please make sure that you have picked up your laptop and that you have successfully logged on by Th. Jan. 21/2021**. If you have problems with your laptop, please contact [the CNS IT Help Desk](#) and email help@cns.utexas.edu or fill the help request form, **making sure to mention "AST 376R Help Request --Please Direct to Matt Davidson."** As outlined in the email

from Ms Williams, please note that it is your responsibility to return the laptop back to UT Austin in good condition at the end of the semester.

- I request that you please attend the 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. **During the zoom class and breakout discussions, we require all students to turn their zoom camera on** and we will take online attendance from the participants list. If you cannot attend the class synchronously or have your camera on, please email me to explain your situation and we will see what we can do to support you. I will aim to record and post key sections of the lectures on the [class repository](#) except in situations where unanticipated technological difficulties get in the way.
- **Course Prerequisites:** This class is restricted to science and engineering majors and class prerequisites are "Mathematics 305G or the equivalent". Prior computing experience and an introductory astronomy course, such as AST 307, are recommended, but not required. However it is your responsibility to develop the required background knowledge for each lecture by studying any background prerequisite reading we provide. 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 so that such students are well prepared to tackle challenging research projects during their next two to three years at UT.
- **Course Description:** Astronomy 376, "A Practical Introduction to Research" is restricted to science and engineering majors. It aims at equipping undergraduates with some of the skills relevant for research projects in astronomy and astrophysics, in order to facilitate their involvement in the [College of Natural Science Freshman Research Initiative \(FRI\)](#), as well as in more advanced individual research projects supervised by research faculty or staff during their sophomore to senior years. This course may be counted toward the quantitative reasoning flag requirement and the independent inquiry flag requirement. Many of the skills you will learn are pre-requisites for [currently offered research projects in Astronomy](#) and some will be useful well beyond research in your undergraduate years, during graduate school in astronomy or astrophysics, or jobs in industry, national observatories, space science centers, etc.

The course will involve an overview of **research practices and professional development topics**, such as

- Importance of Research. The Scientific Method. Ethics in Research.
- Research Communities and Universities. Research Funding.
- Why and How to Participate in Undergraduate Research at UT Austin?
- Different Ways of Communicating Scientific Research (e.g, posters, elevator pitch, talks, research notes, refereed conference papers, refereed journal

papers). Searching/Reading Scientific Papers. Tips for Impactful Posters, Oral Presentations, and Papers.

- Introduction to the UT Career Design Center. Astronomy Careers Panel.
- Establishing Yourself as a Researcher (Publications, CV, Networking, etc).
- Applying for Graduate Schools in Astronomy in US and European Institutions.

and a **wide array of hands-on research-oriented exercises**, such as:

- Navigating the Linux/Mac OSX operating system
 - Visualization and analysis of astronomical data (e.g., CCD images) using SAOIMAGE ds9 and IRAF softwares
 - Programming and Research Applications with Python, including array manipulation, reading catalogs, plotting, statistical analyses. This module was formerly done using the IDL programming language, but we are now doing it with Python.
 - Writing Research Papers with LaTeX and AASTeX package
 - Making your CV for Research
- **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 and Reading:** There is no single textbook that covers the wide variety of topics, which this course will span. We will provide our own tailor-made tutorials and online background reading material, which will be posted on the [class repository](#).
- **Course Assignments and Grade:** While this class is being held in web-based mode, please submit your assignments on [Canvas](#) using the [instructions provided](#) unless otherwise indicated. Your grades will be posted online on [Canvas](#). I strongly recommend that you attend class as the assignments are primarily based on the lectures and related activities. The final grade will consist of:

60% Homeworks and Projects

40% In-Class Activities (or equivalent)

There will be no exams. 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% |

• **Class and University Policies**

- 1) We are in the midst of an unprecedented pandemic that is adding challenges to our learning, teaching, and research activities. **We are all in this together and we will make it through this together. It is important that we all show extra compassion, empathy, and patience toward each other in these trying times.** All students in this class: please know that we (the professor and teaching assistant of this class) are there to support you in every way we can. We understand that different students may face widely different challenges during a pandemic. Please do not hesitate to reach out to [Professor Shardha Jogee](mailto:sj@astro.as.utexas.edu) (Email: sj@astro.as.utexas.edu) if you are having difficulties. UT COVID-19 resources for students can be found [here](#)
- 2) **You All Belong Here:** A climate conducive to learning and creating knowledge is the right of every person in our community. As per [UT Austin 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 have any concerns, please contact me and when appropriate, please report to UT contacts on [nondiscrimination-policy](#) or [sexual harassment and misconduct](#).
- 3) Please turn off your cell phone before the start of class unless you are using it to zoom into the class. I request that you please 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. **During the zoom class and breakout discussions, we require all students to turn their zoom camera on** and we will take online attendance from the participants list. If you cannot attend the class synchronously or have your camera on, please

email me to explain your situation and we will see what we can do to support you.

- 4) 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 from the class [repository](#).
- 5) 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.
- 6) Students with disabilities may request appropriate academic accommodations from the [UT Austin Services for Students with Disabilities](#).
- 7) 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.
- 8) 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 assignment, quiz, or exam or if you let someone copy yours, both of you will receive zero credit, and I will consider filing a report to the [Office of the Dean of Students](#).
- 9) 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.
- 10) Please contact the [Behavior Concerns and COVID-19 Advice Line \(BCCAL\)](#) (phone: 512-232-5050) to address concerns about COVID-19 or another individual's behavior.

- **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](#)
- [Guide to Avoiding Plagiarism](#)

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](#) posted on first day of class.

Extra Class Resources

Research Opportunities, Research Talks, Careers, Courses

- [The Freshman Research Initiative \(FRI\) website](#)
- [Research Opportunities for Undergraduates in the Astronomy Department](#)
- [Research and Career Opportunities for Undergraduates](#)
- [EUREKA: Research/Career Opportunities across the College of Natural Science for Undergraduates.](#)

- [UT College of Natural Sciences \(CNS\) Research Forum for UGs](#)
- [Calendar of Weekly Colloquia and Research Seminars \(Undergrads welcome!\)](#)
- [The UT Career Design Center](#)
- [Astronomy Courses](#)
- [UT Academic Calendar](#)

Journal Articles and Popular Articles

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