Astronomy 376R: A Practical Introduction to Research Methods

Course Information

Contact Information

Instructor:	Prof. Stella Offner
	15.312A PMA (RLM)
	Help Hours: Tu/Th 2-3 pm
Teaching Assistant:	Dreia Carrillo
	16.310 PMA (RLM)
	Help Hours: Wed/Fri 3-4pm
Class Time/Location:	Tu/Th 11-12:30, PMA 15.201
Course Website:	`http://canvas.utexas.edu`
Course Email:	`Canvas` (Preferred) or `soffner@astro.as.utexas.edu` or
	`andreiac@astro.as.utexas.edu`

Description

Astronomy 376R is a course intended to prepare you to perform astronomy research. We will work with astronomy data, databases and tools. The class is oriented around practical exercises including analysis of imaging data, visualization, programming exercises with Python, statistical analyses, and training for papers and oral presentations. There are three main goals in the course:

- that you learn what astronomy data is and how to access and interpret it,
- that you learn to perform basic analysis, plotting/visualization and scientific presentation,
- that you gain skills in critical thinking, formulating research questions and hypothesis testing.

Prerequisites: Mathematics 305G or the equivalent is required. An introductory astronomy course is *highly* recommended. Prior computing experience is recommended but not required. This course may be counted toward the quantitative reasoning flag requirement and/or toward the independent inquiry flag requirement: be prepared to carry out simple calculations and think independently!

This course is restricted to science and engineering majors. See the "Memo for Undergraduate Astronomy Students Regarding Astronomy Courses":
`http://www.as.utexas.edu/astronomy/education/memo.html`.

Textbooks

Required: (1) *Beginners Guide to Working with Astronomical Data* (BG)
                 by Marcus Possel
        (2) *Astronomy* by Franknoi, Morrison & Wolff.

All readings, resources and data used in this class are publicly available and free to access. The references listed above are available for you to download from Canvas. *Astronomy* is an introductory astronomy textbook. *Astronomy* covers a wide variety of material and is intended as a general resource (other introductory textbooks are fine too).

Class Structure

This course combines short lectures with discussions and group activities. You will learn better if you participate so *attendance is required.* A typical class will consist of:

- New discoveries: spotlight on some recent exciting astronomy discoveries.
- 20-30 minute presentation of new material.
- A data challenge!
- A class discussion and review of the activity.

Grading

Grading Components:

- **Homework** (30%). Each assignment will be completed or submitted online through *Canvas.* Each homework assignment is due at the beginning of class. Students may work together, but must write up their solutions individually.
- **Class Activities and Participation** (20%). Learning by doing is central to this class!
- **Final Project** (50%). You will carry out a research project in groups of 2-3. This will include an oral presentation and project report.

Extra Credit: Extra credit will **not** be offered.

This class will **not** be graded on a curve. 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):

$$
\begin{array}{ccc}
& 93\text{-}100 = \text{A} & 90\text{-}92.9 = \text{A-} \\
87\text{-}89.9 = \text{B+} & 83\text{-}86.9 = \text{B} & 80\text{-}82.9 = \text{B-} \\
77\text{-}79.9 = \text{C+} & 73\text{-}76.9 = \text{C} & 70\text{-}72.9 = \text{C-} \\
67\text{-}69.9 = \text{D+} & 63\text{-}66.9 = \text{D} & 60\text{-}62.9 = \text{D-} \\
& < 59.9 = \text{F} &
\end{array}
$$

Homework

There will be 5 homework assignments. The first homework will include a topic survey to find out what you know and what you have learned about astronomy and astronomy data. The homeworks are programming and writing activities related to the material we cover in class. See lecture schedule for the due dates.

Class Participation

Class will be interactive, and you will be working in small groups on short activities. I will collect these at the end of class (usually through Canvas). Full credit will be awarded assuming you have made a good faith effort to complete the activity – don't goof-off in class!

Each activity will contain additional "bonus" questions, which are an opportunity to challenge yourself. More advanced students, i.e., students who have already taken 2 astronomy classes and/or have significant prior programming experience, will be expected to attempt these extra questions.

I will drop the three lowest in-class participation scores (this includes absences). In-class participation will begin for credit the second lecture.

Final Project

You will work in groups of 2 or 3 to carry out a short research project using the skills you learn in class. You will be able to choose between several suggested projects or come up with your own. At the end of the project each group will present their results and complete a writeup of their methods and main result.

Absences and Make-Ups

Missing Lectures: In class activities are a central part of the class, so **participation is required.** No adjustments will be made for missing a regular class. However, a few absences will not affect your grade because I drop the 3 lowest scores. In the case of extended absences, you must provide official documentation within a week of returning from the absence. If you miss class, it is highly recommended that you complete the class activity on your own, since a number of the activities build on earlier concepts and exercises.

Missing Homework: **Late homeworks will not be accepted**. If you do not complete an assignment for emergency reasons, complete the assignment within 3 days of the due date and contact

me by email to explain the circumstances. I may accept the late work with or without a penalty at my discretion.

Religious Observances: By UT policy, you must notify me of your pending absence at least 14 days prior to the date of observance of a religious holy day. If you must miss a homework deadline in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time.

Emergencies and University Closings: If an emergency occurs (death in the family, hospitalization), you must contact me as soon as possible and provide documentation within one week.

Posting of Grades

To protect the privacy of your grades, all grades will be posted to Canvas.

Class Policies

Communications: The course webpage on Canvas will be updated with course announcements, supplementary resources and deadlines. *It is your responsibility to check these on a regular basis.*

It is your responsibility to keep track of the administrative deadlines for dropping the course, changing to Pass/Fail etc.

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.

Courtesy: 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.

Phone use and texting during lecture and group activities will not be tolerated. Make sure your phones are silenced before class begins. Students using their phones will be asked to leave and will not earn participation that day.

Laptops and tablets will be permitted for taking notes electronically or completing the lecture activities. However, it is *not permitted to use the computer classrooms or laptops for non-class activities* – this is a distraction to nearby students. Students found to be using their computers for non-class activities will be asked to leave and will not earn participation that day.

Travel: As part of my duties as a professor I am a professional research astronomer, which often requires travel during the semester. I will do my best to minimize the impact of this travel and maintain communication while away from Austin. When I am away, another UT astronomer will lead the class in my place.

Syllabus Changes: I reserve the right to make changes to the syllabus and class schedule if necessary. If any changes are made they will be announced through Canvas and new versions will be uploaded.

Academic Honesty

Cheating, including plagiarism, is highly destructive. It corrodes the academic environment and cheapens the value of your education. I will not tolerate cheating, nor should you. If you are aware of any cheating, or if you are unsure if a practice is academically honest, speak to me.

Plagiarism is defined as using another's words or ideas without credit. This includes copy-pasting text from a source without using quotation marks *and* including the source reference. Although you may work with and are even encouraged to work with classmates on homework, each student must submit their own original, assignment solution. Any duplicated homeworks will receive a zero.

The University of Texas policy on academic honesty and plagiarism can be found on the **Student Conduct and Academic Integrity website:** `http://deanofstudents.utexas.edu/conduct/standardsofconduct.php`.

Students with Disabilities

Students with documented disabilities are encouraged to request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities (512-471-6259). `http://diversity.utexas.edu/disability/`. Please provide proper documentation from the SSD Office at the **beginning** of the semester.

Diversity, Equity and Inclusion

Astronomy belongs to all people, independent of race, religion, gender, gender identity, gender expression, or sexual orientation. Incidents of discrimination, assault, harassment, threats, intimidation, profiling, or coercion based on membership or perceived membership will not be tolerated.

The University of Texas President's statement of community values can be found here: `http://equity.utexas.edu/presidents-statement/`