

**SYLLABUS**  
**Astronomy: The Physical Universe (Astr170B1)**  
**The University of Arizona, Spring, 2022**

“Space is big. You just won’t believe how vastly, hugely, mind-bogglingly big it is. I mean, you may think it’s a long way down the road to the chemist’s, but that’s just peanuts to space.”  
–Douglas Adams

**Contact Details:** Dr. Brenda Frye  
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Office hours: Tuesdays and Thursdays, 11am - 12 noon, and by appointment

**TA:** Erik Wessel  
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Office hours: Wednesdays 2:30pm - 4:30pm, and by appointment

**LECTURES:** Class is scheduled to be taught in person on Tuesdays and Thursdays from 9:30 - 10:45 am in the Astronomy N210 Lecture Hall.

**COURSE DESCRIPTION:**

This is a challenging class in which we will study objects and phenomena relating to the solar system, extrasolar planets, stars, and galaxies. We will introduce basic concepts used in physics, chemistry, geology and biology needed to better study these objects. We will make use of mathematical tools at the level of high school algebra, such as order of magnitude estimates, scientific notation, and proportionalities. We will write up some assignments which cite references to support our arguments. The application of the scientific method will be used throughout this course. If we are doing this right we will also have a laugh or two along the way.

**LEARNING OUTCOMES:**

Upon successful completion of the lectures, a student will be able:

- to understand some basic physics concepts and apply them to astronomical problems
- to gain a knowledge of the physical scales, masses, sizes, lifetimes and other properties associated with a wide variety of astronomical objects
- to carry out lab activities and hold discussions to gain a more intuitive understanding of a number of fundamental concepts
- Importantly, to learn how by studying Astronomy we can become more mindful of the treatment of our own planet, and even ourselves. To paraphrase Dr. Neil deGrasse Tyson, it is only by exploring other worlds that we can see Earth for the *first* time.

These learning outcomes will be met through attendance of lectures, writing assignments, tutorials, in-class activities, field trips, observing, and in-class exams.

### OFFICE HOURS and EMAIL

Dr. Frye’s office hours are in Steward Observatory and by appointment. To best serve this class, the following email response policy will be followed. In general, emails to the professor will be answered only during office hours, unless they are urgent in nature.

### GRADES

Your final course grade will be calculated as follows:

| Assessment        | Percentage | Comments                     |
|-------------------|------------|------------------------------|
| Midterms          | 30         | lowest score will be dropped |
| Homework and Labs | 40         | lowest score will be dropped |
| Final exam        | 30         |                              |

Attendance will be taken sporadically, and experience shows that the “A” students are those who attend all the classes.

### REQUIRED TEXT AND READINGS

One textbook is required for this class. The first is “D2L Essential Cosmic Perspective 8th Edition,” by Bennett, Donahue, Schneider, and Voit. Note this text is different from the one entitled, “The Cosmic Perspective.” You will be assigned regular readings and homework which are expected to be completed prior to coming to lectures.

For this in-person class you will need daily access to the following hardware: regular access to reliable internet signal; ability to download and run the following software: [web browser, Adobe Acrobat, D2L, document editor].

### COURSE WEBSITE: Desire to Learn (D2L)

This is your first stop to get the Bennett textbook, due dates, class announcements, copies of lectures and laboratory and writing assignments. To access D2L, go to the website, [d2l.arizona.edu](http://d2l.arizona.edu) and click on ‘User Login.’

### LECTURES

“Practice does not make perfect. Only perfect practice makes perfect.”

–Vince Lombardi

The lectures will be complemented by demos, lecture tutorials, field-trips and videos. To accomplish our learning goals, **lectures will move at a pace intended to build and expand upon the assigned reading material, rather than to introduce material for the first time.** The lecture notes will be made available as PDF files, *but these notes are not a substitute for attending lectures.* Absences for any sincerely held religious belief, observance, or practice will be accommodated where reasonable ([policy.arizona.edu/human-resources/religious-accommodation-policy](http://policy.arizona.edu/human-resources/religious-accommodation-policy)). Absences pre-approved by the UA Dean of Students (or dean’s designee) will be honored.

While reading the textbook is a good start, it will not be sufficient to do well on the exams. This is because there is significantly more information in this course than can be obtained by passive reading and/or memorizing vocabulary. The lectures are intended to teach you how to think about these conceptionally-rich and difficult topics at the required level to do well on the exams. Even at their best, the lectures will also only cover a subset of the required material at the level that you will need in order to do well on the exams, thereby requiring extra reading, thought and/or discussion outside of class. Be active, and ask questions when you can! A list of lecture topics appears below:

| <b>Week</b>                   | <b>Topics</b>             |
|-------------------------------|---------------------------|
| January 12 & 14               | Syllabus; Chapters 1 & 2  |
| January 18 & 20               | Chapters 3 & 4            |
| January 25 & 27               | Chapter 4 & 5             |
| February 1 & 3                | Chapter 5 & Midterm 1     |
| February 8 & 10               | Chapters 6 & 7            |
| February 15 & 17              | Chapters 7 and 8          |
| February 22 & 24              | Chapters 8 and 9          |
| March 1 & 3                   | Chapters 10 & Midterm 2   |
| March 8 & 10                  | Spring Break - no classes |
| March 15 & 17                 | Chapters 11 & 12          |
| March 22 & 24                 | Chapter 12 & 13           |
| March 29 & 31                 | Chapters 13 and 14        |
| April 5 & 7                   | Chapters 15 & 16          |
| April 12 & 14                 | Chapters 16 & 17          |
| April 19 & 21                 | Midterm 3 & Chapter 18    |
| April 26 & 28                 | Chapters 18 and 19        |
| May 3                         | Chapter 19                |
| Final exam: May 10, 8 - 10 am |                           |

## **OBSERVATIONS**

You will have the opportunity to visit our telescope on the roof of Steward Observatory's telescope building, and it is required that you go at least one time and submit an observing worksheet. It is highly recommended to go to early, as observing sessions may be canceled with very little notice or even *during* your session. Merely attempting to go one or even several times, but not completing the observation will not count for credit. Note if you know in advance that you will be unable to attend ANY observing sessions then please see me ASAP. Observing is available every MTuWTh excluding major holidays.

## **HOMEWORK**

There will be weekly assignments, which will be posted on the D2L class website. Please do your own work. No late homework will be accepted as this quickly becomes unwieldy in a class of this size. If there is an emergency, then inform me as soon as possible. **You must assume that homework is due every week, even on exam weeks unless otherwise stated. See the section of "Writing Assignments" for additional details.** To accommodate the inevitable missed homework, the lowest-scoring assignment will be dropped at the end of the semester.

## **LABORATORIES**

There will be laboratory activities in this class, the number of which may change depending on availability of resources.

## **EXAMINATIONS and FINAL EXAM**

There will be three in-class midterms, and one final project. All exams will be closed notes and closed book, will last for the duration of the class, and will be comprised of short-answer and some multiple choice questions. Cell phones, laptops, and all other handheld devices must be turned off and put out of sight. This is not the time to test my policy regarding cheating. There will not be makeup exams in this course. To help account for this, I will drop the lowest midterm score at the end of the semester. If you miss a midterm then you will receive a grade of “0” and this one score will be dropped from the calculation of the final grade. If you have a true emergency and cannot attend the final exam, then you will need to contact me immediately with documentation. It is not advisable to miss the final exam for any reason.

There will be opportunities to earn extra credit. Please see me for details, if interested.

## **ACADEMIC HONESTY**

I follow the policies outlined in the Dean of Students code of academic integrity, including cases of plagiarism and cheating (see [deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity](http://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity)). I strongly encourage you to work with your peers on the homework assignments. Such collaborations can include discussion of the qualitative concepts and on the mathematics, but in the end Academic honesty also extends to printed texts, websites, and video content. If an assignment even only *appears* to be copied from someone else, or copied from a source without a reference, or copied from a referenced source and only a few words changed, then the assignment will be assumed to be plagiarized. I will give a grade of “F” for the assignment, and pass along this infraction to the Dean. The Dean, in turn, may take further action that includes assigning a grade of “F” for the course and/or pursue a more stringent penalty.

Note that copying large amounts of text even with proper references will result in a low grade. One can avoid such ‘lazy writing’ by talking over what you intend to write with a peer, your teaching assistant or professor, through email or conversations during office hours, until there is enough confidence in your answer that you can write the answer down on paper in your own words. Another trick is to use direct quotations that are short and infrequent.

Cheating is the second type of serious infraction. Some examples include: cheating on an exam, use of electronic devices or translators without prior consent from your professor, substituting someone else to take an exam and changing an answer to an exam/assignment after the document has been returned to you.

## **ATTENDANCE AND CLASSROOM ETIQUETTE**

Students who are healthy are expected to attend all lectures, lab sections, and other activities. Please turn off cell phones in class, and refrain from extraneous talking, distracting/discourteous behavior, distracting use of laptops/cell phones, and coming late and/or leaving early. Please bring your voting cards to class each day. If you are interested in using a laptop to take notes during the lecture then you are requested to sit in the first five rows of the lecture hall.

**Importantly, you must notify your instructor if you will be missing a course meeting or an assignment deadline. In accordance with a university-wide ruling,**

**non-attendance for any reason does not guarantee an automatic extension of due date or rescheduling of examinations/assessments. Please communicate and coordinate any request directly with your instructor.** If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office, DOS-deanofstudents@email.arizona.edu , to share documentation about the challenges you are facing.

We in effect a UA Threatening Behavior by Students policy, which prohibits threats of physical harm to any member of the University community: [policy.arizona.edu/education-and-student-affairs/threatening-behavior-students](http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students).

## WRITING ASSIGNMENTS

You will have a few opportunities to communicate scientific ideas through writing assignments. Examples of writing assignments are the Lab write-ups and essays on the James Webb Space Telescope. Some of your writing will require the use of embedded references.

All write-ups will be graded according to the formula used in the Writing Program of the Department of English: Content (50%), Organization (20%), Expression (20%), Mechanics (10%). All writing must be single-spaced and have a maximum font size of 12 pt and no smaller than 11 pt. Handwritten assignments are technically acceptable, but will be returned if they are illegible.

**All writing assignments should be submitted electronically on or before the assignment due.** Late assignments, or assignments submitted elsewhere (physically placed into my mailbox or submitted to my email address, etc) will not be accepted as such administration becomes too unwieldy for a class of this size.

## ASSISTANCE

I and my TA are here to help you, so please take advantage of office hours. We want to get to know you, so you are very welcome to stop by to introduce yourself. See Page 1 of this syllabus for our contact details. It is important that you contact me promptly if you have any questions or concerns regarding this class. If you would like extra tutoring you may attend FREE weekly help sessions through the “Think Tank” program (<http://thinktank.arizona.edu/>).

**For any COVID-19 related problem, and especially if you exhibit any COVID-like symptoms, consult the covid website for the latest information regarding the ongoing pandemic: [covid.arizona.edu](http://covid.arizona.edu) .**

We refer to UA rules regarding prohibited behaviors regarding non-discrimination and anti-harassment (<http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>)

If disability-related assistance is required, then the Disability Resources office is there to help (621-3268; <http://drc.arizona.edu/>), and also please let me know. I, together with the DR office, can then work together to ensure your full participation in this course.

If you have general questions about your academic progress this semester, then do reach out to your academic advisor (<https://advising.arizona.edu/advisors/major>). Contact the Advising Resource Center (<https://advising.arizona.edu/>) for all general advising questions and referral assistance. Call (520) 626-8667 or email to [advising@arizona.edu](mailto:advising@arizona.edu) . Life challenges: If you are experiencing unexpected barriers to your success in your courses, then do note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at (520) 621-2057 or [DOS-deanofstudents@email.arizona.edu](mailto:DOS-deanofstudents@email.arizona.edu). Physical and

mental-health challenges: If you are facing physical or mental health challenges this semester, do note that Campus Health provides quality medical and mental health care. For medical appointments, call (520) 621-9202. For after Hours care, call (520) 570-7898. For the Counseling and Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

From experience, students find this to be challenging class, and in a rewarding way. A popular comment on outgoing student evaluations is that this is the most challenging class students have ever taken, and also that they learned a lot! We are delighted to be able to teach this course, and are looking forward getting to know you and to learn from you as well. Good luck!

In closing, we note that the information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.