

Astronomy 210

Introduction to Astrophysics

Spring Semester 2018

103 Transportation Building MWF 1:00–1:50 pm

Course web page URL

<http://go.illinois.edu/astr210>

Professor

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or by appointment

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or by appointment

Welcome to Astronomy! In this course we will develop a qualitative and quantitative understanding of the structure and evolution of physical universe, from the night sky to the earliest instants of the big bang. We will apply basic physical principles on grand scales to outline the major aspects of modern astrophysics. We will explore the deep connections between our understanding of inner and outer space, and find astrophysics to be a great symphony which interweaves all areas of classical and modern physics.

The goal is to develop a broad conceptual synthesis. To do this effectively—to “get under the hood” and see how the cosmic machinery works—requires mathematical description. Thus, the lectures and assignments will feature a strong quantitative component. Indeed, we will find that a quantitative analysis is often essential to address qualitative questions, the results of which can lead to revolutions in our view of the universe.

Requirement	Percentage of Grade	Points	
2 Hour Exams	$2 \times 10\%$ each	20%	200
Final Exam		15%	150
Homework, Observing, and Planetarium (best 12 of 14)	$12 \times 5\%$ each	60%	600
Class Participation		5%	50
Total		100%	1000

Each of the 11 homework assignments, as well as each of the night observing, solar observing, and the planetarium reports, are worth 50 points and thus 5% of the final grade. Of these 14 total assignments, the top 12 scores will be used to compute your final grade, i.e., the lowest 2 scores will be dropped.

Grading

The following table shows the approximate grading scale in this course.

Grade	Approximate Range
A	92–100%
B	82–91%
C	72–81%
D	60–71%
F	< 60%

Final course grades will follow these guidelines. Plusses and minuses will be used.

Exams

There will be two in-class hour exams, and a comprehensive final exam. Dates are as follows.

- Hour Exam 1: Friday, Feb. 16
- Hour Exam 2: Friday, March 30
- Final Exam: Monday, May 7, 8:00-11:00 AM

Homework

There will be 11 homework assignments given throughout the course. These are meant to sharpen your thinking on the material covered in lecture, to develop physical intuition and quantitative skills, and to help prepare you for the exams. Homework must be submitted online in PDF format. Handwritten solutions are acceptable, but should be scanned into PDF format. Homework assignments will be due online by 5:00 pm on the due dates specified.

You are responsible for all of the material covered on all 11 homework assignments. Thus, it is to your advantage to do all 11 of the assignments, and hand them in on time.

Observing

Nighttime Observing. Evening observing sessions will be held for several weeks at the Campus Observatory. You are **required** to go to **one** session at any of the several dates which will be posted on the course website. At the session there will be 3 stations which you can visit in any order. You may come any time during a session, but expect to stay a full hour and so leave enough time for this. Dress warmly. The weather is unpredictable, so go early in the semester.

Solar Observing. Daytime sessions to observe the sun are held at the Campus Observatory. You may attend any one session at any of the dates posted here. Sessions are held from 10:30 am to 3:30 pm. You may go any time during these hours; the session will take about 30 min for observing and hearing a presentation from the TA on duty. As with nighttime observing, the weather is unpredictable, so go early.

Reports. Forms will be made available, containing instructions and questions to be answered before, during, and after your night and solar observing sessions. The reports will each be graded out of 20 points. The night observing report is **due in class Friday, March 16**; to encourage early attendance, extra credit of +2 points will be given for night observing reports turned in by Feb. 23. The solar observing report is **due in class Friday, April 13**. Late reports will be deducted -5 points per calendar day late.

Planetarium

Special presentations designed for Astronomy students will be held at Staerkel Planetarium at Parkland College (on Bradley Avenue in Champaign).

Show dates: Shows will be held on:

Feb. 5 Feb. 7 Feb. 13 Feb. 15

Online **registration** is required; link is on course webpage. Doors open at 6:30pm. Sessions start at 7:00pm and run for about an hour.

Admission Charge: A **\$3 charge** is required and must be paid **in cash** at the planetarium. Sign up for a place online by following the link on the course webpage.

Transportation and Location: You are responsible for your own transportation. Maps and bus schedules are available online.

Report: A form will be posted on the class website, and will contain a series of questions about what you learn during your visit. The report will be graded out of 10 points, which will count as extra credit towards your final grade. To receive credit, the report must be handed in by classtime, Friday March 2.

Participation

You are expected to attend lectures. I will cover material in class that will not always be in the text, and the lecture material will be included on the exam. Class time is the most valuable for you if you come prepared, and are ready to actively engage the material. To reward your participation in these activities, you will often be asked to respond via the iClicker.

For each iClicker poll, 1 participation point will be available: the full 1 point will be awarded to correct response(s), while 0.5 points will be given for any other scientifically reasonable responses. Your total participation points will accumulate until they reach a maximum of 50 total participation points; if you faithfully attend class and answer correctly most of the time, you can reach this maximum a few weeks before the end of the semester. There are thus ample opportunities to attain this maximum score, even if several classes are missed due to situations such as late class registration, family emergencies, job interviews, and malfunctioning iClickers; therefore no additional participation opportunities will be available beyond those in each class.

The iClicker scores will reflect what is recorded by the instructor's receiver. Recorded iClicker scores will be posted on Moodle every few days. Students are responsible for checking throughout the course and verifying that their clicker responses are properly received.

Three-Minute Essays

Occasionally, you will be asked to write a "three minute essay" in class. This will be a chance to briefly collect your thoughts or your questions on the material we are discussing. These will be collected and read, but will not be assigned a letter grade. Instead, I will keep a record of who has turned in the assignments. A record of consistent and thoughtful responses on these essays will indicate that you have regularly and actively attended the classes, and this will justify a "boost" if your final course score is at the borderline between two grades.

Academic Integrity and Collaborative Work

Academic honesty is essential to this course and the University. Any instance of academic dishonesty (including but not limited to cheating, plagiarism, falsification of data, and alteration of grade) will be documented in the student's academic file. In addition, the particular exam, homework, or report will be given a zero.

Guidelines for collaborative work: Discussing course material with your classmates is in general not only allowed but in fact a good idea. However, each student is expected to do his or her own work. On homework, you may discuss the questions and issues behind them, but you are responsible for your own answers. In writing observing and planetarium reports, you may discuss with classmates during the activity, but again, you are expected to give your own individual answers in your own words. Finally, on exams your work and your answers must of course be entirely your own.

Optional Course Text

Pankaj Jain, *An Introduction to Astronomy and Astrophysics*
CRC Press/Taylor & Francis, 2015
EBook available at reduced cost

This book gives an up-to-date overview of modern astrophysics, using elementary physics to develop and understanding of the observed universe. Thus, this book closely follows the spirit and level of our course. It contains more material that we will cover, but its treatment of material we will cover is generally very good and complementary to my own. The text also provides useful diagrams and tables of data.

I do not make it a practice to follow the textbook in structuring the course or the lectures. Rather, I will present material in the manner that I find most pedagogical and, I hope, entertaining; the textbook offers an alternate, self-contained discussion. Thus the textbook is recommended but **optional**.

Course Schedule

An updated schedule appears on the course website. Note that the lecture material may vary, but the assignment dates are fixed.

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Guidelines for collaborative work: Discussing course material with your classmates is in general a good idea. However, you are expected to do your own work. You are responsible for understanding every part of your results and solutions, and for writing these in your own words. Finally, on exams your work and your answers must of course be entirely your own.

Accessibility

To insure that disability-related concerns are properly addressed from the beginning, students with disabilities who require reasonable accommodations to participate in this class are asked to see the instructor as soon as possible.

Classroom Etiquette and Use of Electronic Devices

For the benefit of your fellow students and your instructor, you are expected to follow these basic rules of decorum.

- Show up for class on time. If you must be late on a regular basis, please inform the instructor.
- Turn off or mute your cell phone before class begins.
- Do not leave class early, and do not rustle papers or pack up bags in preparation for leaving before class time is up.

- Be attentive in class. Do not use headphones, read newspapers, or prop your feet up on other chairs or desks.
- Be respectful in your interactions with your fellow students and your teachers, whether in person or in cyberspace.

Electronic devices such as laptops, tablets, mobile phones, and the like, are tools that can enhance the classroom but also can be disruptive if misused. I will allow the use of such devices in class for the purpose of taking notes only. But you are expected to pay attention in class, and these devices can be very distracting; you are expected to use them only for note-taking.

Students must respect the classroom environment. Unless specifically directed by the instructor, students shall refrain from sending email and instant messages, or from engaging in other activities (reading non-course materials, engaging in private conversations and so on) that disrespect the classroom environment and learning conditions for others.

Disruptive behavior and/or misuse of electronic devices can affect your participation grade for that day. If the behavior continues, there will be additional reduction in the overall course participation grade.