PHYS305 - Introduction to Astrophysics & Astronomical Observing

Instructor Information

Instructor: Prof. Brian Jackson
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Office Hours: Wednesdays, 11-12p MT in MPCB room 426 or by appointment

Course Description

A broad survey of basic astrophysics and astronomical observation. Topics include the physics of light, measurement uncertainty and statistics, time and coordinate systems, astronomical databases and catalogs, geometrical optics and telescopes, interaction of light and matter, astronomical detections, and digital imaging. The course will culminate in the collection and analysis of data using Boise State's astronomical observatories, weather permitting. May require evening labs.

Course Learning Outcomes

Students will demonstrate the following:

1. basic quantitative understanding of the physics of light;
2. grasp of measurement uncertainty and the underlying statistical framework;
3. understanding of astronomical time and motions;
4. familiarity with astronomical databases and catalogs;
5. working knowledge of telescope design and optics; and
6. ability to conduct and analyze simple astronomical observations.

Course Meeting Time and Place

Regular Class Meetings

2024 Jan 8 - Apr 24
Mondays and Wednesdays, 12-1:15p MT in MPCB room 408 and on Zoom (https://boisestate.zoom.us/j/99477689791) – N.B: Zoom will ONLY be activated if notified.

Office Hours

Wednesdays, 10a-12p MT in MPCB room 426

Final Exam

2024 Apr 29 in the Multipurpose Classroom Bldg room 408, 12-2p MT

Textbook

To Measure the Sky, 2nd ed., Frederick R. Chromey, Cambridge U. Press, 2016.

Grading

Exam grades may be curved up, but not handing in assignments will not lower the curve and will be detrimental to your final grade.

Grades from coursework will be weighted as follows:

- Homework -- 40%
- Exam 1 -- 15%
- Exam 2 -- 15%
- Final Exam -- 15%
- Observing Project -- 15%

The following thresholds represent the minimum required for a final letter grade --
A: 90% B: 80% C: 70% D: 60% F: less than 60%.

I cannot modify your grades at the end of the semester for any reason. Therefore, if you have concerns about your grades, please contact me as early as possible. Don't wait until the end of the semester to consult me about your grade.

Coursework

I describe the coursework and graded assignments below. There are no extra assignments that I can provide late in the semester to bulk up your grade, so please stay on top of the coursework and let me know ASAP if you run into problems. **Late assignments will not be accepted**, and extenuating circumstances are required for an assignment to be exempted. Please contact me as soon as the extenuating circumstances arise so that we can make arrangements.

Reading

The course schedule below provides approximate dates on which we will cover topics. You are expected to have read the sections by the end of the week indicated in the schedule (except, of course, for the first week of class).

Homework

Homework will be assigned each week. The assignments consist of problems applying the ideas from class and will usually be due at the beginning of the next class. Complete solutions will be posted after class the day the homework is due. Late assignments are not allowed.

We'll spend some class time working on homework problems and answering your questions, so make sure you've at least looked at the problems by class time.

You are welcome to work in groups on the homework, but the solutions you turn in must be your own work. You must turn in your hand-written or typed solutions on Canvas (smartphone photos of your solutions are fine). You may NOT work in groups on the exams (see below).

For most homework assignments, three problems of your choice will be graded out of five points each. You will also receive one point for each problem for which you make a good faith attempt. However, for other assignments, you will be required to complete all problems. I will provide complete solutions for each homework problem.

Exams

You will have three exams, two during the semester and one final exam.

All exams will consist of a handful of multi-part, in-depth problems, all of which will be cumulative. Exams will be take-home and handed out on Wednesdays.

You are allowed to use your textbook, notes, and previous homework and exam solutions but NOT the internet. You are NOT allowed to work together on exams.

You will be allowed to work on the exam until the next class. Exams are due at the beginning of the next class, and solutions will be posted after class that day. Turning the exam in after the deadline (without agreed-upon arrangements) will result in a zero. You must turn in your hand-written or typed solutions via Canvas (smartphone photos of your solutions are fine).

Final Exam

We'll concoct a plan as a class for how to handle the final exam, but, however we handle it, the final exam will be due by Monday, Apr 29 at 2p MT.

Observing Project

You will complete an astronomical observing project during the course of the semester. We will discuss details in class, but the project will be due by Monday, Apr 29 at 2p MT.

Academic Integrity

All students are required to adhere to Boise State University's Student Code of Conduct on academic dishonesty. Assignments you submit must be your original work and cannot be used in other courses, nor can you use significant portions of assignments completed for another course in this course.

Assignments you submit must be original and developed by you. You are welcome to adapt ideas from other sources and work together (except on exams); however, you must interpret such ideas significantly and cite your sources. Anything copied from a source (even the textbook) must be indicated by appropriate citations. Please refer to Student Code of Conduct sections on Academic Dishonesty, Cheating, Classroom Misconduct, and Plagiarism.

Chegg, AI, or Other Homework Help Services

You are NOT allowed to find or solicit solutions on homework help websites including Chegg. If it is found you used such a service, it will constitute academic misconduct. If you need help with your homework, please contact me (bjackson@boisestate.edu).

Educational Access

Students with disabilities needing accommodations to fully participate in this class should contact the Educational Access Center (eacinfo@boisestate.edu). All accommodations must be approved through the EAC prior to being implemented. To learn more about the accommodation process, visit the EAC's website at https://www.boisestate.edu/eac/.

Student Well-Being

Boise State is committed to the safety and well-being of our college students, faculty, and staff. You can help to identify and assist members of our community who may be at risk. If you are concerned about the behavior or safety of a member of the campus community or are in need of support yourself, please share your concerns with the CARE team by submitting a report of concern at https://www.boisestate.edu/care/. When in doubt, reach out!

This class, like this university, is a community. Communities contain diverse identities and perspectives, and the most successful communities respect that diversity as a key to collective improvement. In alignment with the Boise State University statement of diversity and inclusivity, all community members are encouraged to contribute their perspectives and experiences. I encourage you to enrich yourself and the community by listening to others and sharing your thoughts. If you feel isolated from our classroom community in some way, please let me know so that we can work together to create a welcoming space for you to feel like part of the community.

Class Schedule

The following schedule is notional and subject to change throughout the semester:

Date		Topics	Reading	HW due
2024 Jan 8	M	Introduction to PHYS305		
2024 Jan 10	W	Snow Day	Ch. 1	
2024 Jan 15	M	MLK Day		
2024 Jan 17	W	Light		
2024 Jan 22	M	Light	Ch. 2	
2024 Jan 24	W	Uncertainty		Ch. 1 HW
2024 Jan 29	M	Uncertainty	Ch. 3	
2024 Jan 31	W	Place, Time, Motion		Ch. 2 HW
2024 Feb 5	M	Place, Time, Motion/Exam Rev		
2024 Feb 7	W	Exam 1		Ch. 3 HW
2024 Feb 12	M	Astronomical Optics	Ch. 5, Secs. 5.1-5.4	
2024 Feb 14	W	Astronomical Optics		
2024 Feb 19	M	Presidents' Day		
2024 Feb 21	W	Astronomical Optics		Ch. 5 HW
2024 Feb 26	M	Telescopes	Ch. 6, Secs. 6.1-6.3	
2024 Feb 28	W	Telescopes		
2024 Mar 4	M	Exam 2 Review		Ch. 6 HW
2024 Mar 6	W	Exam 2		
2024 Mar 11	M	Databases	Ch. 4	
2024 Mar 13	W	Databases		Ch. 4 HW
2024 Mar 18	M	Spring Break		
2024 Mar 20	W	Spring Break		
2024 Mar 25	M	Matter and Light	Sec. 7.1, 7.3, 7.4.1	
2024 Mar 27	W	Detectors	Sec. 8.1, 8.2	
2024 Apr 1	M	Digital Images	Ch. 9	Ch. 7 & 8 HW
2024 Apr 3	W	Digital Images		
2024 Apr 8	M	Observing Project		Ch. 9 HW
2024 Apr 10	W	Observing Project		
2024 Apr 15	M	Observing Project		
2024 Apr 17	W	Observing Project		
2024 Apr 22	M	Careers in Astronomy		
2024 Apr 24	W	Final Exam Review		
2024 Apr 29	M	Final Exam (12-2p)		Observing Project