

University of Wyoming
ASTR 1050
Survey of Astronomy, 4 credits
Lectures: CR 214; Labs: STEM 180
Fall semester 2024

Class Times

Lecture: MWF 2:10–3:00 PM, from 26 Aug 2024 to 6 Dec 2024 excluding university breaks.

Laboratory (You should be registered for *one* laboratory section): Sec 10: M 3:10–5:00 PM; Sec 11: M 5:10–7:00 PM.

Instructor

Richard Barrans, Ph.D., M.Ed., Assistant Lecturer, Physics and Astronomy
Physical Science Building room 116, no phone in office, rbarrans@uwyo.edu.
Office Hours: M 3:10–4:10 PM, WF 11:00AM–12:00 PM, R 2:00–3:00 PM

Teaching Assistants

Lab section 10: Adam Tedeschi

Lab section 11: Caleb Eastlund

Enrollment Restrictions

Prerequisite: MATH 1000 or equivalent, or passing the Mathematics Placement examination at Level 2.

Course Description

This is a course aimed at a basic mathematical understanding on astronomy. It is designed primarily for non-science majors, and it is also the first astronomy course in the sequence for Astronomy and Astrophysics majors. This requires the concepts to be accessible without being oversimplified or watered down. Students who work hard to understand the material will have the opportunity to excel. The rewards are intrinsic—the Universe is astonishing, and doubly so if you appreciate how we have learned about it. If you truly understand a concept, you will be able to predict how results would change if conditions were different; for instance, do you understand eclipses well enough to understand what eclipses would be like if the Earth were farther away from the Sun?

University Studies Program

This course fulfills the Physical and Natural World (PN) requirement of the 2015 University Studies Program. Physical and Natural World (PN) courses will help students understand the fundamental concepts of scientific and quantitative inquiry and develop the ability to understand the fundamental concepts of scientific and quantitative inquiry and develop the ability to understand the relevance of scientific, technological, and quantitative skills to contemporary society. Physical and Natural World (PN) courses will also develop and

promote critical and creative thinking skills through active learning, inquiry of pressing issues, and individual and collaborative processing of ideas.

Student Learning Outcomes

Physics & Natural World Student Learning Outcomes

- Understand the principles of the scientific method.
- Formulate and test ideas through analysis and interpretation of the data.
- Use quantitative data analysis as the basis for making critical judgements and drawing conclusions.

Physics & Natural World Critical & Creative Thinking Student Learning Outcomes

- Separate facts from inferences and relevant from irrelevant information, and explain the limitations of information.
- Evaluate the credibility, accuracy, and reliability of conclusions drawn from information.
- Analyze one's own and others' assumptions and evaluate the relevance of context when presenting a position.

Astronomy Student Learning Outcomes

- Identify and describe the contents of the Universe.
- Identify and explain evidence leading to our ideas of what exists and how it behaves.

Required Materials

Textbook: Comins, *Discovering the Universe*, 11 Ed. W.H Freeman and Company, 2019, with Achieve. Available via WyoCourses through StartRight+.

General Requirements and Expectations

Lecture

Since ideas and definitions from the text will be used freely in class, please read and study the assigned chapters before class. The more actively engaged you are in class, the better you will learn and perform.

Lab

The lab activities are to be completed entirely in lab. Scoring is all-or-nothing: either you get full credit for a lab, or you don't. You should always be able to get full credit, though: if your lab instructor tells you that something is incorrect or missing, just fix it before you leave.

Homework

The assignments will be posted online via the Achieve platform. Students are encouraged to work together, but each student must submit their own work. The deadline for each homework will be indicated, typically right before the class at which the next homework is

assigned. Please check and be mindful of the submission deadlines; they typically won't be at midnight.

WebAssign advice and information:

“Inclusive access” to the textbook and Achieve is available with StartRight+. I will provide you with registration information.

Internet

Course information and lecture outlines will be accessible through WyoCourses. Supplemental materials, such as lecture slide shows, worksheets, and labs, can also be accessed directly at my website, www.barransclass.com, in case the links in WyoCourses are missing or incorrect.

Required Examinations, Assignments, and Activities

Homeworks and labs will be assigned approximately weekly. There will be four exams, including the final exam, held at the following times:

Exam 1	Monday, Sep 16	
Exam 2	Wednesday, Oct 16	
Exam 4	Monday, Nov 11	
Exam 4 (Final exam)	Wednesday, Dec 11	1:15–3:15 PM

Required Participation Outside of Class Meetings

When weather permits, there will be opportunities to watch the night sky outside of normal class hours. Missed standards must be made up on your own time, optimally during my office hours.

Grading Scale and Grading Policies

The final grade will be determined from cumulative points attained. Grading will be on a standard scale (90's = A, 80's = B, 70's = C, 60's = D, < 60% = F). The different components of the course comprise the following fractions of the semester grade:

Item	Percent
Standards	75%
Labs	25%

Standards: Standards are specific skills that I recognize as evidence of mastery of the course content. The list of standards can be viewed from the WyoCourses shell. The quizzes, and the final exam, contain questions that probe your understanding of the standards assessed. Your performance on the questions probing a standard determines whether you satisfy the standard or not. If you satisfy a standard, great! That contributes to your tally of mastered standards.

If you don't satisfy a standard on a quiz, you automatically qualify to try again. If you satisfy the standard at the retest, it counts as satisfied with no penalty. If you don't satisfy the

standard at the retest, you may retest again, but you must first meet with me or a designee to review the standard and schedule the retest. No retests will be available after the final exam.

Homework: Homework is administered online through the Achieve platform. It should be accessible through WyoCourses.

Labs: You must average **at least 60% on the labs** to pass the course. If your lab average is less than 60%, you will receive an F for the course regardless of your scores on the standards.

A note about grades: Your grade in this course reflects your performance over a 15-week period on a limited set of contrived evaluations. It does not reflect your worth as a person or what I think of you. Because of the scope of this course, and because it comprises only a small fraction of your college career, your grade is not a prediction of your future success or an evaluation of your career potential. In short, do not cause yourself (or your instructor) anxiety by making more of your grade than it really is.

Attendance and Absence Policies

Attendance is expected in class sections, and I will record attendance. There is no explicit grade for attendance, however. Attendance in lab is required to receive credit for the lab. If you have an excused absence from lab, you may attend another lab session in the same week, we may arrange a make-up lab for you, or the lab may be pro-rated.

Classroom Behavior Policy

Students are expected to respect others' opinions and abilities, and to help each other during group work activities. Those who repeatedly disrupt the class or interfere with other students' opportunity to learn will be asked to leave the class. If you have a cell phone or any personal audio equipment, ensure that it does not make noise during class, and that it does not create a distraction for your classmates or the instructor. Laptops and tablets are allowed for note-taking purposes. No unauthorized video or audio recording during class is allowed to protect the privacy of your fellow students. If you require recording for accommodation of disabilities, work with Disability Support Services and me to accommodate your needs.

Diversity

The University of Wyoming values an educational environment that is diverse, equitable, and inclusive. The diversity that students and faculty bring to class, including age, country of origin, culture, disability, economic class, ethnicity, gender identity, immigration status, linguistic, political affiliation, race, religion, sexual orientation, veteran status, worldview, and other social and cultural diversity is valued, respected, and considered a resource for learning.

Disability Support

The University of Wyoming is committed to providing equitable access to learning opportunities for all students. If you have a disability, including but not limited to physical, learning, sensory or psychological disabilities, and would like to request accommodations in this course due to your disability, please register with and provide documentation of your

disability as soon as possible to Disability Support Services (DSS), Room 128 Knight Hall. You may also contact DSS at (307) 766-3073 or udss@uwyo.edu. It is in the student's best interest to request accommodations within the first week of classes, understanding that accommodations are not retroactive. Visit the DSS website for more information at: www.uwyo.edu/udss. Once UDSS informs me of the accommodations appropriate for you, I will implement them.

Academic Dishonesty Policies

Academic honesty develops respect between faculty and students, ensures fair and effective grading, and creates an environment that fosters learning. Although I encourage you to study with other students, any assignments, exams, and lab submissions must represent your own work.

Academic dishonesty will not be tolerated in this class. Cases of academic dishonesty will be treated in accordance with UW Regulation 2-114. The penalties for academic dishonesty can include, at my discretion, an "F" on an exam, an "F" on the class component exercise, and/or an "F" in the entire course. Academic dishonesty means anything that represents someone else's ideas as your own without attribution. It is intellectual theft – stealing - and includes (but is not limited to) unapproved assistance on examinations, plagiarism (use of any amount of another person's writings, blog posts, publications, and other materials without attributing that material to that person with citations), or fabrication of referenced information. Facilitation of another person's academic dishonesty is also considered academic dishonesty and will be treated identically.

Physics is fun. Involvement in a case of academic dishonesty is not fun.

AI Technology

Students are permitted to use advanced automated artificial intelligence or machine learning tools on assignments in this course if that use is properly documented and credited. For example, text generated by ChatGPT-3 should include a citation such as "Chat-GPT-3. (YYYY, Month DD of query). "Text of your query." Generated using OpenAI. <https://chat.openai.com/>" Material generated using other tools should follow a similar citation convention.

Duty to Report

UW faculty are committed to supporting students and upholding the University's non-discrimination policy. Under Title IX, discrimination based upon sex and gender is prohibited. If you experience an incident of sex- or gender-based discrimination, we encourage you to report it. While you may talk to a faculty member, understand that as a "Responsible Employee" of the University, the faculty member MUST report information you share about the incident to the university's Title IX Coordinator (you may choose whether you or anyone involved is identified by name). If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are people who can meet with you. Faculty can help direct you or you may find info about UW policy and resources at <http://www.uwyo.edu/reportit>.

You do not have to go through the experience alone. Assistance and resources are available, and you are not required to make a formal complaint or participate in an investigation to access them.

Substantive changes to syllabus

Information in the syllabus was, to the best knowledge of the instructor, correct when distributed at the beginning of the term. The instructor, however, reserves the right, acting within the policies and procedures of the University of Wyoming, to make changes in the course content, schedule, or instructional techniques during the term. If any changes to the syllabus become necessary, students will be notified in class, by email, and on WyoCourses. Please check your university email daily.

Student Resources:

- DISABILITY SUPPORT SERVICES: udss@uwyo.edu, 766-3073, 128 Knight Hall, www.uwyo.edu/udss
- COUNSELING CENTER: uccstaff@uwyo.edu, 766-2187, 766-8989 (After hours), 341 Knight Hall, www.uwyo.edu/ucc
- ACADEMIC AFFAIRS: 766-4286, 312 Old Main, www.uwyo.edu/acadaffairs
- DEAN OF STUDENTS OFFICE: dos@uwyo.edu, 766-3296, 128 Knight Hall, www.uwyo.edu/dos
- UW POLICE DEPARTMENT: uwpd@uwyo.edu, 766-5179, 1426 E Flint St, www.uwyo.edu/uwpd
- STUDENT CODE OF CONDUCT WEBSITE: www.uwyo.edu/dos/conduct

Tentative Schedule

Date	Topic	Reading*
08/26	Introduction, scale	
08/28	How the sky changes	1.7–1.14
08/30	Celestial Coordinates	1.2–1.5
Lab	None	
09/02	Labor Day—No class	
09/04	Orbits, transits, and eclipses	1.12–1.14
09/06	Kepler’s laws	2.2–2.10
Lab	Kinesthetic Astronomy	
09/09	Electromagnetic radiation	3.1–3.4
09/11	Light and color	none
09/13	Telescopes	3.5–3.13
Lab	Electromagnetic spectrum	
09/16	Exam 1 (Ch. 1 and 2)	none
09/18	Non-visible observing; black body radiation	3.4–3.19, 4.1–4.2
09/20	Spectra, absorption, scattering, and shifting	4.3–4.7
Lab	Solar System walk	
09/23	Forming stars and planets	Chapter 5
09/25	Overview of the Solar System	Chapter 6
09/27	Earth	7.1–7.4
Lab	Rooftop observing	
09/30	The Moon	7.5–7.9
10/02	Mercury and Venus	8.1–8.7
10/04	Mars	8.8–8.15
Lab	Parallax	
10/07	Father of the Gods	9.1–9.8
10/09	Saturn	9.9–9.13
10/11	The rest of the Solar System	9.16–9.17, Chapter 10
Lab	Surveying the Solar System	
10/14	Semester Break—No class	
10/16	Exam 2 (Ch. 3–8)	
10/18	The Sun’s exterior	11.1–11.7
Lab	Planetarium	

10/21	The Sun's interior; Describing stars	11.8–11.12; 12.1–12.3
10/23	Classifying stars	12.4–12.19
10/25	Understanding stars; Birth of stars	12.10–12.13; 13.1–13.5
Lab	Stellar Safari	
10/28	Lives of stars	13.6–13.11
10/30	Variables; white dwarfs	13.12–13.16; 14.1–14.4
11/01	Core collapses	14.5–14.13
Lab	Coloring the Universe	
11/04	Extraordinary nuclei	14.14–14.20
11/06	Theory of black holes	15.1–15.6
11/08	Evidence for black holes	15.7–15.12
Lab	Exploding stars	
11/11	Exam 3 (Ch 9–13)	
11/13	Our Galaxy	Chapter 16
11/15	Galaxies	17.1–17.6
Lab	Milky Way Structure	
11/18	Interacting galaxies	17.7–17.10
11/20	Dark matter and the structure of the Universe	17.11–17.14
11/22	Active Galaxies	Chapter 18
Lab	Exploring the observable universe	
11/25	The big bang	19.1–19.10o
11/27	Thanksgiving Break—No class	
11/29	Thanksgiving Break—No class	
Lab	No lab	
12/02	What happens then?	19.11–19.15
12/04	How rare is life?	20.1–20.3
12/06	Where is everybody?	20.4–20.7
Lab	The expanding universe	
12/11	Final exam 1:15–3:15 PM	

*Reading assignments are from the textbook.