

PHYS 165 Quantitative Astronomy

Syllabus Spring 2026

Instructor: Dr. Ann Wright
Office: Acxiom 104
Phone: 450-3808

Email: wright@hendrix.edu
Office Hours: TH 3-4pm,
WF 1-2, or drop in

Meeting times: Section 1, A7 MWF 2:10-3:00 pm. Section 2, A8 MWF 3:10-4:00 pm

Class location: MCACX 119

Course Learning Goals

NS and QS Learning Goals: Students who successfully complete this course will:

- ... explore the methodology of observational astronomy and how to fit the observations to the models to understand our universe (NS LG 1)
- ... discuss how models agree or do not agree with observations, and how those discrepancies lead to revised models (NS LG 2 and 3)
- ... use mathematical/computing techniques to analyze data and solve problems related to astronomy (QS LG 1)
- ... quantitatively interpret results of analysis applied to real world problems (QS LG 2)

Learning Goals for this course: Students who successfully complete this course will...

- ... explore the historical development of models of the physical world, the experimental basis of these models, and how these models have impacted how humanity views the physical world.
- ... learn about the celestial objects in our solar system and beyond, and the methods used to gather information about them.
- ... demonstrate their ability to present information clearly, logically, and critically, both orally and in writing.

Textbook:

We will be using the OpenStax free textbooks for Astronomy and Algebra and Trigonometry. OpenStax is a series of free textbooks that are developed and hosted online by Rice University. You can access the textbooks through a web browser or you can download a pdf file for free. You may also purchase a paper copy of the textbook. Details are at the textbook website links below.

1. Astronomy 2e <https://openstax.org/details/books/astronomy-2e>
2. Algebra and Trigonometry 2e <https://openstax.org/details/books/algebra-and-trigonometry-2e>

Course Materials:

The course syllabus, class announcements, and assignments will be available on the class Team. Class content will be available on the course website at <http://astronomy.calliope.us/>

Course equipment:

You must have a calculator that can handle scientific notation and functions such as sine and cosine. You may use the calculator on your phone in class and for homework assignments, but you will not be allowed to use your phone during tests. Therefore, I strongly encourage you to practice using a calculator for all quantitative work in this class. The calculator does not need to have graphing capability, but that may be helpful.

Optional equipment. The following items will be useful if you have them: a compass, astronomy apps on your phone or tablet such as Astronomy Picture of the Day (APOD), Sky Safari, Star Walk. The physics department has telescopes and binoculars that we will use during the class, or you are welcome to use your own if you have them.

Course letter grades are assigned based on the numerical course grade:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
0-59%	F

The instructor reserves the right to adjust the limits down (but never up). For example, a course grade of 88% will never be assigned a letter grade lower than a B, but may be raised to an A.

Course Grade Formula:

75% Test average (4 midterm exams, lowest grade dropped)
20% Homework/Observation assignments
5% Presentation

Attendance Policy:

The Hendrix attendance policy may be found in the 2025-26 Catalog in section [D.6.e. Class Attendance](#). Attendance will be taken at the start of each class meeting. If you miss class for an excused reason (mental or physical health, athletic event, other school sponsored event, religious holiday, etc.), please fill out the excused [absence form](#). A link to this form is also located in Teams. Excused absences will not lower your course grade. Three to six unexcused absences will result in a letter grade reduction for the course. Seven or more unexcused absences will result in two letter grade reductions. Students do not need to provide proof for excused absences, but dishonesty about reasons for absences is treated as an academic integrity issue. Students should make sure that they cover the material that was missed by completing the reading assignments, and using the course website. If assignments or exams are missed, please communicate with Dr. Wright immediately, using Hendrix e-mail (wright@hendrix.edu).

Homework and Observation Assignments

- Assignments will be announced in class, and on the class Team.
- HW will be submitted to Teams. Please upload your solutions in a single pdf file. Handwritten work can be scanned or converted to pdf through a phone app such as CamScanner or Adobe Scan.
- Each HW assignment may have qualitative work (vocabulary, multiple choice, short answer questions) and/or quantitative work (mathematic skills, numerical problems, computational

assignments). Each category is graded on a 2 point scale according to the rubric below. Solutions for each assignment will be posted on Teams.

- There will be several observational assignments. These assignments will include outdoor naked-eye observations, and virtual/simulated observations using computer programs or internet resources. Observation assignments will also be graded on a 2 point scale.
- Late assignments will receive a score of 1 point, and may be submitted within 2 weeks of the assignment due date (or the final exam period for the last assignment).
- Please communicate with Dr. Wright using e-mail if you need an assignment extension due to an excused absence or illness.

Assignment rubric

	Sufficient (2 points)	Needs Improvement (1 point)	Missing or insufficient (0 points)
Qualitative work	All questions are answered in complete sentences, bullet points, and/or pictures. The answers are mostly correct and complete. The submitted work is easy to read and navigate.	Some questions are missing or incorrect. The submitted work is difficult to read and/or navigate. Or, the assignment was submitted late (up to 2 weeks)	All questions are missing or answered incorrectly. The submitted work cannot be read.
Quantitative work	Calculations are complete and mostly correct. Correct units are used when appropriate. Solutions are neat and easy to read and navigate.	Some calculations are missing or incorrect. Units are not given when appropriate. The submitted work is difficult to read and/or navigate. Or, the assignment was submitted late (up to 2 weeks)	All questions are missing or incorrect. The submitted work cannot be read.
Observational work	Observations were made and recorded correctly and completely. Analysis is mostly correct and complete.	Observations were made, but are incomplete or recorded incorrectly. Analysis is not correct and/or complete. Or, the assignment was submitted late (up to 2 weeks)	Observations were not made or recorded. Analysis was not done.

Observation Opportunities:

Opportunities such as telescope observation nights, and public star parties will be offered, and observation suggestions will be given in most classes.

Test Information:

Four tests, given during class time. Test dates are given in the class schedule, actual dates will be announced in class at least 1 week prior to each test. Cell phones, or any other electronic devices are not allowed within view during tests. You will need a calculator for the tests. Lowest test score is dropped before the test average is calculated for the course grade.

Presentations

Students will select a research topic in astronomy and present a poster during the final exam period. Details will be given in class mid-semester.

Final Exam

The final exam period on Tuesday May 12 is reserved for the class poster session. Section 1 meets at 8:30-11:30am, Section 2 meets at 2-5pm. There is no final exam, but attendance is mandatory. Students will present their posters and evaluate other posters during this time.

Academic Accommodations

It is the policy of Hendrix College to accommodate students with disabilities, pursuant to federal and state law. Students should contact Ms. Lauren Wilson in the Office of Advising & Academic Success (AcademicSuccess@hendrix.edu) to begin the accommodation process. Any student seeking accommodation in relation to a recognized disability should inform the instructor at the beginning of the course and at least 3 business days before each exam.

Academic Integrity:

Our academic integrity policy may be found in the 2025-26 Catalog in section [D.6.c.Academic Integrity](#). Students are encouraged to work in small groups inside and outside of class on assignments. However, each student is expected to prepare his or her own submitted work unless instructions explicitly require group submission. All work on tests and assignments must be the effort of the individual student. Direct copying of another student's work, the textbook, the textbook solution manual, or the use of online resources such as Chegg or Artificial Intelligence is cheating and is not allowed.

Diversity Statement:

Hendrix College values a diverse learning environment as outlined in the College's Statement on Diversity. All members of this community are expected to contribute to a respectful, welcoming, and inclusive environment for all community members. If you believe you have been the subject of discrimination, please contact the Dean of Students Office (JB Banks, banksa@hendrix.edu, SLTC 211, 501-450-1230) or the Title IX Coordinator (Danielle Crowell, crowelld@hendrix.edu, SLTC 249, 501-450-1416). If you have ideas for improving the inclusivity of the classroom experience, please feel free to contact this professor. For more information on Hendrix's non-discrimination policies, please visit Hendrix.edu/nondiscrimination.

Schedule of topics and tests

Date	Astronomy Topic	Math Reading	Astronomy Reading
W 1/21	Syllabus, introduction, Scientific notation, units, Scale of universe	1.1-1.2	Ch 1, 19.1
F 1/23	Angles, spherical coordinates, azimuth and altitude coordinates, Earth's rotation, latitude and longitude, right ascension and declination.	7.1-7.2	2.1, 4.1
M 1/26	Celestial Sphere, Polaris motion, N sky motion, ecliptic, Earth's tilt Earth's orbit around Sun, analemma, prograde/retrograde motion, zodiac		2.1, 4.2
W 1/28	History: Aristotle through Galileo, parallax		2.2-2.4
F 1/30	Kepler's Laws	12.1	3.1
M 2/2	Newton's Laws, gravity	12.2-12.3	3.2-3.6
W 2/4	Earth rotation, latitudes, Foucault pendulum, seasons, Moon phases, eclipses		4.1-4.7
F 2/6	Light is a wave: wavelength, frequency, spectrum, energy, speed.	8.1	5.1-5.2
M 2/9	Test 1		
W 2/11	Blackbody curve, Wien's law, Stefan-Boltzmann law	3.1	5.2
F 2/13	Bohr atom, light emission and absorption, Periodic table		5.3-5.5
M 2/16	No class		
W 2/18	Doppler shift		5.6
F 2/20 *	Lenses, mirrors, optical telescopes		6.1-6.3
M 2/23	Non-optical telescopes		6.4-6.6
W 2/25	Solar system intro.		7.1
F 2/27	Atmosphere, greenhouse effect, magnetic field (aurora), goldilocks zone		7.2, 8.3-8.4
M 3/2	Earth's Moon		9.1-9.4
W 3/4	Test 2		
F 3/6	Mercury, Venus		9.5, 10.1-10.3
M 3/9	Mars, Jupiter		10.4-10.6, 12.1-12.2
W 3/11	Saturn, Uranus, Neptune		CH 11, 12.5
F 3/13	Outer solar system, Pluto		12.4
M 3/16	Meteoroids, asteroids		13.1-13.2, 14.1-14.2
W 3/18	Comets		13.3-4
F 3/20	Sun – luminosity, outer layers		15.1
M 3/23	No class, spring break		
W 3/25	No class, spring break		
F 3/27	No class, spring break		
M 3/30	Sun – magnetic field, active Sun		15.2-15.4
W 4/1	Sun – fusion reaction, neutrinos		Ch 16
F 4/3 **	Star classifications		CH 17
M 4/6	Test 3		

W 4/8	HR diagrams	2.1	Ch 18
F 4/10	Mass of stars, binary stars, HR cont'd		
M 4/13	Star birth		CH 21
W 4/15	Solar system formation, angular momentum		14.3-14.5
F 4/17	Star death: low mass vs high mass		22.1-22.5, 23.1
M 4/20	Stellar remnants – neutron stars, black holes, general relativity		23.2-23.4, Ch 24
W 4/22	Galaxy shapes, Milky Way		CH 25, CH 26
F 4/24	Hubble's Law	2.1	Ch 19, 29.1
M 4/27	Cosmology, universe structure and evolution, infinite universe, observable universe, expansion		29.2-29.6
W 4/29	Test 4		
F 5/1	Final Exam prep, course evals		
T 5/12	Final Presentations (A7 in am, A8 in pm)		

*Drop Day

** Drop Day with W