PH1600 Introduction to Astronomy Summer 2025

Instructor

Course Instructor: Dr. Katrina Black
Office: Dept. of Physics, Fisher 114 - but I will often be working from home or the road.
Contact: keblack@mtu.edu
Office Hours: via Zoom, Mondays 6-7 pm EDT and Thursdays 2-3 pm EDT.
To make an appointment to meet outside office hours, email to arrange a time!

Textbook

Our textbook is Discovering the Essential Universe, 6th Edition, by Neil Comins. The ISBN is 978-1464181702.

Course Overview and Learning Goals

In PH1600, we will explore fundamentals of observational astronomy and astrophysics, including Kepler's and Newton's laws of motion; origin and evolution of the solar system; stellar, galactic and extra-galactic astronomy; cosmology; and modern instrumentation, including space-based astronomy.

At the end of the course, successful students will be able to:

- Accurately use and define astronomical vocabulary terms
- Perform calculations using common astronomical and physical equations.
- Describe the motions of the earth, moon, and planets through space and how this motion affects our view of the night sky
- Describe features of solar system bodies and categorize solar system and exoplanet bodies based on those features
- Identify the rungs of the distance ladder and explain how each is used to measure astronomical distances
- Identify features of stars, explain the interdependence of those features, and categorize stars based on their features
- Describe the life and death of stars, and how this varies depending on mass
- Describe current evidence for the expanding universe and the existence of dark matter and energy
- Use astronomical software to plan a naked eye, binocular, or telescopic observing session.
- During a naked eye, binocular, or telescopic observing session, identify stars, planets, constellations, or other astronomical objects and explain to others how to locate them in the sky.

Grading Policy

Your final grade will be determined using the following weights:

Assignment Group	**Percentage**
Fact Check Quizzes	5%
Reflect Questions	5%
Extend Quizzes	10%
Weekly Homework	20%
Observing Projects	10%
Midterm Exam	25%
Final Exam	25%

Letter grades will be assigned as follows. I round to the nearest whole point.

Grade	Range
A	90 - 100%
AB	85 - 89%
B	80 - 84%
BC	75 - 79%
C	70 - 74%
CD	65 - 69%
D	60 - 64%
F	0 - 59%

I reserve the right to adjust these ranges downward (to increase final grades), but will not adjust them upward.

Class Routine

Since this class meets entirely online, you should use Canvas Modules to keep track of the order of work throughout the semester.

In order to accommodate as student schedules as possible, our weeks will run from Tuesdays to Mondays. In general, assignments from four "sections" will be due each week, Tuesday through Friday at 11:59 pm EDT, with a weekly wrap-up homework due Mondays.

For each section:

- Do the reading and watch the videos
- Complete the *fact check* quiz based on the reading and videos
- Work on the *extend* activities and complete the *extend questions*
- Post your answer to the *reflect question* in Discussions
- At the end of the week, complete the *weekly homework* by 11:59 pm on Monday. It behooves you to start on the homework before Monday at 11 pm! :)

For those who like to get an early start, each week's Module opens on the Thursday of the week before.

Fact Check Quizzes: After reading and watching videos, complete the fact check, based on the videos and readings. The fact check quiz will typically be 5 questions. You will be limited to 30 minutes and one attempt for each fact check, but your lowest 3 scores will be dropped.

Extend Activities and "Quizzes": For each topic, I will post additional materials to help you extend the knowledge you gained from the reading and videos. This content will vary, but will include using and understanding important astronomical equations, thinking more deeply about topics glossed over in the text and videos, etc. Each Extend activity will include a set of questions (the "Extend quiz") to test your understanding. You will have ten attempts with unlimited time for each Extend quiz until the due date. Your lowest Extend quiz will be dropped.

Reflect Discussions: Since there are 24 topic groups, there are 24 reflect discussions, each worth 1 point. The easiest way to earn a 100% on your reflect grade is to answer every reflect question; however, you may earn up to 36 points in the reflect section of your grade by making additional substantive (not "Me too!" or "Yeah.") posts in any course Discussion thread. Additional points beyond the required 24 will be applied as extra credit.

Homework: Each week, you will have a homework to help you review and synthesize the knowledge you have gained. You will have unlimited time (until the due date) but only one attempt for each homework. Your lowest homework grade will be dropped.

Observing Projects

All students will complete four observing projects of their choice over the course of the semester. These projects are designed to help you become familiar with the night sky and techniques for amateur astronomical observing. Projects are due in the last two weeks of class, but start working on them immediately since weather can be fickle! For more details, please see the Observing Projects module on Canvas.

Exams

This course has one midterm and one final exam. The midterm is scheduled for **Wednesday, May 28** and the final is scheduled for **Friday June 20.**

Exams are open book/open notes/Canvas resources. You may use a calculator, but should not use the internet to look up how to do a problem. Exams will only be available during specific time slots the day of the exam, which will be mutually determined based on instructor and student availability. Proctoring will be via Zoom; students should have a webcam or phone with camera.

Exams for this course are computerized. However, for computation questions you are strongly encouraged to show your work on paper, which allows me to award partial credit. You should plan to upload a scan or photo of your work.

Please allow 60 minutes for your midterm exam and 120 minutes for your final exam. The final exam will be comprehensive with an emphasis on material from the second half of the semester.

Late Work and the Grace Period

I know everyone is busy, especially during a compressed summer class! Canvas will automatically apply a 12-hour grace period for every assignment. After the grace period, the assignment will lock and work will not be accepted except for reasons allowed by the Dean of Students. See guidelines at www.mtu.edu/deanofstudents/academic-policies/attendance. Please use the grace period responsibly and only when needed so that I can continue to offer it.

University Policies

Student work products (exams, essays, projects, etc.) may be used for purposes of university, program, or course assessment. All work used for assessment purposes will not include any individual student identification.

Michigan Tech has standard policies on academic misconduct and complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. For more information about reasonable accommodation for or equal access to education or services at Michigan Tech, please call the Dean of Students Office, at (906) 487- 2212 or view the policies here.

This course supports University Student Learning Goal #2: Knowledge of the Physical and Natural World.

If you require disability accommodation for any reason, please don't hesitate to contact me or the Dean of Students for guidance. Distance students should be aware that according to Michigan Tech University guidelines, disability accommodations should be verified through the Dean of Students.

Tentative Schedule

Week	Date	Reading	Crash Course
0	5-May	Course Introduction	
1	6-May	1-14, Appendices A & K	1: Introduction to Astronomy
	7-May	1-1 to 1-9	2: Naked Eye Observations, 3: Cycles in the Sky
	8-May	1-10 to 1-13	4: Moon Phases, 5: Eclipses
	9-May	2-1 to 2-8	7: Gravity
	12-May	Week 1 Homework Due	
2	13-May	3-1 to 3-4; 3-12 to 3-18	24: Light
	14-May	3-5 to 3-11	6: Telescopes
	15-May	4-1 to 4-10	9: Solar System;22: Oort Cloud
	16-May	6-1 to 6-10	11: Earth; 12: Moon, (Opt) 8: Tides
	19-May	Week 2 Homework Due	
3	20-May	6-11 to 6-20	13: Mercury, 14: Venus, 15: Mars
	21-May	7-1 to 7-8	16: Jupiter, 17: Jupiter's Moons
	22-May	7-9 to 7-17	18: Saturn, 19: Uranus and Neptune
	23-May	8-1 to 8-13	20: Asteroids, 21: Comets, 23: Meteors
	26-May	**Memorial Day**	
4	27-May	Week 3 Homework Due	
	28-May	**Midterm Exam**	
	29-May	9-1 to 9-8	10: Sun
	30-May	10-1 to 10-7	25: Distances, 26: Stars Part 1
	2-Jun	Week 4 Homework Due	
5	3-Jun	10-8 to 10-12	26: Stars Part 2, 34: Binary Stars Part 1
	4-Jun	11-1 to 11-14	(Opt) 36: Nebulae, 35: Star Clusters, 29: Low Mass Stars, (Opt) 28: Brown Dwarfs
	5-Jun	11-15 and 12-1 to 12-5	34: Binary Stars Part 2, 30: White Dwarfs, 31: High Mass Stars
	6-Jun	12-6 to 12-10	32: Neutron Stars
	9-Jun	Week 5 Homework Due	
6	10-Jun	12-11 to 12-18	33: Black Holes, 40: Gamma Ray Bursts
	11-Jun	13-1 to 13-7	37: Milky Way, 41: Dark Matter
	12-Jun	13-8 to 13-16	38: Galaxies Part 1
	13-Jun	13-17 to 13-23	38: Galaxies Part 2
	16-Jun	Week 6 Homework Due	
7	17-Jun	14-1 to 14-15	42: Big Bang and Cosmology, 43: Dark Energy, 44: History of the Universe, 45: Deep Time
	18-Jun	Ch. 5 and 15	27: Exoplanets, 46: Everything, the Universe,…and Life
	19-Jun	Week 7 Homework Due	
	20-Jun	**Final Exam Day**	