ASTR 1000 Descriptive Astronomy
Part II Project

Purpose

Demonstrate your understanding of the laws of physics controlling the physics of astronomical objects; of the signals we receive from space; and how the signals interact with intervening space, our instruments, and our detectors.

What it is

Your project is a formal way to demonstrate that you understand the content covered in Part II of the course. It should thoroughly fulfill two of the unit objectives.

Part II learning objectives

7. Define and relate position, direction, time, velocity, speed, and acceleration.
8. Define **force**, and explain how force influences motion.
9. Explain and apply Newton's formula for the gravitational force.
10. Describe the orbits of the planets, including direction and shapes of their paths.
11. Define mechanical energy and angular momentum, how they relate to orbital motion, and what it means for them to be conserved.
12. Identify the different categories of signals that Earthbound observers receive from space and what we learn from them.
13. Describe the nature of electromagnetic radiation; relate energy, momentum, wavelength, and frequency; and order the spectral regions.
14. Describe the characteristics of black body radiation and what conditions affect it.
15. Match the type of a spectrum to the substance and conditions that create it. Describe the effect on a spectrum of movement of the source toward or away from the detector.
16. Compare and evaluate the advantages and disadvantages of refracting (lens) and reflecting (mirror) telescopes.
17. Identify and explain the observational challenges with different bands of the electromagnetic spectrum.

Possible projects

These are some ideas for a project. You are free to suggest others. I will approve of projects that demonstrate your mastery of the required unit objectives.

- A concept map describing the relationships between position, velocity, acceleration, time, and force. (St 7, 8)
- A concept map describing planetary orbits, including the roles of force, energy, momentum, angular momentum, and gravity in the orbital shapes and dynamics. (St 9, 10, 11)
- A poster describing different astronomical observatories: the signals they detect, and where the signals originate. (St 12, 13; possibly 14, 15)
- A historical fiction story imagining how a real scientist added to our understanding by considering new theory or observations to what was already understood. (Some combination of St 12–16)

- A video demonstrating properties of light or images. (I can help with props.) (Some combination of St 12–17)
- A plan for a museum exhibit teaching some of these topics. (Possibly St 7–9, or 13–15, or 13, 16, etc.)

You can, of course, make posters explaining just about any combination of these standards.

Quiz questions were a popular choice for the Part I project, so I recommend refraining from those this time around.

Components

Sign up: Select a project. Describe succinctly what form your project will take, and which of the unit objectives it will cover.

Rough Draft: Your project itself. The more complete it is, the more useful feedback your classmates and instructor can provide.

Rough draft feedback: Feedback to your classmates on how you see the project addressing the objectives.

Final Project: The completed project.

Final project feedback: Summarize what the project teaches about its objectives.

Dates and Deadlines

Feb 11	Claim ideas (sign-up)
Feb 25	Rough drafts due
Feb 27	Rough draft feedback due
Mar 4	Project due
Mar 6	Final project feedback

Scoring

Rough Draft (10 points)

This is the full project, but not polished.

10	Contains all parts of the project, addressing all of the specified objective.
6	Submission lacks substantial portions of the project.

Rough Draft feedback (10 points)

For each draft that you review, explain how the project addresses its learning objectives.

10	Summarizes how each draft covers its learning objective.
proportional	Misses assigned drafts or associated objective.

Final Report (30 points)

This is graded by the student, with the instructor having veto power.

Is it easy to understand? Does it communicate the objective clearly, correctly, and completely?

Final report feedback (10 points)

Summarize what each project that you review teaches about its learning objectives.

10	Summarizes what each project teaches about its learning objective.
proportional	Misses assigned projects or associated objectives.