

ASTR 1000 Descriptive Astronomy

Part V Project

Purpose

Demonstrate your knowledge of galaxies and the universe, including types of galaxies, evolution of galaxies over time, the arrangement of matter in the universe, the evolution and fate of the universe, dark matter, and dark energy.

What it is

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

Part V learning objectives

44. Recount how the center of the Milky Way galaxy was first located. Recount how other galaxies were found to be “island universes” separate from our Milky Way. Includes Shapley’s study of globular clusters, and how distances to galaxies can be estimated.
45. Describe the structure, composition, and classification of galaxies, including our Milky Way. Explain the structure, composition, and classification of galactic clusters, including our Local Group. Describe how galaxies interact with each other. Includes identifying and distinguishing stars as population I, II, and III.
46. Identify the evidence for dark matter, and where in the universe dark matter is located. Includes velocities of stars and galaxies and gravitational lensing.
47. Describe the classification of black holes, including stellar mass, intermediate mass, and supermassive black holes. Describe and explain their detectable manifestations, including X-ray sources and active galactic nuclei. Includes describing, distinguishing, and classifying the types of active galaxy.
48. Identify the evidence for cosmic expansion and inflation. Describe the hypothesized history of the universe. Includes describing and explaining the cosmic microwave background and elemental abundances, as well as the uniformity problem and flatness of spacetime.
49. Describe the likely fate of the universe, the relevant evidence, and the uncertainties in the prediction.

Possible project ideas

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

- A fictional diary “by” Harlow Shapley describing his realization that galaxies are distinct from our Milky Way.
- A concept map describing galaxies, their types, structure, occurrence, environment, and interactions.
- A poster describing how the existence of “dark matter” became mainstream.

- A podcast explaining how the “big bang” hypothesis became accepted over its rival “steady state” hypothesis.
- A physical or digital booklet using real images to categorize galaxies by type, with explanations of stellar populations I, II, and III.
- An infographic covering rotation curves, gravitational lensing (such as with the Bullet Cluster), and where dark matter is thought to reside.
- A poster or slideshow distinguishing Seyfert galaxies, quasars, blazars, and radio galaxies, explaining how viewing angle and jet orientation relate to their appearance.
- Plans for a museum exhibit about the types of active galaxies, including an explanation of the processes driving the activity.
- An obituary for the Universe, describing its fate (your choice of outcomes) as well as its alternatives. Explain what influence (mass, gravity, dark energy, whatever) determined the chosen outcome over the others.
- Quiz questions are acceptable, BUT
 - You must officially sign up on the sheet, and
 - No two students may write questions about the same objective.

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

Apr 20	Claim ideas (sign-up)
Apr 27	Rough drafts due
Apr 29	Rough draft feedback due
May 4	Project due
May 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 what each draft does to cover its learning objectives.
proportional	Misses assigned drafts or associated objectives.

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?

Is it creative and appealing?

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.