

ASTROPHYSICS

INSTRUCTOR: Bennett Link
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OFFICE HOURS: drop by almost anytime after 11 am; I'm usually around except lunchtime and 10-11 am, MWF. I am not available on Thursdays. My schedule is posted on the class website.

CLASS WEBSITE: www.physics.montana.edu/classes/435

RECOMMENDED TEXTS

There is no required text for this course. I strongly recommend *An Introduction to Modern Astrophysics*, Carroll & Ostlie, for background in both astrophysics and basic astronomy. Another good text is *Astrophysics*, Bowers & Deeming, in two volumes. For an introduction to astronomy, there are many texts available, e.g., *Exploration of the Universe*, Morrison, Wolff & Fraknoi.

COURSE DESCRIPTION

Astrophysics is the study of processes occurring in celestial bodies and in the universe as a whole. *Astronomy* is the observational side of this endeavor. In this course, we will focus more on the physics of the universe than on the technical details of how we observe the universe. Several things I hope you will get from this course:

1. The ability to formulate and apply simple physical arguments in the study of astrophysical systems.
2. A working knowledge of the time and length scales that characterize astrophysical systems.
3. The ability to use the above skills to make *estimates*.

REQUIRED PREREQUISITES

PHSX 320 (Mechanics; formerly PHYS 301) and PHSX 423 (Electricity & Magnetism I; formerly PHYS 317).

HOMEWORK

There will usually be a homework assignment due each Wednesday at the **beginning** of each class. Watch the class website for homework assignments, upcoming quizzes and announcements. I encourage working together on the homework – the discussion is very educational – but the work you turn in should be your own. **No late homework, please.**

QUIZZES

There will be a **short quiz** (15-20 minutes) whenever we conclude an important topic. Quizzes will

occur approximately weekly. There will be no mid-term exams or final exam. There will, however, be a ...

TERM PAPER

An 8-10 page paper describing a topic in astrophysics of your choice is an important component of this course, and will give you the opportunity to explore in depth a topic that you find particularly interesting. See the separate *Term Paper Requirements*.

TIME REQUIREMENTS

Plan on spending about **6 hours a week** on this class solving homework problems and preparing for quizzes. Expect to spend more time later in the course as you prepare your term paper. It is best to come to class prepared as follows:

- Do the assigned homework. **Don't let yourself get behind.**
- Be clear on all previous material covered. If you don't understand something from today's lecture, make sure you understand it before the next lecture. Office visits can be useful for this.
- If a lecture or an assignment reveals to you a hole in your background, fill that hole immediately. This might take only a few minutes with a physics or mathematics textbook, or you might have to sit down and work some additional problems. I can make suggestions. **The pay-offs of self-assessment and self-correction cannot be overstated.**
- Review your notes from the last class before today's class. Think about the material and come to class with questions. Participate in class discussion.

GRADING

In determining your course grade, I will consider your performance on quizzes, the term paper, homework, and in-class participation. Letter grades will be assigned with the following meaning: A = excellent command of the material, B = good command of the material, C = competence but significant weaknesses, D = very little command of the material.

TOPICS

1. Properties of radiation.
2. Stars: how they work, evolve and die.
3. The bizarre stellar remnants that stars leave behind: white dwarfs, neutron stars and black holes.
4. Binary systems and accretion.
5. Things that explode. Supernovae and novae.

6. Galactic dynamics and evidence for “dark matter”.
7. Cosmology: evolution of the universe and evidence for mysterious “dark energy”.
8. Physics of the universe shortly after the Big Bang.
9. Special topics (as time permits).