

Stellar Universe

Fall 2018

Astronomy 212

PEngel 319

Instructor:

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Drop-by Informal Office Hours: 7:30 A.M. – 5:30 P.M.

Texts:

- *Astronomy*
by Andrew Fraknoi, David Morrison and Sidney Wolff (OpenStax; 2016)
Chapters: 1–6, 15–29, Note: this book is available as a free pdf
- <http://www.physics.csbsju.edu/astro/>

Grading:

Your grade will be determined by averaging six scores: net lab-homework-quiz score, three exam scores, and the final exam score (which is double-counted). Assigned homework is due at the beginning of the next class period. Late homework is generally not accepted. Web-based homework will be graded based on the first submission. Usually quizzes are unannounced and consist of a few short-answer questions covering recently assigned readings or previously discussed lecture material. Expect almost daily quizzes during the first mod. Missed quizzes cannot be made up. There will be three night-labs at the SJU Observatory (located south of the cemetery), two ‘home labs’ that you do yourself, and several in-class lab experiences. Missed labs cannot be made up. *You will select a night-lab section next class period, so see if one fits into your schedule A.S.A.P.* If none of the suggested lab sections fit, see me today or tomorrow. Exams are about 1/3 true/false, 1/3 short answer, and 1/3 essay. Past exams are online. Exam dates are: September 26 (Wednesday), October 24 (Wednesday), and November 19 (Monday). If informed in advance, I may be able to accommodate exam conflicts. The final exam will be comprehensive and have a structure similar to the other exams (but with more questions since the testing period is longer). The registrar has scheduled the final exam for Monday December 17 at 8:00 A.M..

If you intend to take this course S/U, please provide me with a signed, unconditional notification any time *before* the start of the final.

Questions:

There is no such thing as a dumb question. Questions asked during lecture do not “interrupt” the lecture, rather they indicate your interests or misunderstandings. I’d much rather clear up a misunderstanding or further develop a topic of interest than continue a dull lecture.

Remember: you are almost never alone in your interests, your misunderstandings, or your problems. Please help your classmates by asking any question vaguely related to astronomy. If you don’t want to ask your question during class, that’s fine: I can be found almost any time in my office or (particularly on Tuesday and Thursday) in the nearby Physics labs. Please stop by!

Topics:

This course deals with the stuff of the universe beyond the orbits of the planets. After an introduction to the sciences behind astronomy (Exam 1), we'll start with stars. What types of stars exist? What makes them shine? (Exam 2) How are they born? How do they die? How do stars fit into the larger structure of galaxies? (Exam 3) How do the galaxies fit together to form the universe? How did it all start? How will it all end? How did astronomers figure all of this out? Of course, behind these surface questions lie the really interesting questions: Why do we ask the above types of questions? What determines whether an answer is "correct"? How robust are the questions and answers? (Note: this course does *not* discuss NASA's discoveries in the Solar System; they are covered in ASTR 211.)

Night labs (and the first Mod of class) stress the night sky. How do the stars and planets seem to move during a day and over a year? How is the sky mapped? How can you find your way around in the sky? We hope to use both telescopes and binoculars to observe "deep-sky" objects and planets. Sunset times and finite instructor stamina limits us to three night labs. Labs occur at the observatory rain or "shine." With luck you'll get three good (cloudless, dark) nights; with bad luck you'll get three indoor nights (still at the SJU Observatory) using star charts. Expect night lab material to appear on exams and in lecture.

Warning: The home labs have proven to be a significant problem for students. Self-scheduled, weekly observational homework (sky sketches) throughout the semester produces the data required to complete the lab's calculations due near the end of the semester. These sky sketches (or cell phone photos) must be contemporaneously emailed to your instructor, so postponement is failure. Planning and diligence are required to make the sustained sequence of observations. Almost certainly weather (or events) will disrupt that plan; resilience in the face of adversity is required. Procrastination will result in failure: *the only observations that will be graded are those contemporaneously emailed to your instructor.* You are required to start your observations within the next three weeks; there is no reason you can't start this weekend.

Double Warning: Falsification of data is a capital offense in science—those who are caught (and I believe most are) never work in science again. Correspondingly falsification of home lab data will be treated as academic misconduct; the minimum penalty is a zero for the entire homework-quiz-lab score ($\frac{1}{6}$ of your grade). (The maximum penalty is expulsion but it is only rarely applied.) Much too frequently students submit drawings that are clearly falsified as they are impossible (a Moon above the horizon after it has set; drawings of stars when the all sky camera shows it was raining). If procrastination has made data collection impossible, you are much better off accepting a zero for that portion of the lab rather than risk detection. If you feel that you're caught between a rock and a hard place by the home lab assignment, come in and talk to me about it.

One final point: it is important to remember that the subjects of our study are not in the book; they are in the night sky. Look up from the sidewalk and let your eyes drink in the sight! You can start tonight by looking almost directly overhead soon after sunset for the Northern Cross which makes up the constellation Cygnus. The brightest star in Cygnus (a.k.a. α Cygnus), found at the head of the cross, is called Deneb.

References:

<http://www.astro.wisc.edu/~dolan/constellations/> — Chris Dolan's constellation web site.

<http://www.fourmilab.ch/yoursky/> — Sky maps from John Walker's *Your Sky* web site.

<http://www.skymaps.com> — Download a monthly pdf sky map