

Planetary Astronomy: ASTR 105

Fall 2016

Instructor: Professor Joshua Pepper

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Text: *Universe: The Solar System*, by Roger Freedman, Robert Geller, and William Kaufmann III, Freeman, 2011, 5th edition

Tools: Socrative answer tool, <http://www.socrative.com/>

Class Times: Tuesdays and Thursdays, 9:20am – 10:35am

Office Hours: Tuesdays, 1:30pm-2:30pm, and by appointment

Course Requirements: General requirements include:

- (i) Reading assigned materials prior to class
- (ii) Attending all classes
- (iii) Completing all assignments on time
- (iv) Seeing the instructor if you are having trouble.

Grading: Your numerical grade will be determined *approximately* as follows:

In-class quizzes	25%	You will be allowed to drop your lowest-scoring quiz, and possibly your two lowest scores.
Midterm	20%	
Final Exam	25%	
Participation	10%	
Homework Problems	20%	

Primary Course Topics:

- *Astronomical Measurements:* How do we know there are things out there?
- *The Celestial Sphere:* You live on a spinning, tilted sphere that is orbiting around a star while hurtling through the Galaxy. Everything is moving. Deal with it.
- *Celestial Dynamics:* How I learned to stop loving circles and started worrying about ellipses.
- *Formation of the Solar System:* A huge mess.
- *The Sun:* Why the Ford Fusion does not live up to its name.
- *Physical Properties of the Planets:* Mars has all the fun.
- *The Climates of Terrestrial Planets:* Why you should be thankful that you don't live in a furnace with sulfuric acid rain constantly falling on you.
- *Satellites of the Outer Planets:* The awesomest places ever.
- *Pluto, Kuiper-Belt Objects, Asteroids, and Comets:* One solar system's trash is an astronomer's treasure. Or: It's just not a planet. Get over it.
- *Extra-Solar Planets and the Search For Life:* The next big adventure...

Upon starting the class, I expect that everyone has mastered the following skills:

Initial Competencies:

- Arithmetic, algebra, trigonometry
- Familiarity with the concept of scientific units
- Literacy

My goal is that at the end of the class, among other objectives, you will have also mastered the following skills:

Final Competencies:

- ✓ Describe the structure of the solar system
- ✓ Explain the significance of Kepler's Laws
- ✓ Understand what tides are, and why seasons happen
- ✓ Relate the present structure of the solar system to theories of how it formed
- ✓ Describe significant features of most of the planets in the solar system
- ✓ Explain how Earth's climate is regulated, and how it compares to Mars and Venus, and why
- ✓ Describe sources of heat in the solar system, and how they manifest
- ✓ Understand why space travel is so difficult
- ✓ Use real numbers to describe the universe without being scared or overwhelmed
- ✓ Present an scientific argument for why a particular celestial body is interesting

The purpose of this class is not to memorize facts. It is to rather have the background knowledge to read an article about space and the solar system in the popular media and interpret it critically. To participate in discussions about the causes of climate change. To know exactly why astrology and horoscopes are not just wrong, but meaningless. To appreciate the difficulties and dangers of space exploration, but also the rewards. To know that a hundred million and ten billion are not just arbitrarily large numbers but have specific magnitudes. And finally, to antagonize all your friends and families by explaining smugly exactly what is wrong in their favorite science fiction movies.

Accommodations for Students with Disabilities:

If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center C212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

The Principles of Our Equitable Community:

Lehigh University endorses [The Principles of Our Equitable Community](http://www4.lehigh.edu/diversity/principles) (<http://www4.lehigh.edu/diversity/principles>). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.