

# ASTR 302: Modern Astrophysics II

## Spring 2018

Instructor: Professor Joshua Pepper

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Texts: *Foundations of Astrophysics*, by Barbara Ryden and Bradley Peterson, Addison-Wesley, 2009

*An Introduction to Galaxies and Cosmology*, edited by Mark H. Jones, Robert J. A. Lambourne, and Stephen Serjeant, 2<sup>nd</sup> edition, Cambridge University Press, 2015

Class Times: Tuesdays and Thursdays, 1:10pm – 2:25pm

Office Hours: By appointment

Course Requirements: General requirements include:

- (i) Read assigned materials prior to class
- (ii) Attend all classes
- (iii) Complete all assignments on time
- (iv) See the instructor if you are having trouble.

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

Midterm	20%
Final Exam	30%
Homework Problems	30%
Attendance	20%

Primary Topics:

- Review of stellar astrophysics
- The Milky Way galaxy
- Stellar populations
- Galaxy morphologies and types
- Groups and clusters of galaxies
- Large scale structure and the distribution of galaxies
- Active galaxies
- Overview of cosmology

Coursework Policies

You may work with other students in the class on homework. However, you must submit your own version of the homework. Other policies regarding homework are posted on the Course Site.

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

Initial Competencies:

- Algebra, trigonometry, vector arithmetic, calculus
- Introductory physics, including mechanics and electromagnetism, and basic principles of blackbody radiation and spectroscopy

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

Final Competencies:

- ✓ Understand the attributes of various types of galaxies
- ✓ Describe the structure of a spiral or elliptical galaxy, and relate that structure to the underlying stellar populations
- ✓ Describe the evidence for dark matter
- ✓ Explain the significance and types of active galaxies
- ✓ Know the significant size scales of the universe from stars to cosmology
- ✓ Explain how the current distribution of matter in the universe connects to big bang cosmology
- ✓ Describe the evidence for the hot big bang model of the universe
- ✓ In non-specialist terms, explain the concept of dark energy, the evidence for it, and how it is different from dark matter
- ✓ Describe the basic principles and open questions of the concordance model of the universe

***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.*