

ASTR 301: Stars, Galaxies, and Cosmology
Fall 2014
Section 1: Mondays 5pm Phillips 247
Section 2: Mondays 12pm Phillips 220

Instructor: Prof. Adrienne Erickcek
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Office Hours: Wednesdays 5-6 pm, Thursdays TBD, or by appointment

Course Website: Sakai contains the course website.

Co-requisites: ASTR 102 and PHYS 117 or 119

Course Description: ASTR 301 is a one-credit-hour course that complements ASTR 102 by covering the same material (the sun, stellar observables, star birth, evolution, and death, novae & supernovae, white dwarfs, neutron stars, black holes, the Milky Way, normal galaxies, active galaxies and quasars, dark matter, dark energy, cosmology, and the early universe) at a more in-depth and quantitative level. The ASTR 301 problem sets will be similar in difficulty to the problem sets in an intermediate physics course. ASTR 301 is designed for students who intend to major or minor in astrophysics and serves as preparation for the upper level 500-series courses.

Course Goals:

1. To understand the physical concepts that underlie our knowledge of stars, galaxies, and cosmology
2. To learn to analyze astronomical data using Python
3. To obtain and practice the problem-solving skills required to tackle advanced problems in astrophysics

Course Resources: Astronomy Today, 7th or 8th Edition (Eric Chaisson and Steve McMillan); we will use it sparingly, and I do not recommend purchasing it solely for this course.

Many of you have used this book for ASTR 102. The modular textbook used for ASTR 102H this term is also acceptable, but students should be prepared to refer to Astronomy Today as needed. A copy of Astronomy Today is on reserve in the Undergraduate Library. Additional reading assignments will be distributed on Sakai.

Course Requirements:

1. Attendance and participation in class
2. Completion of 9 problem sets
3. Two take-home midterm examinations
4. In-class final exam

Problem Sets:

Problem sets will be posted on Sakai. Students should read these problem sets *in advance* of the class where they are discussed and review any basic ASTR 101 and ASTR 102 material they rely on. ***Collaboration on problem sets is encouraged, but each student must submit an independently prepared solution set.*** Written assignments will generally be due on Fridays before 12pm. Problem sets should be submitted in legible hardcopy, handwritten or typed, to Phillips 288. Unless prior arrangements have been made or there is a university-excused absence, late problem sets will be accepted until the Monday following their due date, but will receive a 20% penalty.

Exams:

The take-home midterms are open-book and open-notes (and open-internet), but must be completed without any aid from another human. You must submit take-home midterms with the signed pledge, "On my honor, I have neither given nor received unauthorized aid on this assignment." The final exam will be closed book, but students may refer to notes that they personally prepare on one side of a letter-sized sheet of paper.

Grades:

Problem Sets	60%
Midterms	15%
Final	15%
Class participation	10%

Schedule: (subject to revision)

August 25: Motion and mass; dark matter

Sept. 1: No class – Labor Day

Sept. 5: PS 1 (python intro & circular motion) due by 12 pm

Sept. 8: Scatterings within stars

Sept. 12: PS 2 (rotation curves) due by 12pm

Sept. 14: Stars in motion

Sept. 19: PS 3 (scatterings) due by 12 pm

Sept. 22: Blackbody radiation

Sept. 26: PS 4 (stellar motion) due by 12 pm

Sept. 29: Stellar formation

Oct. 3: PS 5 (blackbody radiation) due by 12 pm

Oct. 6: Midterm Review

Oct. 10: Midterm 1 due by 12pm

Oct. 13: Black holes
FALL BREAK

Oct. 20: Galactic dynamics
Oct. 24: PS 6 (stellar formation and death) due by 12 pm

Oct. 27: Cosmic distances and redshift
Oct. 31: PS 7 (galactic dynamics) due by 12pm

Nov. 3: The expansion and content of the Universe
Nov. 7: PS 8 (cosmic distances) due by 12pm

Nov. 10: Midterm Review
Nov. 14: Midterm 2 due by 12pm

Nov. 17: The early Universe
Nov. 21: PS 9 (cosmology) due by 12pm

Nov. 24: Outstanding questions in cosmology and review
HAPPY THANKSGIVING

Dec. 1: Final Exam