

**Astronomy 2001**  
**Fall 2009**  
**Robert D. Gehrz, Instructor**  
**TTh 14:30-16:25, Physics 131**

ASTRO 2001 is an introductory course for astronomy and astrophysics majors. Mathematical and physical discussions presume that the student has had a year of both calculus and physics at the college level. The small and informal class environment should encourage stimulating discussions. This class will introduce you to a broad range of topics in modern astrophysics, with an emphasis on how we measure astrophysical quantities and how we learn what these observations tell us about the physics of the universe. By the end of this class you will have a much greater facility with elementary theoretical calculations and making the kind of order of magnitude estimates that often guide the work of scientists and engineers. A limited number of special topics representative of current astrophysical research will be investigated in depth. The ultimate objective of the course is to give you the basic tools that you will need to read the current literature on astrophysics with a basic level of understanding. I will generally be available in my office TTh after 16:25 PM (I am in 357 Physics) or at other times by appointment (call 612-624-7806). Grading will be based on five problem sets (30%), two five question mid-semester exams (20% each), and a seven question final (30%). Two of the questions on the final exam will be taken from material covered on the two mid-semester exams. Examinations will be open book and notes. The questions will be a combination of problems and essays. The text is "An Introduction to Modern Astrophysics, Second Edition" by B. W. Carroll and D. A. Ostlie. We will not be covering the text in its entirety, but will instead use it as a reference source for discussions on selected topics. Students are expected to consult the elementary astronomy survey text books available in the Astronomy Reading Room (Physics 358) to supplement the lecture material. We will address selected topics from the following list, which is not necessarily in order:

1. Brief introduction - applying the physics to astrophysical situations
2. Orbital mechanics
3. Radiation and telescopes
4. Celestial mechanics
5. The contents, formation, and origin of the solar system
6. Comets, asteroids, meteors, and giant impacts
7. Earth-moon system and the physics of the planets
8. Elementary solar physics; the sun as a star
9. Observation and measurement of stellar properties
10. Stellar structure and evolution
11. White dwarfs, neutron stars, and black holes
12. Novae and supernovae
13. The galaxy and the interstellar medium
14. Topics in extra galactic astronomy and cosmology
15. Other topics of current interest by the lecturer and guest lecturers (TBD)

## Grading:

Five problem sets: 30%

Mid-semester exam #1: Tuesday, October 6, 2009 (Physics 131): 20%

Mid-semester exam #2: Tuesday, November 10, 2009 (Physics 131): 20%

Final exam: 10:30-12:30, Tuesday, December 22, 2009 (Physics 131): 30%

Grades will be on an absolute scale: A > 90%; B > 80%; C > 70%; D > 50% (These are the bottoms of the - (minus) grades.) A grade of S will be awarded for performance at the level of C- (70%) or above. The assignment of an "I" grade will be made only under very special circumstances.

You are expected to be familiar with and follow the Regents' Policy for Student Conduct:

[http://www1.umn.edu/regents/policies/academic/Student\\_Conduct\\_Code.pdf](http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.pdf)

## DUE DATES FOR PROBLEM SETS

ASTRO 2001, FALL 2009

Problem set #1: Thursday, September 24, 2009

Problem set #2: Thursday, October 15, 2009

Problem set #3: Thursday, November 5, 2009

Problem set #4: Tuesday, December 1, 2009

Problem set #5: Tuesday, December 15, 2009