PHYS 231, Winter 2009

Introductory Astrophysics

Instructor

Prof. David Goldberg (*goldberg@drexel.edu*)

Office: Disque Hall, Room 810

Phone: (215) 895-2715

Office Hours: Tu 10-11, Th, 2-3

Grader

Ms. Rachael Kratzer (*rmk55@drexel.edu*)

Office: Disque Hall, Room 809

Office Hours: TBA

Lectures

Tu, Th 12:30-2:00

Disque 919

Textbook

An Introduction to Modern Astrophysics, by Carroll & Ostlie. 2nd Ed.

Note, the first edition is about 15 years old and will be VERY out of date. Copies of this book have been ordered and should be available at the bookstore.

Course Webpage

I will make certain materials available, including images, links, and occasional examples, available on the course webpage:

http://www.physics.drexel.edu/∼goldberg/Physics-231/

Course Overview

The universe is a vast place with a lot going on, and yet, we only have 10 weeks to discuss it. The goal of this course will be to understand the unifying principles of physics which relate what goes on here on earth, to that which goes on up there in space.

For example, we will discuss the motions of the planets, time, gravity, and the motions of the stars, and try to bring all of these concepts together. We will also talk about how Newton's force laws predict the structure of stars. We will talk about energy transfer, radiation, and the detection of the most distant galaxies.

Sound tough? Well, it is, but hopefully, not too tough. See the "background" below for what I expect from you coming in. As for what I expect from you on a day to day basis: come to class, ask questions, do the readings, and keep up with your homework. And, most importantly, if there is something you don't understand or you don't believe yourself to be adequately prepared for, come see me.

Background

No prior knowledge of astronomy or astrophysics is assumed. While students who've taken

"Survey of the Universe" may find some topics familiar, this course will treat a number of very different topics, and will treat the overlapping topics at a significantly higher level. I expect it to be challenging even to the initiated.

A knowledge of mechanics at the Phys 101/Phys 113 level is assumed, as is elementary differential and integral calculus.

Grading Policy

• 10% – Class Participation: You are expected to attend all lectures, to participate in discussions, and to ask questions. Some of the topics we'll be covering are quite esoteric, so if we don't have feedback, we can't be sure you're getting it.

• 30% – Homework: Homework will be given weekly. It will be assigned on Thursdays in lecture, and will be due the next Thursday. All homeworks will be out of 100 points, and will assessed a 5 point penalty for each day of lateness. The lowest homework will be dropped from your final average.

Important note: You are encouraged to discuss your homework with others, but the work you submit must be your own. Copied homeworks are considered plaigarism (and you'd be surprised how easy this is to detect). One way to assure that you're in no danger of inadvertently copying work that it is not your own is to discuss (at length) how to do the problems with your classmates, and then retire to a quiet room with a a **blank** sheet of paper and begin to actually work through the problems.

The first violation of cheating will result in the points on the problem set being split between all parties involved. The second will result in a 0, and notification to the office of judicial affairs.

• 25% – **Midterm**: On Feb. 10 (I will notify you if there is a change), we will have an in-class midterm. The questions will be mostly similar in structure to homework problems, so you'd be well-advised to review your homework. However, there will also be some short-answer questions as well. I will pass out a review sheet a week beforehand.

• 35% – **Final Exam**: You will be given a final exam during the exam period. It will be similar in structure to the midterm, and it will be cumulative. As with the midterm, you will be given a formula sheet.

Topics To be Covered

Note: The listed chapters below average about 1.5/week. It is vitally important that you keep up with your reading. Even though it only amounts to about 300 pages over the course of the term, they are fairly densely packed with info.

Week 1: The Scale of the Universe. The Celestial Sphere, coordinates, and the motion of the sky (Ch. 1)

Week 2: Orbits, Kepler's Laws and the Motion of the Earth (Ch. 2)

Week 3: Light, magnitudes, and spectroscopy (Ch. 3,5)

Week 4: The Hertzsprung-Russell Diagram (Ch. 8)

Week 5: Radiative Transfer and Stellar Structure (Ch. 9,10,11)

Februar 13, 2007: Midterm Exam

Week 6: Stellar Evoltution, Black Holes and Neutron Stars (Ch. 13, 15, 16)

Week 7 Structure of the Milky Way Galaxy (Ch. 24)

Week 8: The Hubble Sequence, Other Galaxies, and Clusters (Ch. 25.26)

Week 9: Introduction to Cosmology (Ch. 27, 29,30)

Week 10: Catch up to the schedule