Phys 134 Course Objectives

1. **Error Analysis: In interpreting physical measurements, how do we separate knowledge from uncertainty?**

3. **Computers & software: What tools are available (especially in an astronomical context) to help us with item (1)? How do we learn to use them?**

5. **Astrophysics: what exotic materials and phenomena are lurking among the stars, how can we use their emitted light to learn about them, and what are the uncertainties in our resulting knowledge of their properties?**

Labs

and

A Project

Useful Tools

Class web site:

http://physics.ucsb.edu/~phys134/s2010

This site contains the lecture schedule, dates of observing sessions, and reading assignments. Answers to lab questions will be posted there. It also contains some physical and astrophysical constants that you will find useful in your work, links to tutorials, sources of data, and other wonders too marvelous to describe here.

Books

There is 1 required text for the class:

***An Introduction to Error Analysis, 2nd Edition*, by John Taylor**

This book is a classic of its kind, describing the elementary procedures of error analysis clearly and concisely, with many illustrative examples and revealing problems. Available online through e.g. Amazon.com. (should be less than $30 used).

In addition, I will from time to time put links to useful astronomical information on the class web site. These too will be required reading.

Labs

This is a lab course. There will be no homework or tests as such, but lab writeups will serve the same function. These labs will constitute almost your entire grade. Do them all!

I will announce (and post on the web site) when labs are due. They will be due at the *beginning* of class on the specified date. I will try to size the labs so that you will have to spend about as much time in the lab outside of class hours as you do inside them.

I will not accept late lab writeups.

I encourage you to discuss the labs with others in the class, and to work on them together.

However, *what you turn in must be written by you alone*: express your own thoughts your own self. Do not copy another student's work, or allow your own to be copied! Doing so will cause trouble for both of you.

Your cumulative lab score will count as 85% of your total grade for the quarter.

Quizzes

During every class I will give a short multiple-choice quiz. These will relate almost entirely to the assigned reading -- their main purpose is to encourage you to read (very important!). The total of these will count as 5% of the total grade for the quarter.

Here is the first one:

- **What's your name?**

- **What's your quest?**
  (a) Restore Prince Charles Stuart to the throne of Scotland.
  (b) Become familiar with astronomical measurement techniques.
  (c) Travel to Mt.Doom and destroy the One Ring.

3. **What's your favorite color?**
   (a) Red
   (b) Blue
   (c) Green

Observing Nights

There will be 2 required observing nights.

The first will be a remote observing night using Byrne Observatory at Sedgwick 83-cm telescope. We are scheduled for 4 consecutive nights on the telescope, April 12-15 (Mon-Thurs nights). The data obtained during this run will be used for your projects, later in the course. For these nights, we will be in the UCSB remote observing room (Brda 3402), connected by video and running the telescope.

Each student is expected to be present for at least *one* of these observing nights. We will start about 7:00 PM and run until about midnight. You may choose which of the 4 nights you wish to attend.

Second, we will have a (mostly) visual observing night at LCOGT on May 14, 8:00-10:30 PM. We will look through small amateur telescopes and (perhaps) use an LCOGT 0.4m telescope to obtain digital images of galaxies and other deep-sky objects. You must attend this night, or arrange a make-up activity with me *beforehand*.

These 2 required nights will count as 1/2 of your attendance grade.

Projects

The culmination of the course and the largest single part of your grade will be a final lab, which is a large project. The project will involve analysis of astronomical photometry; every student will be expected to write a report and to give an oral presentation describing the aim of his or her project, and explaining the procedures used and the results obtained.

The combination of report and presentation will count for 30% of your grade.

Everyone should submit his or her own report and presentation, but actual work on the project may take place in teams of one, two, or three students.

Individual projects will be similar in nature, but will involve different data on different astronomical objects. About halfway through the term, you may choose which object you wish to work on. Each team should work on a different object.

Written reports will be due on Thurs, June 4. Oral presentations will be given in class on Tues, June 2 and Thurs, June 4.

Computing

We will use PCs running Linux and loaded with chosen software packages to do class exercises, homework, and data analysis for the projects in this course.

You may specify a key code that allows you to get into the lab to work on the computers after hours. To do this, visit http://www.physics.ucsb.edu/~doorcodes and fill out the form. You must also take the online safety training (item 2).

You will be held responsible for the room and its contents when you are inside it, excluding class hours. Therefore, do not admit others who are not in the class. If you are the last one out of the room, be sure it is closed and locked, in good condition, with the lights out.

After hours, you may get into the building through the 2nd-floor entrance on the N. side. *Do not* attempt feats of mountaineering to gain entrance via other routes. There is no need, and if I hear that you tried, your grade will suffer.

Office Hours

Office hours will be held in the lab (BRDA 2302).

Please **come by if something confuses you. We will be here to help, but can only do so if you ask.**

Hours: Tim Brown Wed 1:00-3:00 PM

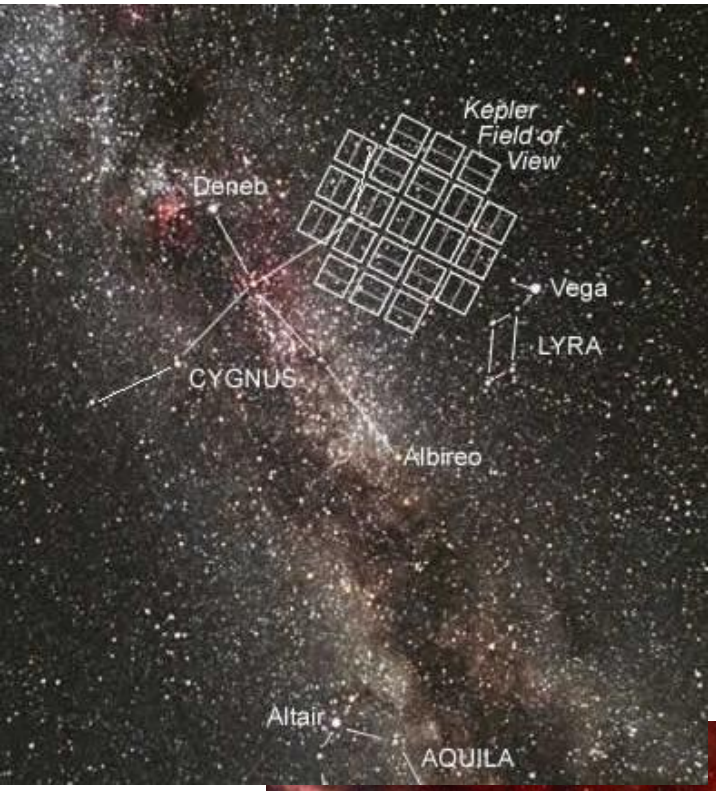
Kurt Soto Tues 4:00-5:00 PM and Wed 10:00 AM - Noon

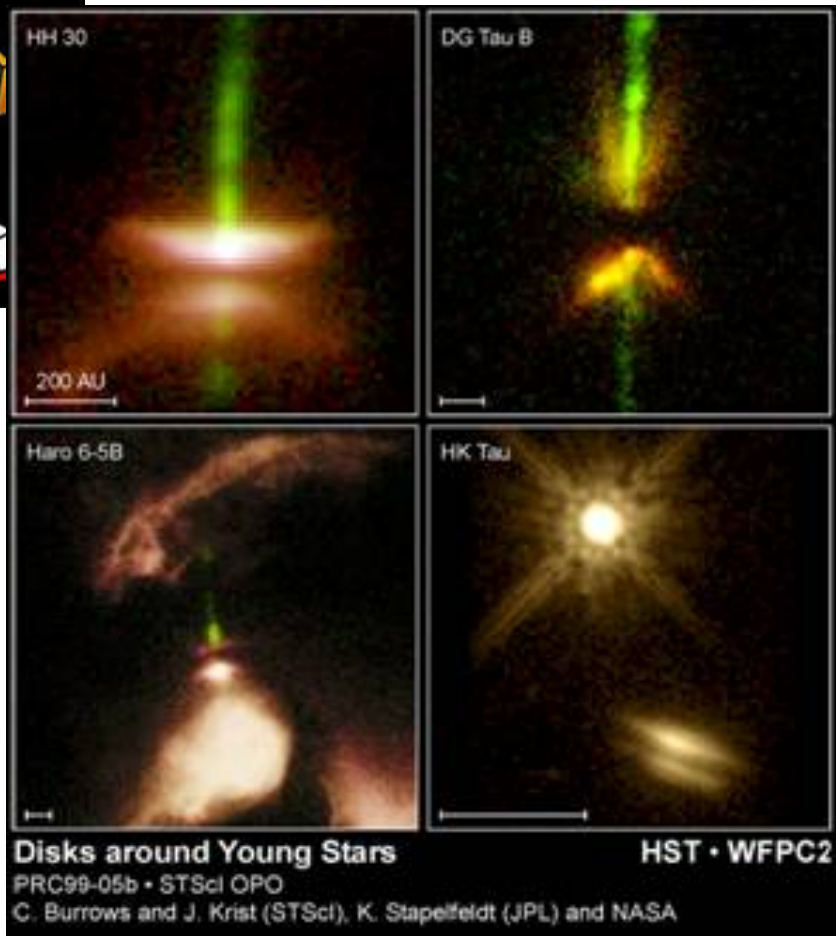
Summary of Grading

Lab 1	**10%**
Lab 2	**15%**
Lab 3	**15%**
Lab 4	**15%**
Lab 5 (Project)	**30%**
Quizzes	**5%**
Attendance & Participation	**10%**

If you are unable to attend either or both of the observing nights, or if you have schedule conflicts with exams or final reports, please see me immediately, so that we may agree on make-up activities.

So Much for Bureaucracy….
On to the Fun Part



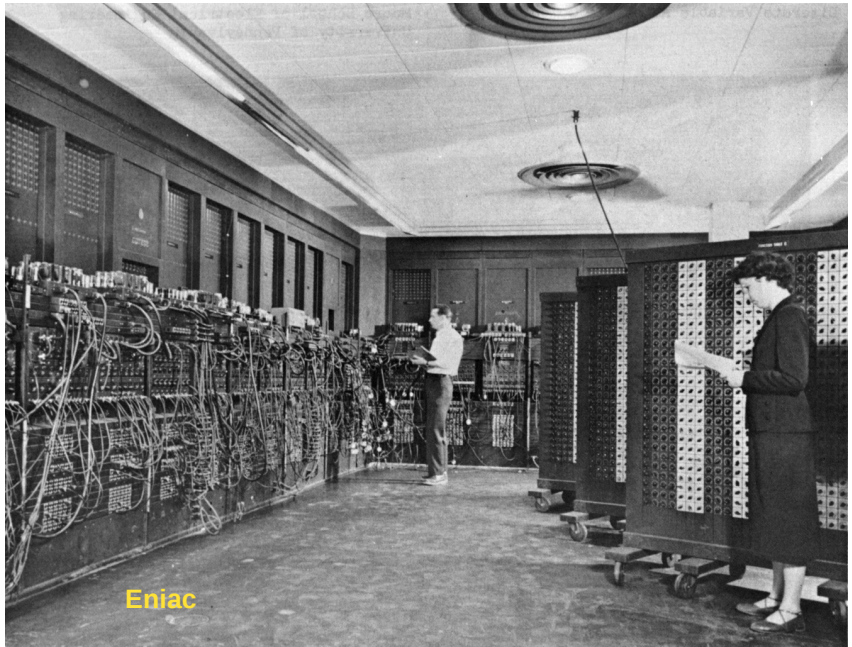


Astronomy, Physics, Math, Numbers, and Computers

If it isn't numbers, it isn't science…….

If it doesn't have error bars, it isn't physics…….

If you want to compute error bars, use a computer.



Computer Operating Systems

Roughly speaking, there's Windows, Unix, and Mac.

We will be using PCs running Linux (a flavor of Unix), because the software we want to use runs on this system.

This means that you will need to become at least moderately conversant with Unix ways and means . Check out the tutorials that are linked on the class Web site. Practice, practice, practice. And consider these hints:

Linux is *command line oriented* (few or no GUIs). The reasons for this were originally historical, but the command-line bias has persisted. IMHO, this is because GUIs gain in convenience, but at the cost of lost flexibility and power.

Linux's *directory structure* is powerful and of central importance. Learn to navigate it smoothly.

We will use a lot of plain ascii files. You will need to use a non-WYSIWYG editor such as emacs or vi in order to manipulate these files.

Practice……How?

Room will be available as soon as your pass codes are entered.

Computers are on and loaded with software and with (at least some) data.

login name: student
password: physics

Reading is good, too. For Thurs, please read Chapter 1 of Taylor's book (I will hand out copies) For next week, get the book – we will use it a lot.