Course Syllabus
PHY 114.01
Laboratory for Stars & Stellar Systems
1 Credit Hour
Summer II 2008

Class Time: MTW 12:00 – 1:50
Class Location: Far 211
Lab Supervisor: Dr. C. Renee James
Contact Info: Far 306a 294-4888 phy_crj@shsu.edu
Office Hours: AFTERNOONS BY APPOINTMENT
YOUR INSTRUCTOR MAY HAVE ADDITIONAL OFFICE HOURS.
Required Textbook: *None – labs are posted in the assignments section of BB*
Required Supplies: Each lab handout will have a list of the required materials for that week's lab.

You can check for lab handouts on Blackboard.

Introduction: This course is designed to introduce you to astronomical techniques and concepts that you will discuss in PHY 134. You are not required to be enrolled in both PHY 114 and PHY 134 simultaneously, but it is strongly encouraged. There will be an attempt to correlate the material in the laboratory to the PHY 134 class. Because this will not always be possible, your lab instructor will give a 15-20 minute introduction to the material for each lab session.

Grade Breakdown: Your grade will be based on the successful completion of the following:

Lab reports:	**50%**
Final Exam:	**20%**
Quizzes:	**30%**

Attendance: ATTENDANCE IS MANDATORY AT ALL SCHEDULED LAB SESSIONS. EACH ABSENCE WILL LOWER YOUR GRADE BY 10%. You will be required to make up any missed work in the event of an emergency. Contact your lab instructor as soon as you can in order to inform him/her of any emergency situation. You will then attempt to work together to remedy the situation. YOUR LAB INSTRUCTOR IS REQUIRED TO MEET WITH YOU ONLY DURING SCHEDULED LAB TIMES. Don't expect to get a private tutorial outside class on information that you missed. In extenuating circumstances, either the lab instructor or the lab supervisor may choose to brief you on the missed material and allow you access to the lab equipment for completion of your write-up. However, this is not automatic and is ONLY in the case of serious emergencies.

Quizzes: These will be brief assessments of your understanding of the main concepts in the current week's labs. To succeed on the quizzes, you must 1) read the lab exercise ahead of time, and 2) answer all pre-lab warmup questions. Quizzes will be written and graded by the individual lab instructors and approved by the lab supervisor. Quizzes will be given every lab session.

Lab Reports: You will not be asked to turn in formal lab reports. However, during each lab session you will perform a series of activities, and you are required to at least synthesize the information. Virtually all labs will have associated handouts where you will be asked to fill in tables, make computations, and answer questions. In addition to completing the handouts and thoroughly answering the questions, you will write a short "Lab Summary" that discusses the

primary focus of the lab and how it relates to the practice of astronomy. The summaries should be approximately 250 words long (about one typed page), and should reflect your personal understanding of the lab exercise. Do not simply describe what you did. You will get zero credit for a lab summary that merely outlines the procedures followed with no attempt to synthesize the information. Except for data tables and other "fill-in-the-blanks", all work is expected to be typed or word-processed on standard white paper. **LAB REPORTS WILL BE TURNED IN THE MONDAY FOLLOWING THE PERFORMANCE OF THE EXERCISE EXCEPT WHEN YOU ARE INSTRUCTED OTHERWISE**. **LATE LAB REPORTS WILL NOT BE ACCEPTED.**

Observatory: As part of your final exam grade, you might be asked to attend night-time observing sessions at the SHSU observatory concurrently with the PHY 113 students. This schedule will be handed out on a separate sheet. Each observation you record and turn in will add 3 points to your final exam grade. You may perform up to 10 observations for a total of 30 extra points on your final exam. Your instructor will hand out the observatory schedule and observation logs for you to fill out and turn in.

MY POLICY ON ACADEMIC DISHONESTY: Work you turn in is expected to be original. Do not turn in lab reports that are copied directly from another. I don't mind if you work on the lab reports together, but it should be in your own words. Do not cheat on the final exam. YOU WILL RECEIVE AN AUTOMATIC F FOR THE ENTIRE SEMESTER IF YOU CHEAT ON THE FINAL, and then you'll have to do a horrendous runaround with the department head and the Dean of our college that involves lots of time-consuming paperwork. So don't go there. Try not to allow anyone to cheat off your paper. Keep it covered at all times, and avoid looking around too much during the final.

CLASSROOM RULES OF CONDUCT: Please see the student handbook for guidelines on acceptable student behavior. Be sure to turn off all cell phones, pagers, Blackberries, etc. before class begins.

<u>Tentative</u> Lab Schedule (the actual lab exercise topics become more tentative as they go because they will be loosely correlated with the lecture):

Week of::	*Laboratory Exercise:*
Jan 28	LAB 1: Math review
Feb 4	LAB 2: Intro to Spectroscopy – Reading the Rainbow
Feb 11	LAB 3: Stellar Spectroscopy: Determining the properties of stars from spectra
Feb 18	LAB 4: Stellar Parallax and determining stellar distances
Feb 25	LAB 5: Brightness & the Magnitude Scale
Mar 3	LAB 6: Using the HR Diagram to Determine Stellar Properties
Mar 10	SPRING BREAK! NO LAB
Mar 17	LAB 7: Binary Stars & Stellar Masses
Mar 24	LAB 8: Optics
Mar 31	LAB 9: Cepheid Variables
Apr 7	LAB 10: Hubble's Law
Apr 14	REVIEW FOR FINAL
Apr 21	LAB FINAL EXAM

LAB SUMMARY GUIDELINES:

40% of each lab grade comes from your lab summary. Lab summaries MUST be turned in with the rest of your lab report unless otherwise noted. LATE LAB SUMMARIES WILL NOT BE ACCEPTED!

Below is a sample lab summary for one of the labs that you will perform. There are certain things you should **avoid** in your lab summary. Here are some common problems:

1) Try to avoid misspellings and grammatical errors. Double check your work. There have been some really glaring errors in some summaries turned in during previous semesters (For example, we're ASTRONOMERS, not astrologers!).
2) Do not include vague statements like "This lab was helpful." Or "This lab was confusing." Definitely don't editorialize ("The lab instructor was a real jerk" or "I hated this lab") or put in fluff like "This lab was long, but informative." How did it relate to the practice of astronomy?? Why did you do some activity with your fist and a piece of tape if you're trying to find distances to stars? If you don't know, you have an entire week to discuss the point of the lab with Dr. James or one of the lab instructors.
3) Do not turn in a summary in your own handwriting. Type it up. Make it nice. Be thankful you don't have to do REAL lab reports, complete with abstracts, procedures, discussions and conclusions.

You should run your lab summary past someone who has NO idea what you've been doing and see if they get anything from it. People at the Writing Center do this for a living, so take it there when in doubt. If they read it and STILL have no idea what you've been doing, then your lab summary needs some work.

SAMPLE SUMMARY:

I.M. Student
PHY 114.02
Spring 2008

LAB SUMMARY: Parallaxes and Stellar Distances

In this lab we explored the most direct method used by astronomers to determine cosmic distances: Parallax. Parallax is the apparent shift in the position of an object because of the motion of the observer, and is easily seen when you hold your finger in front of your face and look at it from one eye and then the other. Your finger appears to move when you change your point of view.

Before applying the concept of parallax to the distant stars we had to familiarize ourselves with measuring the angular shift. To do this, we calibrated the angular size of our fists held at arm's length. By seeing where the angular size of my fist exactly equaled the angular separation of two dots on the wall AND by measuring the distance to the wall and applying rules of similar triangles as drawn in the lab handout, I was able to find that my fist has an angular size of 10 degrees.

Once I knew how to measure angles with my fist, I practiced determining a distance to an object (a piece of tape on a window) by finding the parallax when I viewed the tape from two spots separated by 2 feet. I found that the angular shift was about 4 degrees, giving a computed distance of 28.6 feet. The actual distance measured was 25.5 feet, so my percent error was 12%. This is reasonable considering that our hands do not have any sort of even subdivisions to measure angles by.

Knowing that parallax works and, more importantly, WHY it works, we were then able to determine distances to a number of stars whose parallaxes have been measured by the Hipparcos satellite.

Overall this lab helped me to better understand how astronomers determine accurate distances to objects that we can never visit. The geometry is the same whether you look at nearby objects or distant objects. The only difference is that the baseline for measuring stellar parallaxes is 300,000,000 kilometers and the angles are not measurable without some seriously precise technology.