AST 112-P7 – Astronomy of Stellar Systems Lab

Fall 2006 Syllabus

Thursdays at 5:30-8:30pm, in CH461

Instructor Gopi Samudrala
Office CH340
Office Hours By appointement
Phone 934-4736 (Physics Office)
email gopi@uab.edu

Instructor Parimal Bapat
Office CH
Office Hours By appointement
Phone 934-4736 (Physics Office)
email parimal3@.uab.edu

Objectives

- Learn proper measurement technique and data presentation
- Analyze numerical and graphical data to identify relationships
- Perform experiments relevant to topics in astronomy and planetary science
- Apply standard techniques in astronomy and planetary science to interpret images and other data from inter-planetary probes and telescopes

Materials Instructions for each experiment or exercise will be distributed at the beginning of the lab period. There is no textbook. Bring a scientific calculater, paper, pencil, and pen. Additional materials may be provided by the lab instructor, as necessary. Your lab instructor is a resource. Ask your instructor to clarify difficult instructions or to give advice for writing your report.

Reports You will be required to write a brief report for each lab exercise, due at the end of the current lab period or the beginning of the next lab period, depending on time. The report should contain the following four sections:

- **Abstract** – An abstract is a concise description of the goals, methods, and results of the lab. Answer each of these three questions in about one or two sentences each: What was the purpose of the lab? What was the *essence* of the experimental procedure? What were your most important results? *Summarize*; detail should be avoided in this section.
- **Data** – Data include measurements as well as the results of computations performed on measurements. Organize and present your data appropriately: large amounts of related numerical data should be arranged in tables and each datum should be reported with the appropriate precision. All tables should be numbered and have captions that indicate what the data represent. Table headings should be labeled and units indicated.
- **Analysis** – Analyze your data quantitatively. A complete error analysis should be given whenever an instrument is used to take measurements. Data should be graphed in order to identify relationships, when appropriate. Graphs should be arranged in figures. All figures should be numbered and have captions that indicate what the data represent. Axes should be labeled and units indicated. You may be given a list of questions to answer to help you understand your data.
- **Discussion** – Analyze your data verbally. The discussion will rely heavily on your quantitative analysis: Describe any relationships present in your data. Estimate the amount of experimental error. State the conclusions that can be drawn from your data. Use your error analysis to state how certain your conclusions are. Be as detailed and specific as possible. Explain your reasoning carefully.

The sections are worth 20%, 30%, 30%, and 20% of the report grade, respectively. Points may be deducted for poor legibility, improper grammer, and lack of relevance. Neatness counts!

Grades There will be 12 regular labs and one make-up lab. A list of labs is given on the back of this syllabus. The make-up lab is provided to make-up an absence; it cannot be used to replace the grade of another lab. Attendance is mandatory; you must be present to receive credit for each lab. Your grade for the course will be the 12-lab average of your lab report grades. Missing lab reports will count as zeros.

Honesty Copying information from a book, web site, someone else's report, or any other source, into your report without citation is considered *cheating*. This pertains to sentences as well as pictures and illustrations. Quoting short passages is OK, but you must reference the source. Violations will be handled as stated in the UAB Academic Honor Code.

AST 112-P7 – Astronomy of Stellar Systems Lab

Fall 2006 List of Labs

1. 08/31 Measurement and Error Ananlysis
2. 09/07 Data Analysis
3. 09/14 Spectroscopy I: Identifying the Elements
4. 09/21 Spectroscopy II: Stellar Classification
5. 09/28 Observing Lab I: Jupiter and the Moon
6. 10/05 Stellar Distance Determination: Parallax
7. 10/12 Hertzsprung-Russell Diagrams
8. 10/19 Binary Stars: Stellar Mass Determination
9. 10/26 Scattering of Light in the Interstellar medium: Stellar Extinction and Reddening
10. 11/02 Observing Lab II: The Pleiades and the Hyades
11. 11/09 Cepheid Variables as Distance Indicators
12. 11/16 Pulsars

    11/23 Thanksgiving Break (No Lab)

13. 11/30 Location of the Galactic Center (Make-up Lab)

Writing Scientific reports

Scientific reports are normally written in the third-person passive voice. The passive voice is strongly discouraged in ordinary writing, but it is highly recommended in scientific and technical discourse. Rather than writing "I did this" or "she did that", write "This was done" or "That was done". Ocassionally, the first person plural "we" may be used – "We did this or that" – but third person passive is always preferred.

Omit subjective qualificatons. Avoid words that imply a personal opinion like "fun", "simple", "beautiful", or "confusing". Do not write how much you enjoyed or hated the lab. Comments and criticisms about the labs may be voiced directly to an instructor, to the lecture professor, or through e-mail but they should not be included as part of the report. Remain as objective as possible throughout the report.

Scientific reports always contain an abstract and usually have a main body of five general sections: introduction, experimental methods, results, and discussion. The reports for the laboratory exercises in this course will have a more condensed format that omits or combines several of these sections.

The abstract is typically very short and always comes first. It is a concise summary of the entire experiment and normally includes a statement of the purpose, methods, results, and conclusions. The abstract should be detailed enough for the reader to know what kind of information the report contains, but breif enough to be read quickly. Researchers read the abstract to determine if the report contains information they may be seeking or that may be relevant to their field of study.

The discussion is the most important part of your report. It should contain a detailed analysis of your data. You may state which data were obtained, the amount of variation in the data, and whether any of your data may be untrustworthy. Note any trends or relationships that may be evident in your data and what they mean. Graphs are particularly useful for identifying relationships. Be as specific and complete as possible. Identify sources of error. Quantitate your error whenever possible. State your conclusions. Was the goal of the lab acheived? How do your results relate to your objectives and the broader astronomical context of the study? Explain your reasoning. Remember that the focus of your discussion should be your data; introductory material and experimental procedures do not belong here.