ASTR 121: Introductory Astrophysics II Lab

Spring 2017 Syllabus

Logistics

Meeting Times

Section 0101: Monday, 2:00pm-4:00pm, CSS 0224

Section 0102: Monday, 11:00am – 1:00pm, CSS 0224

Office Hours: TBA, or by appointment, CSS 1224

Contact Info

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Lab Philosophy

In order to develop students' skills in lab work and scientific writing, this lab will take a "backwards faded scaffolding" approach. Basically, this means that at the beginning, labs will be very structured and will gradually become less so, until the point where you will come up with the majority of the work with little assistance. This process will slowly build a solid foundation of skills necessary for astronomy and scientific research in general.

Goals

By the time you complete the lab portion of this course, you should be able to…

- Convey the current state of knowledge regarding stars, galaxies, and the universe in general to a non-specialist.
- Solve complex problems requiring the application of several scientific concepts.
- Collaborate with others to develop shared understanding.
- Write scientifically and communicate your results effectively.
- Critically evaluate current astrophysical research and your peers' written work.
- Apply different techniques used in astronomy research to solve problems.
- Interpret error, accuracy, and precision of scientific measurements in the existing literature and compute these for your own data.
- Use MATLAB to analyze and visualize astrophysical data.

Lab Structure

Over the course of the semester, we will do six labs. You will work in pairs on lab reports and submit one lab report per pair. Each lab will take two weeks: on the first Monday you will turn in the prelab questions and begin working on the assigned lab in class. A rough draft of the lab will be due the following Monday in lab. This second Monday's class will consist of more time to work on the lab, as well as a class wide critique session of each other's drafts. The final draft will be due the following Friday in discussion. Final lab reports turned in after the due date will be penalized, as described in the Grading section.

The lab reports will start off very structured and gradually become less so. The first lab report will be mostly written in a template. In every following lab, sections will be taken away from the template and you will be responsible for writing more of it. For the final lab, you will be responsible for writing the entire report.

Grading

The lab component of this course counts for 15% of your overall grade. Your lab grade will consist primarily of lab reports, of which there are six. However, the six lab reports are not graded equally; because of the "backwards faded scaffolding" structure of the lab, the lab reports will gradually increase in point value as you become responsible for writing more of them.

Grading of individual lab reports is broken down in the rubric. However, there will be some variation over the course of the semester as less of the report is given to you in advance. Sections that are given to you to complete will be worth half of their full value as reported on the rubric, and sections that you are fully responsible for are worth their full value. *Points will be deducted for not using the correct number of significant digits.* Additionally, you will receive points for participating in the bi-weekly critique sessions. The table below shows the breakdown of the lab grade.

Lab reports are to be handed in as a hard copy on Fridays during discussion, AND submitted online before the Friday discussion begins. Late final drafts of lab reports will be reduced by 20% if handed in by the following lab session, and 30% on the following Friday. No labs will be accepted more than a week from the due date. Prelab questions are to be turned in on the first Monday of each lab in class, and are not accepted late. Late rough drafts, but participation in the critique session will result in loss of half of participation points for that lab. Absence from a critique session will result in loss of all participation points for that lab. About 10% of the lab grade requires attendance; for this reason, it is highly recommended that students not miss lab.

Grading continued...

Work	Point Value	Percentage of Lab Grade
Lab Introduction Activities	5	2%
Prelab Assignments	12	6%
Lab 1: Introduction to MATLAB	30	14%
Lab 2: Stellar Parallax	24	11%
Lab 3: Blackbody and Stellar Spectra	28	13%
Lab 4: Cluster HR Diagrams	32	15%
Lab 5: Rotation Curve of the Milky Way	36	17%
Lab 6: Hubble's Law	38	28%
Critique Session Participation	10	4%
Total for Lab	210	100%

Absences and Accommodations

The UM Attendance and Assessment Policy defines excused absence as absence that results from "illness of the student, or illness of a dependent as defined by Board of Regents policy on family and medical leave; religious observance (where the nature of the observance prevents the student from being present during the class period); participation in University activities at the request of University authorities; and compelling circumstance beyond the student's control." 'Compelling circumstance' could be a death in the immediate family, a serious car accident, or something similar. I am only obligated to allow makeup work for excused absences.

Theoretically, students should be able to make up lab work independently, as all lab materials are available on ELMS and MATLAB is available for free from the university. Additionally, students making up labs are encouraged to use office hours for assistance. However, note that credit for the participation related points of lab will only be able to be made up if there is a valid excuse for the absence. Additionally, making up lab independently will put students at a disadvantage, as they won't have constant access to assistance from LAs, the ability to collaborate with a partner, or the benefits of the critique sessions. Therefore, it is enormously beneficial to attend all lab sessions.

Simply put....don't miss lab! Ultimately, absences and make up work will be dealt with on a case by case basis at the discretion of the LAs.

How to Do Well in This Couse

- Read the labs before coming to class. You are not expected to start the lab before class (except the prelab questions), but knowing what you will do will make the work go faster.
- To make the critique sessions more useful, have as much of a complete draft as possible when you come in; at the very least, a complete abstract. The more you have done, the more useful comments may be.
- Take the critiques seriously; try to give honest feedback when looking at others' papers.
- Learn to teach yourself! There are a million MATLAB commands, and we won't teach all of them, but you should be able to find out what you don't know. This skill is invaluable.
- *Ask for help when you need it*: email or come into office hours.

Academic Integrity

This lab, like all courses at the University of Maryland, will follow the campus wide Code of Academic Integrity, administered by the Student Honor Council. This code outlines expectations for students and can be found at http://www.studentconduct.umd.edu/. You will submit lab reports in pairs, but are still expected to maintain a high standard of academic integrity in your work.

Students with Special Needs

Any student with a documented learning disability who need special accommodations is encouraged to contact me as soon as possible so any necessary arrangements can be made. Also, contact campus Disability Support Service if any additional assistance is needed.

These policies are in addition to those laid out in the course syllabus, except in the event of direct conflict, in which case the policies laid out here take precedence.

Schedule and Due Dates

Date		Topic
1/30	M	Lab introduction: scientific writing, error analysis
2/6	M	Lab 1 – **Introduction to MATLAB**
2/13	M	Lab 1 Rough draft due
2/17	F	Lab 1 Final draft due
2/20	M	Lab 2 –**Stellar Parallax**
2/27	M	Lab 2 Rough draft due
3/6	F	Lab 2 Final draft due
3/6	M	Lab 3 - **Blackbody and Stellar Spectra**
3/13	M	*Spring Break – No lab*
3/20	M	Lab 3 Rough draft due
3/24	F	Lab 3 Final draft due
3/27	M	Lab 4 – **Cluster HR Diagrams**
4/3	M	Lab 4 Rough draft due
4/7	F	Lab 4 Final draft due
4/10	M	Lab 5 – **Rotation Curve of the Milky Way**
4/17	M	Lab 5 Rough draft due
4/21	F	Lab 5 Final draft due
4/24	M	Lab 6 – **Hubble's Law**
5/1	M	Lab 6 Rough draft due
5/5	F	Lab 6 Final draft due
5/8	M	*Make-up lab – no class otherwise*