

ASTR 008 – Introduction to Astronomy Lab

Fall 2020

Instructors:

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Course Objectives:

The broad, overarching goals of studying astronomy are:

1. To be inspired by the beauty and complexity of the universe;
2. To improve your intuition of physical scales and 3-dimensional spatial reasoning;
3. To build your critical thinking and problem solving skills; and
4. To understand that astronomy is an active and evolving scientific pursuit, not a collection of known facts.

Specifically, in ASTR 008 lab, students will learn:

1. To use simulations to visualize real astronomical data;
2. To explore different techniques for performing astronomical research;
3. To think about the errors inherent in an astrophysical measurement;
4. To analyze data and visualize your results using spreadsheet programs;
5. To improve your written and oral communication skills.

This one-credit laboratory is designed to accompany the three-credit course ASTR 007, Introduction to Astronomy. Although the lecture course (007) can be taken without the laboratory (008), the reverse is not permitted. Students registered for ASTR 008 must be enrolled concurrently in ASTR 007 or have already passed ASTR 007.

Special Statement for Fall 2020:

The COVID-19 pandemic has upended life as we know it, but it doesn't have to ruin your Astronomy lab experience. Astronomy is an experimental science that, under normal circumstances, does not offer us the opportunity to work with real-life samples. In a way, genuine astronomy research has always been done remotely; we regularly collect our data from millions of miles away. Therefore, we are uniquely well-suited to run successful ASTR 008 labs in this unusual COVID era. While we may be holding class over Zoom for safety, your ability to engage with real astronomical data will not be compromised!

We recognize that everyone's stress levels are probably a lot higher than normal. It is entirely possible that many of us will be dealing with personal and/or family emergencies

throughout the semester that will require special accommodations. **If you know in advance** that you will need an extended deadline, please let Prof. McSwain or Erin know as soon as possible, and we'll gladly work with you to reschedule a reasonable deadline without requiring documentation. **If you miss a deadline that has already passed** and want to arrange for accommodations, we will require written documentation of a valid excuse (at Prof. McSwain's discretion).

Materials:

- Computer with internet access, webcam, and microphone
- Online lab manual: *Investigations in Astronomy* by McSwain & Blauvelt
- Scientific calculator (optional)

Lab Procedures for Fall 2020:

1. Before class, watch the short pre-recorded video showing tips and tricks for the lab.
2. Join the Zoom meeting with your video on. The lab sessions will NOT be recorded on Zoom.
3. There will be a short, approximately 15 minute lecture by the TA to the whole group. There will also be an opportunity to ask questions before splitting into small groups.
4. Students will be assigned to breakout rooms to work with partners or small groups as appropriate for the activity.
5. If necessary, one partner should connect to an Astro Lab computer and initiate screen sharing.
6. All members of the partnership or group should collaborate on the lab report, preferably using a PDF editor to mark up the file.
7. You may also need to use a spreadsheet program to handle data collection and analysis during the lab. You may use screen sharing or a collaborative platform to work together.
8. If you have questions for the TA, use a private chat message to let the TA know. They will join your breakout room as soon as possible. Otherwise the TA will simply float between the rooms to check in on students.
9. The deadline to upload all lab reports (in PDF format only) and other associated data files to Course Site is 20 minutes after the end of the lab period to receive full credit. Only one lab report should be submitted for each group. (Make sure all group members' names are included in the file!) Emailed submissions will not be accepted.

Zoom Policies

- The ASTR 008 lab session on Zoom will NOT be recorded.
- You may opt to leave your camera on during the full-class portion. Keep your camera on when you are in a breakout session with your lab partner or group.
- Keep your microphone muted during the full-class portion, unless you have a question.
- Dress appropriately, as you would in a real classroom.
- Do not drink alcoholic beverages before or during the class session.
- Our class period requires a high level of participation and collaboration from every participant. Please keep other distractions to a minimum during class time.

Grading:

You may work together within small groups (2–3) students as assigned by your TA. Completed labs will be collected at the end of each session. You are required to do all of the experiments and to be present for all of your scheduled laboratory meetings.

Each laboratory will be graded on the basis of 10 points maximum. One point will be earned by watching the pre-class video to prepare for class. The remaining 9 points will be based on how well you and your lab partner(s) performed and analyzed the experiment and, particularly, on how well you communicated your results. Each member of the group will receive the same grade, but you may contact Prof. McSwain or the TA if you feel that a member of the group did not participate equally. Grades will be assigned based on the quality and integrity of the lab report as well as individual participation.

If you have to miss a lab, consult with Prof. McSwain and/or the TA as soon as possible (in advance, if possible) so that they so that can work with you to schedule a makeup lab session.

Lab grades will not be curved. After all student work is accounted for, a curve may be applied to the final averages if necessary.

Academic Integrity:

Copying work from other students or outside sources is considered plagiarism, and it will not be tolerated. You may work together with in small groups (2–3) students as assigned by your TA, and your group's work will be graded as one. Copying the data or analysis of another group is considered cheating. Outside references (other than the ASTR 007 textbook, ASTR 008 lab manual, or the necessary web links or software) must be properly cited if used on any assignment. Any student suspected of engaging in academic misconduct on a graded assignment or exam may be assigned a zero for that assignment, assigned an F in the course, and/or reported to the Office of Student Conduct.

Accommodations for Students With Disabilities:

Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at indss@lehigh.edu, or online at <https://studentaffairs.lehigh.edu/disabilities>.

The Principles of Our Equitable Community:

- We affirm the inherent dignity in all of us, and we maintain an inclusive and equitable community.
- We recognize and celebrate the richness contributed to our lives by our diverse community.
- We promote mutual understanding among the members of our community.
- We confront and reject discrimination in all its forms, including that based on age, color, disability, gender identity, genetic information, marital status, national or ethnic origin, political beliefs, race, religion, sex, sexual orientation, socio-economics, veteran status, or any differences that have been excuses for misunderstanding, dissension, or hatred.
- We affirm academic freedom within our community and uphold our commitment to the highest standards of respect, civility, courtesy, and sensitivity toward every individual.
- We recognize each person's right to think and speak as dictated by personal belief and to respectfully disagree with or counter another's point of view.
- We promote open expression of our individuality and our differences within the bounds of University policies.
- We acknowledge each person's obligation to the community of which we have chosen to be a part. We take pride in building and maintaining a culture that is founded on these principles of unity and respect.

We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

Tentative Laboratory Schedule:

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| Week of Aug. 24: | Introduction to the course |
| Week of Aug. 31: | Lab 1: Exploring the Night Sky with <i>Stellarium</i> |
| Week of Sept. 7: | Lab 2: Understanding Astronomical Quantities |
| Week of Sept. 14: | Lab 3: Orbits of the Moons of Jupiter |
| Week of Sept. 21: | Lab 4: Understanding Stars with Spectroscopy |
| Week of Sept. 28: | Lab 5: Measuring Features on the Moon |
| Week of Oct. 5: | Lab 6: Drawing Conclusions about the Moon |
| Week of Oct. 12: | Lab 7: The Weather and Climate of Mars |
| Week of Oct. 19: | Lab 8: Drawing Conclusions about Mars |
| Week of Oct. 26: | Lab 9: Sunspots and the Rotation of the Sun |
| Week of Nov. 2: | Lab 10: Drawing Conclusions about Sunspots |
| Week of Nov. 9: | Lab 11: The Hertzsprung-Russell Diagram |
| Week of Nov. 16: | Lab 12: The Lightcurve of the Supernova SN 2014J |
| Week of Nov. 23: | Thanksgiving Break ; No labs this week |
| Week of Dec. 3: | Lab 13: The Hubble-Lemaître Law |

This syllabus is only a tentative outline of the course. The grading policy, lab schedule, or the topics covered in class may change as needed.