

ASTR 008 – Introduction to Astronomy Lab

Fall 2025

LL 221

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 and online tools to visualize real astronomical data;
2. To think about the errors inherent in an astrophysical measurement;
3. To analyze data and visualize your results using spreadsheet programs;
4. 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.

Materials:

- Online lab manual: *Investigations in Astronomy* by McSwain & Blauvelt
- Scientific calculator (optional)

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, 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.

Makeup labs are not allowed without a valid written excuse. 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. The use of artificial intelligence (AI) is also not allowed in the ASTR 008 lab. 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:

Lehigh University endorses 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.

Policy on Harassment and Non-Discrimination:

Lehigh University upholds the Principles of Our Equitable Community and is committed to an educational, working, co-curricular, social, and living environment for faculty, staff, and students. The University does not discriminate in its admissions practices, employment practices, or educational programs or activities on the basis of age, color, disability, ethnicity, familial status, gender expression, gender identity, genetic information, marital status, national origin (including shared ancestry), pregnancy or related conditions, race, religion, sex, sexual orientation, and veteran or military status. Harassment or discrimination is unacceptable behavior and will not be tolerated. The University strongly encourages (and, depending upon the circumstances, may require) students, faculty, or staff who experience or witness harassment or discrimination, or have information about harassment or discrimination in University programs or activities, to immediately report such conduct.

If you have questions about Lehigh's Policy on Harassment and Non-Discrimination or need to report harassment or discrimination, contact the Equal Opportunity Compliance Coordinator (Alumni Memorial Building / 610-758-3535 / eocc@lehigh.edu).

Tentative Laboratory Schedule:

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| Week of Aug. 25: | Lab 1: Understanding Astronomical Quantities |
| Week of Sept. 1: | Lab 2: Exploring the Night Sky with <i>Stellarium</i> |
| Week of Sept. 8: | Lab 3: Orbits of the Moons of Jupiter |
| Week of Sept. 15: | Lab 4: Understanding Stars with Spectroscopy |
| Week of Sept. 22: | Lab 5: Measuring Features on the Moon |
| Week of Sept. 29: | Lab 6: The Weather and Climate of Mars |
| Week of Oct. 6: | Lab 7: Exploring Solar System Missions |
| Week of Oct. 13: | Lab 8: Sunspots and the Rotation of the Sun |
| Week of Oct. 20: | Lab 9: Detecting Exoplanets |
| Week of Oct. 27: | Lab 10: Protoplanetary Disks Around Young Stars |
| Week of Nov. 3: | Lab 11: The Hertzsprung-Russell Diagram |
| Week of Nov. 10: | Lab 12: Eclipsing Binary Stars |
| Week of Nov. 17: | Lab 13: Rotation of Spiral Galaxies |
| Week of Nov. 24: | Thanksgiving Break; no labs this week |
| Week of Dec. 1 | Lab 14: 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.