

MSE 2150: ASTRONOMY LABORATORY – PLANETS
Mendel Hall 241
Mon 11:45pm-2:25pm

Fall 2024 Syllabus

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OFFICE HOURS

Mon 10:30 – 11:30
Tue 10:30 – 11:30
Wed 10:30 – 11:30
Thu 10:30 – 11:30

other times by appointment

In this class we value each person as part of a learning community for their insights, perspectives and opinions, irrespective of gender, gender identity, race, sexual orientation, disability, spiritual values, political beliefs or nationality. We celebrate diversity and highlight its principal role in enriching our academic, professional and personal lives.

Course homepage:

<https://aprsa.villanova.edu/?q=mse2150>

Course description:

In the lab we will explore the basics of working with numbers, units, graphs and using the computer to get scientific results. We will touch upon the motions of planets in the sky, lunar and solar eclipses, Kepler's laws, Newton's law of gravity, measuring the masses of planets, measuring the speed of light, studying comets, detecting extrasolar planets, and exploring their habitable zones. In parallel, we will use the Villanova public Observatory to observe the night sky and describe our experience using real astronomical instrumentation.

This course aims to offer a joyful, meaningful, and empowering experience to every participant; we will build that rich experience together by devoting our strongest available effort to the class. You will be challenged and supported. Please be prepared to take an active, critical, patient, and generous role in your own learning and that of your classmates.

Course objectives:

Once you have successfully completed the *Astronomy Laboratory Planets* course, you will be able to:

- explain the steps in the scientific method of inquiry, which involves gathering observable, empirical and measurable evidence subject to specific principles of reasoning, and recognizing that reproducible observation of a result is necessary for a theory to be accepted as valid by the scientific community;
- analyze specific examples of how the scientific method has been used in the past to collect data through observation and experimentation, and to formulate, test and reformulate hypotheses about the physical universe; evaluate scientific information from a variety of sources and use that information to articulate well-reasoned responses to scientific concerns;
- interpret scientific data – graphs, tables and equations – and highlight the importance of physical units;
- have the foundation to conduct your own scientific experiments and astronomical observations;

- gain proficiency with the basic astronomical vocabulary related to astronomical observations;
- gain independence and critical thinking when interpreting information encountered in the media.

Course material:

- AST 2150 Lab Manual, Fall 2024 Edition, available for download from the course webpage.
- Stellarium program – open source, free of charge, available for Windows, Mac, and Linux

Weekly schedule (subject to change due to University closures or unforeseen events):

Aug 26:	Lab A: Working with Numbers, Graphs and the Computer (take-home)
Sep 9:	Lab B: Motions in the Sky
Sep 16:	Lab C: Lunar eclipses and the Saros cycle
Sep 23:	Lab D: The “Big” North American total solar eclipse
Sep 30:	Lab E: Planetary motion
Oct 7:	Lab F: Kepler’s determination of the orbit of Mars
Oct 14:	--- midterm break ---
Oct 21:	Lab G: Gravity, orbits and Kepler’s laws
Oct 28:	Lab H: Measuring the mass of Jupiter
Nov 4:	Lab I: Rømer’s measurement of the speed of light
Nov 11:	Lab J: Comets
Nov 18:	Lab K: Detecting extrasolar planets
Nov 25:	Lab L: Exploring habitable zones
Dec 2:	Make-up lab
Dec 6:	Observatory lab due

Course work and grading:

There are 13 labs that comprise this course. Each lab is graded on a 0–100 scale, each lab contributes equally to the final grade.

Note that two of the labs, “Lab A: Working with Numbers, Graphs and the Computer” and “Observatory Lab”, happen outside of normal lab hours. The first lab is a take-home lab. For the second, you are required to visit the observatory on a clear night and write a 2-page report that describes your visit. Include sky conditions, information on the telescope that you used, and celestial objects that you observed. There is no makeup for the Observatory Lab, so exercise due vigilance and do not postpone this to the end of the semester as weather might be unfavorable for observing. Bad weather is no excuse for missing this lab assignment.

The final grade is determined according to the following breakdown:

0-60%	F	70-73%	C-	83-87%	B
60-63%	D-	73-77%	C	87-90%	B+
63-67%	D	77-80%	C+	90-93%	A-
67-70%	D+	80-83%	B-	93-100%	A

Pre-lab requirement:

Before coming to the lab, you are required to write a pre-lab portion of your report. You must read lab instructions ahead of time and write a description of the lab. The description should include: (1) a brief statement of the purpose of the lab; (2) discussion of the relevant theory pertinent to the lab; (3) explanation of techniques and procedures to be used; and (4) perceived outcomes of the lab. Pre-lab carries 15% of the lab grade. If you do not have pre-lab done, you will not be allowed to start the lab.

The pre-lab must be submitted as part of the overall lab report on Blackboard. You should typeset the pre-lab in advance and then copy-paste it into the designated field on the lab sheet. You do not need to print out the pre-lab; it is submitted electronically.

Attendance:

Regular attendance is essential for completing all lab assignments. Please arrive to the lab on time. If you are more than 10 minutes late with no prior arrangement, you will not be allowed to complete that day's lab. There will be a single make-up opportunity at the end of the semester, when you will be able to make up one lab. If you cannot attend the lab session for any justifiable reason, note that there are several sessions of this lab every week; reach out to the instructor for the lab session that you can make and ask to do the lab with them. If due to extenuating circumstances you miss more than a single lab, talk to me and we will figure something out.

In addition to the attendance policy stated above, students are entitled to one excused absence for any reason that may contribute to their personal wellness. Students must advise the instructor by email before class of their intent to utilize a Personal Day as the reason for their absence. A Personal Day will not be approved retroactively. Students may, but are not required, to provide additional information regarding their absence.

Additionally, a Personal Day may not:

- be used immediately preceding or following a University holiday or break period;
- be used on days when exams, presentations or other major assignments are scheduled.

A Personal Day does not grant an automatic extension for items due. Students remain responsible for all assignments, exams, presentations, etc. due on that date. It is in the instructor's discretion to determine whether any extension is appropriate given individual circumstances.

The use of artificial intelligence (AI):

You are free to use AI to help you prepare the pre-lab; however, the use of AI for answering questions during the lab is not allowed.

Special needs:

It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. All students who need accommodations should go to Clockwork for Students via myNOVA to complete the Online Intake or to send accommodation letters to professors. Go to the [LSS website](#) or the [ADS website](#) for registration guidelines and instructions. If you have any questions, please contact LSS at 610-519-5176 or learning.support.services@villanova.edu, or ADS at 610-519-3209 or ods@villanova.edu.

Academic integrity:

All students are expected to uphold Villanova's Academic Integrity Policy and Code. Any incident of academic dishonesty will be reported to the Dean of the College of Liberal Arts and Sciences for disciplinary action. You may view the University's Academic Integrity Policy and Code for a detailed description.

If a student is found responsible for an academic integrity violation, which results in a grade penalty, they may not WX the course unless they are approved to WX for significant medical reasons. Students applying for a WX based on significant medical reasons, must submit documentation and their request for an exception will be considered.

Absences for religious holidays:

Villanova University makes [every reasonable effort](#) to allow members of the community to observe their religious holidays, consistent with the University's obligations, responsibilities, and policies. Students who expect to miss a class or assignment due to the observance of a religious holiday should discuss the matter with their professors as soon as possible, normally at least two weeks in advance. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the absence.