

ASTR 103: Intro Astronomy of the Solar System Syllabus

Summer 2023

Instructor:	Dr. Matthew Route
Email:	mproute@olemiss.edu
Office Hours:	M and T 3:00-4:00 pm, or by appointment in Lewis 121B
Website:	https://physics.olemiss.edu/route/
Lectures:	M-R 1:00pm-2:50pm, Lewis 109
Exams:	Select days in Lewis 101 during class (see schedule)
Textbook:	<i>Cosmic Perspective, 9th Ed.</i> (2019) by Bennett, J., Donahue, M., Schneider, N., & Voit, M. (ISBN 978-0134874364). (Older text versions are okay, but note differences in text and problem sets as will be mentioned in class.)
Teaching Assistant:	Azwad Adnan (aadnan@go.olemiss.edu)
Labs:	M/W 8:30 to 10:50 pm All sections meet in Lewis 1 (enter from the parking lot by the bus stop)
Lab Manual:	<i>Astronomy 103 Laboratories Spring 2023</i> , available for free from your lab instructor.
Other Materials:	A scientific calculator that has trigonometric functions and can handle scientific notation for labs and exams. This does not include a smartphone calculator app.

Course Description

This one-semester course introduces solar system astronomy. It includes both lecture and lab components. Topics include the apparent motion of objects in the night sky, orbital motion, light, the planets and small bodies of the solar system, extrasolar planetary systems, and the search for life in the universe. The course consists of two lectures and one laboratory meeting per week. Labs will consist of indoor experiments, naked-eye observing, and observations through an optical telescope.

Course Objectives

After taking this course, students should know and understand the following key concepts.

- The evolution of our thinking in what the night sky consists of, how it operates, and why these changes occurred.
- The physical laws that underpin the functioning of the solar system and our ability to perceive the solar system, including gravitation, energy, and the nature of light.
- The physical properties of the objects that constitute the solar system, including the Sun, planets, minor bodies, etc.
- The origin and evolution of the solar system, and how its characteristics compare to extrasolar systems.
- Unanswered questions that remain at the frontiers of astronomy as related to the planets.

This course will emphasize the following critical thinking components.

- Science is a “living” process and mode of thinking that can be applied to many problems, not simply a collection of facts and theories.

- Conceptualization of complex issues and problems.
- Interpreting data and appraisal of evidence, especially within various theoretical frameworks.

Students will develop the following competencies by the conclusion of this course.

- Proficiency in using mathematics as a “language of science” to enable comparison and evaluation of objects, phenomenon, and theoretical frameworks.

Evaluation		Grading Scale	
Attendance	10%	93 to 100%	A
Homework/ Classroom Activities	15%	90 to <93%	A-
Laboratory Exercises	30%	87 to <90%	B+
Midterm Exam 1	10%	83 to <87%	B
Midterm Exam 2	10%	80 to <83%	B-
Comprehensive Final Exam	25%	77 to <80%	C+
		73 to <77%	C
		70 to <73%	C-
		60 to <70%	D
		<60%	F

Policies

Course-specific Policies

Attendance is mandatory. During the first two weeks, scan your ID card before entering the lecture classroom. Classes will be divided into two halves, with a 10-minute break in between from 1:50-2 pm. Attendance will be taken during each half. Classroom activities for credit will occur during many lecture sessions.

Communications. The TA and I will respond within 48 hours during business days, and within 72 hours on weekends.

Course Materials will be posted to Blackboard. Modifications to the syllabus will be announced in class and revisions posted to Blackboard. Homework assignments, in-class activities, and their respective solutions will be posted to Blackboard.

Technology Use in the Classroom. In order to foster an environment conducive to learning, the usage of cell phones, tablets, laptops, etc. are prohibited during lectures, classroom activities, and exams unless otherwise noted. Numerous studies demonstrate that taking notes by hand leads to significantly better retention and recall of information than if notes are taken on an electronic device, because the physical act of writing provides a deeper processing of the information¹. In addition, personal electronic devices tempt students with recreational, non-academic distractions².

¹ Mueller, P. A., Oppenheimer, D. M. (2014). The Pen is Mightier than the Keyboard: Advantages of Longhand over Laptop Note Taking. *Psychological Science*, Vol 25, Issue 6, pp. 1159 -1168.

² Kraushaar, J. M., Novak, D. C. (2010). Examining the Effects of Student Multitasking with Laptops During the Lecture. *Journal of Information Systems Education*, 21, 241–251.

Late and Missed Work. You will lose 10% of an assignment's value for each day it is late, up to a limit of one week. After that time, assignments may be turned in and evaluated for correctness, but a score of zero will be assigned. If you miss a lab for a university-approved reason (illness, university athletics, etc.), arrange a makeup lab with your TA. Missing more than 3 labs will result in a final grade of F for the course. No make-up exams will be given unless arrangements are made in advance.

Grade Disputes. You may dispute your grades on classroom activities, homework, labs, etc. up until the corresponding midterm exam, but not afterwards. For example, grades received on activities covering chapters 1-5 may be disputed prior to the exam on 8 June, but not afterwards. This will facilitate your learning and not getting too far behind on material, while expediting the delivery of accurate grades.

Course Tips.

- The preface of the textbook gives a rule of thumb as to how much time you should spend on this course. Although it may seem excessive, it is a good estimate if you want to do well.
- When studying for this course, set your smartphone and computer aside. Do as much reading and problem-solving on paper before going to any electronic device. You will find your ability to understand and retain information improves by leaps and bounds.
- Show all your work. For calculations, start with the algebraic equation and show your steps. Showing steps allows partial credit to be given even if the final answer is wrong.
- Include units. There is a huge difference between 10 cm, 10 AU, and 10 pc.
- Label diagrams and axes on plots.

University-wide Policies

Academic Conduct. You are encouraged to cooperate with your classmates and discuss course materials. However, dishonesty, cheating, plagiarism, or knowingly furnishing false information to the university in any way are regarded as serious offenses. Submission of products derived from artificial intelligence resources (e.g., ChatGPT) as one's own work will be construed as plagiarism. Students are responsible for knowing and adhering to the academic integrity policy of the University of Mississippi listed in the [Student Academic Conduct and Discipline Policy](#). Students who violate academic integrity policies will be subject to the appropriate sanctions.

COVID-19/ Infectious Diseases Policy. If students test positive for COVID-19 at any health care facility, they must [report it to the Student Health Center](#) (or call 662-915-7274). Students with COVID-19 should follow the CDC's [COVID-19 exposure guidelines](#), seek medical attention by a healthcare provider, and contact their instructor to let them know that they will be missing class due to a health-related issue.

If you need to isolate due to contracting COVID-19 at any point this semester, email me and your TA as soon as possible. We will determine how best to help you continue your progress in the course. You will have access to texts, course content, and our Blackboard course site. The [University Health Center COVID-19 FAQs](#) provides more information on isolation protocols, as does the CDC's [Isolation and Precautions](#) website.

Non-Discrimination Policy. It is the policy of the University of Mississippi not to discriminate against anyone on the basis of race, color, religion, sex, national origin, handicap, age, sexual orientation or being a veteran. Students are encouraged to freely examine and exchange diverse ideas both inside and outside the classroom.

Disability Access and Inclusion. The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact the course instructor as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are registered with SDS, you must log in to your [Rebel Access portal](#) to request approved accommodations. If you are NOT registered with SDS, you may [apply for disability services](#).

Verification of Class Attendance. The University requires that all students have a [verified attendance/participation](#) at least once during the first two weeks of the semester for each course. Students without verified attendance will be dropped from the course and their financial aid amended accordingly.

Tentative Schedule

Date	Topic and Events	Textbook
30 May	Introduction to Modern Astronomy, Scale of the Universe	xxxii-xxxvi, 1.1-1.2
	Spaceship Earth, Patterns in the Sky	1.3-1.4
31 May	Patterns in the Sky, Seasons, Math review*	2.1-2.2
	Ancient Mysteries of the Moon and Planets	2.3-2.4
1 June	Classical Astronomy and the Scientific Revolution	3.1-3.5
	Deadline to Withdraw	
	Physics: Motion and Energy	4.1-4.3
5 June	Physics: Gravitation	4.4-4.5
	Physics: Matter and Light	5.1-5.3
6 June	Physics: Spectroscopy	5.4
	Telescopes: Fundamental Properties	6.1-6.2
7 June	Telescopes: Across the EM spectrum	6.3-6.4
	Overview of the Solar System	7.1-7.3
8 June	1st Midterm Exam	Ch. 1-5
	Formation, Age, and Mysteries of the Solar System	8.1-8.3
12 June	Planetary Geology: Interiors and surfaces	9.1-9.2
	Planetary Geology: Moon, Mercury, Mars	9.3
13 June	Planetary Geology: Venus and Earth	9.4-9.6
	Planetary Atmospheres: Structure and Physics	10.1-10.2
14 June	Comparative Terrestrial Planetary Atmospheres	10.3-10.6
	Gas Giants: Structure, Composition, and Magnetism	11.1
15 June	2nd Midterm Exam	Ch. 6-10
	Gas Giants: Moons and Rings	11.2-11.3
19 June	Classification of small bodies, asteroids, comets	12.1-12.3

	Pluto, the Kuiper Belt, and Impact Risks	12.4-12.5
20 June	Exoplanets: Detection and Characterization	13.1-13.2
	Exoplanets: Formation of Other Solar Systems, Open Questions	13.3-13.4, +
21 June	The Sun: Structure, Composition, and Fusion	14.1-14.2
	The Sun: Magnetism and Star-Planet Interactions	14.3
22 June	The History of Life on Earth	24.1-24.2
	Search for Life in the Solar System and Beyond	24.2-24.5
26 June	Final Exam (4:00 pm, Lewis 101)	Everything

Additional Resources

- PBS NOVA's [The Planets series](#). Episodes include "Inner Worlds", "Mars," "Jupiter," "Saturn," "Ice Worlds." Episodes without the compass icon are available for free. If there is an episode you are interested in but its paywalled, check back periodically.
- [Astronomy magazine](#) website. Learn about current events by signing up to their free email newsletter, delivered once a week on Friday. Interesting events in the night sky are listed under Observing/The Sky This Week.
- [Science News](#) website. Learn about news across the sciences, including physics and astronomy, by signing up to their free email newsletter delivered once a week on Thursday.