Astronomy 1303: Stars and Galaxies

Summer 2026 Syllabus

Lecture
Meeting Times: — **Location:** Web

Instructor: Anirban Bhattacharjee
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Office Hours: By appointment
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Course Description:

ASTRO 1303 is an introductory course for non-science majors. It provides a broad introduction to Astronomy including: (1) daily, monthly and yearly patterns in the sky; (2) basic physics of gravity, light, and atoms; (3) stars and stellar evolution; (4) formation of the solar system; (5) galaxies, cosmology, and the evolution of the Universe; and (6) the fundamental tenets of science and the scientific process. The goal of this course is to cover most of the areas of modern astronomy at a level which requires only basic mathematics.

Resources:

Required:

Astronomy Notes (**AN**) by Nick Strobel (http://www.astronomynotes.com)

https://openstax.org/details/books/astronomy

– Online textbook for pedagogical development of concepts

Occasionally, you will need a calculator in class. A basic scientific calculator will work well.

Various Wikipedia Articles (**WA**)

– Supplemental reading for additional declarative knowledge

Loose-leaf paper – for in-class assignments

Optional:

"Universe" (w/ Starry Night Enthusiast CD-ROM) (**UN**) by Roger Freedman & William Kaufmann III, 8th ed.(9th edition is ok too)

Course Objectives:

We will follow the guidelines set forth by the American Astronomical Society, the National Science Education Standards, the American Association for the Advancement of Science, and the in-class survey. The goals for this class are as follows:

- Appreciate the scientific process, how it works, the notion that physical laws are universal, the elements of scientific theories, what they do and do not tell us.
- Develop familiarity with the night sky and how its appearance changes with time and position on Earth.
- Describe how data is collected from astronomical objects, and what quantities can be measured/inferred.
- Understand basic - yet crucial - physical laws, and the processes that govern astronomical quantities.
- Integrate concepts from related subjects to explain relationships (e.g., physics and math) between astronomical quantities.
- Infer the nature, structure and evolution of the Universe, and objects therein.

Instructional Philosophy of the Course:

The overarching goals of this course are for you to understand the nature of science through the eyes of astronomy; to understand the big ideas in astronomy; and to develop a lifelong interest in astronomy and current events surrounding astronomy. To meet these three goals, the course instructors have carefully designed a sequence of learning tasks and assessment procedures as outlined below.

– – To get the best out of this course, if you are having problems with understanding the course material, is by emailing me or texting me through a free messenger service called WhatsApp or iMessage. PLEASE DO NOT TEXT OR CALL ME DIRECTLY, I WONT BE ABLE TO RESPOND OR MIGHT NOT EVEN RECEIVE YOUR MESSAGE -*Carefully studying the text is REQUIRED.* The course mini-lectures are designed to focus on the really difficult aspects of astronomy or to provide structure for your out-of-class study. You are accountable for all material, concepts, and interrelationships presented in the mini-lectures and the text. Reading assignments should be completed BEFORE the date listed. Otherwise, the mini-lectures and tutorials will be less useful in helping you develop a deep understanding of the course topics. It is important to remember that the exams or questionnaires will cover material from the text readings that may or may not be discussed in class.

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Assessment and Grading:

In order to promote an active and collaborative learning environment, there will be no curve to assess grades. Each student will only be competing against themselves, and will be responsible for gaining the declarative knowledge and conceptual understanding for performance. This is a three credit class with three credits in the primary lecture section (§1) and one credit from the accompanying lab section. The portion of the grade in the lecture section will come from four sources: (1) Exams and (2) HWs and Quizzes . Midterm exams will account for 25% of the final grade. There will be three midterm exams. The top two will count toward the grade (12.5% each) and **the lowest score will be dropped.** Final exam will will account for 25% of the grade. HWs will account for 50%. Extra credit is provided for meeting with me over Zoom.

Total points $+0.25 \times$ (Midterm Total)
$+0.25 \times$ (Final Total)
$+0.25 \times$ (HW)
$+0.25 \times$ (Presentation)

Grading Scheme

Total Points	Grade
85–100	A
75–84.999...	B
65–74.999...	C
55–64.999...	D
below 54.999...	F

From the total points, letter grades will be assigned according to the table on the right. There will be no plus or minus grades assigned.

My favorite color is lavender blue.

Students with disabilities: If you require any special accommodations to participate in the class or complete assignments, please contact the instructor as soon as possible.

Students enrolled in distance education courses have equal access to the university's academic support services, such as library resources, online databases, and instructional technology support. For more information about accessing these resources, visit the SRSU website. Students should correspond using Sul Ross email accounts and submit online assignments through Blackboard, which requires secure login. Students enrolled in distance education courses at Sul Ross are expected to adhere to all policies pertaining to academic honesty and appropriate student conduct, as described in the student handbook. Students in web-based courses must maintain appropriate equipment and software, according to the needs and requirements of the course, as outlined on the SRSU website. Directions for filing a student complaint are located in the student handbook.

Academic Honesty:

University Student Conduct and Discipline defines Academic Dishonesty:

"The University expects all students to engage in all academic pursuits in a manner that

is beyond reproach and to maintain complete honesty and integrity in the academic experiences both in and out of their classroom. The University may initiate disciplinary proceedings against a student accused of any form of academic dishonesty, including but not limited to, cheating on an examination or other academic work, plagiarism, collusion, and the abuse of resource materials. 1. Cheating includes:

- a. Copying from another students test paper, laboratory report, other report, or computer files, data listings, and/or programs, or allowing another student to copy from same.
- b. Using, during a test, materials not authorized by the person giving the test.
- c. Collaborating, without authorization, with another person during an examination or in preparing academic work.
- d. Knowingly, and without authorization, using, buying, selling, stealing, transporting, soliciting, copying, or possessing, in whole or in part, the contents of an unadministered test.
- e. Substituting for another student; permitting any other person, or otherwise assisting any other person to substitute for oneself or for another student in the taking of an examination or test or the preparation of academic work to be submitted for academic credit.
- f. Bribing another person to obtain an unadministered test or information about an unadministered test.
- g. Purchasing, or otherwise acquiring and submitting as ones own work any research paper or other writing assignment prepared by an individual or firm. This section does not apply to the typing of the rough and/or final versions of an assignment by a professional typist.
- h. "Plagiarism" means the appropriation and the unacknowledged incorporation of anothers work or idea in ones own written work offered for credit.
- i. "Collusion" means the unauthorized collaboration with another person in preparing written work offered for credit.
- j. "Abuse of resource materials" means the mutilation, destruction, concealment, theft or alteration of materials provided to assist students in the mastery of course materials.
- k. "Academic work" means the preparation of an essay, dissertation, thesis, report,problem, assignment, or other project that the student submits as a course requirement or for a grade.
- l. "Falsification of Data" means the representation, claim, or use of research, data, statistics, records, files, results, or information that is falsified, fabricated, fraudulently altered, or otherwise misappropriated or misrepresented.

Procedures for discipline due to academic dishonesty shall be the same as in other disciplinary actions, except that all academic dishonesty cases shall be first considered and reviewed by the faculty member. If, after reviewing the case, the faculty member believes that disciplinary action is necessary, he/she may recommend a penalty but must notify the student of his/her right to appeal to the academic department chair and, eventually, to the dean before imposition of the penalty. If the student does not accept the decision of the academic department chair or dean, the student may then follow the normal disciplinary procedures. No disciplinary action shall become effective against the student until the student has received substantive and procedural due process except as provided under Interim Disciplinary Action.

Use of Artificial Intelligence:

The University does not recommend or endorse any specific AI tools or resources. Students should be aware that many generative AI tools (e.g., ChatGPT, Google Gemini, Microsoft Copilot) store user input and may use this data to train future models. For this reason, students should never upload or share personal, confidential, or identifiable information—such as names, ID numbers, health data, or assignment submissions containing such details—into any generative AI platform. When using AI tools, students should verify whether the tool complies with student privacy standards as indicated by the University. Faculty may recommend specific tools that better align with institutional data privacy policies, but ultimate responsibility for data protection rests with users. Students are encouraged to use faculty-recommended platforms when engaging in coursework involving generative AI. The University is not liable for any adverse experience or impact when students interact with these tools.

- a. **No use of generative AI tools permitted** This course assumes that work submitted by students will be generated by the students themselves, working individually or in groups as directed by class assignment instructions. This policy indicates the following constitute violations of academic honesty: a student has another person/entity do the work of any substantive portion of a graded assignment for them, which includes purchasing work from a company, hiring a person or company to complete an assignment or exam, and/or using generative AI tools (such as ChatGPT). In this course, every element of class assignments must be fully prepared by the student. The use of generative AI tools for any part of your work will be treated as plagiarism. If you have questions, please contact me. All assignments should be fully prepared by the student. Developing strong competencies in the skills associated with this course, from student-based brainstorming to project development, will prepare you for success in your degree pathway and, ultimately, a competitive career. Therefore, the use of generative AI tools to complete any aspect of assignments for this course are not permitted and will be treated as plagiarism. If you have questions about what constitutes a violation of this statement, please contact me.
- b. **Generative AI is permitted in specific contexts and with acknowledgment**. The

emergence of generative AI tools (such as ChatGPT and DALL-E) has sparked interest among many students in our discipline. The use of these tools for brainstorming ideas, exploring possible responses to questions or problems, and creative engagement with the materials may be useful for you as you craft responses to class assignments. While there is no substitute for working directly with your instructor, the potential for generative AI tools to provide automatic feedback, assistive technology and language assistance is clearly developing. Please feel free to reach out to me well in advance of the due date of assignments for which you may be using generative AI tools and I will be happy to discuss what is acceptable. In this course, students shall give credit to AI tools whenever used, even if only to generate ideas rather than usable text or illustrations. When using AI tools on assignments, add an appendix showing (a) the entire exchange, highlighting the most relevant sections; (b) a description of precisely which AI tools were used (e.g. ChatGPT private subscription version or DALL-E free version), (c) an explanation of how the AI tools were used (e.g. to generate ideas, turns of phrase, elements of text, long stretches of text, lines of argument, pieces of evidence, maps of the conceptual territory, illustrations of key concepts, etc.); (d) an account of why AI tools were used (e.g. to save time, to surmount writer's block, to stimulate thinking, to handle mounting stress, to clarify prose, to translate text, to experiment for fun, etc.). Students shall not use AI tools during in-class examinations, or assignments unless explicitly permitted and instructed. Overall, AI tools should be used wisely and reflectively with an aim to deepen understanding of subject matter. It is a violation of university policy to misrepresent work that you submit or exchange with your instructor by characterizing it as your own, such as submitting responses to assignments that do not acknowledge the use of generative AI tools. Please feel free to reach out to me with any questions you may have about the use of generative AI tools before submitting any content that has been substantially informed by these tools. In this course, we may use generative AI tools (such as ChatGPT) to examine the ways in which these kinds of tools may inform our exploration of the topics of the class. You will be informed as to when and how these tools will be used, along with guidance for attribution if/as needed. Any use of generative AI tools outside of these parameters constitutes plagiarism and will be treated as such. Understanding how and when to use generative AI tools (such as ChatGPT, DALL-E) is quickly emerging as an important skill for future professions. To that end, you are welcome to use generative AI tools in this class as long as it aligns with the learning outcomes or goals associated with assignments. You are fully responsible for the information you submit based on a generative AI query (such that it does not violate academic honesty standards, intellectual property laws, or standards of non-public research you are conducting through coursework). Your use of generative AI tools must be properly documented and cited for any work submitted in this course. To ensure all students have an equal opportunity to succeed and to preserve the integrity of the course, students are not permitted to submit text that is generated by artificial intelligence (AI) systems such as ChatGPT, Bing Chat, Claude, Google Bard, or any other automated assistance for any classwork or assessments. This includes using AI to generate answers to assignments, exams, or projects, or using AI

to complete any other course-related tasks. Using AI in this way undermines your ability to develop critical thinking, writing, or research skills that are essential for this course and your academic success. Students may use AI as part of their research and preparation for assignments, or as a text editor, but text that is submitted must be written by the student. For example, students may use AI to generate ideas, questions, or summaries that they then revise, expand, or cite properly. Students should also be aware of the potential benefits and limitations of using AI as a tool for learning and research. AI systems can provide helpful information or suggestions, but they are not always reliable or accurate. Students should critically evaluate the sources, methods, and outputs of AI systems. Violations of this policy will be treated as academic misconduct. If you have any questions about this policy or if you are unsure whether a particular use of AI is acceptable, please do not hesitate to ask for clarification.

- c. **Students are encouraged to use generative AI tools in coursework** The use of generative AI is encouraged with certain tasks and with attribution: You can choose to use AI tools to help brainstorm assignments or projects or to revise existing work you have written. When you submit your assignment, I expect you to clearly attribute what text was generated by the AI tool (e.g., AI-generated text appears in a different colored font, quoted directly in the text, or use an in-text parenthetical citation). Designers commonly use AI-content generation tools in their work. In this course, using AI-content generation tools is permitted and will be a normal and regular part of our creative process when it is used according to the below criteria. In this course, neglecting to follow these requirements may be considered academic dishonesty. (1) For each assignment, you are required to include a paragraph that explains which AI content-generation tool you used, the dates you used it, and the prompts you used to generate the content according to the MLA style guide. (2) During critique, it is important to describe the precedents you used and how any source content was transformed. When showing or presenting images or other content you generated using an AI-tool, cite that image or content following the MLA style guide. If you need help referencing your creative work, contact me to collaborate. Students are invited to use AI platforms to help prepare for assignments and projects (e.g., to help with brainstorming or to see what a completed essay might look like). I also welcome you to use AI tools to help revise and edit your work (e.g., to help identify flaws in reasoning, spot confusing or underdeveloped paragraphs, or to simply fix citations). When submitting work, students must clearly identify any writing, text, or media generated by AI. This can be done in a variety of ways. In this course, parts of essays generated by AI should appear in a different colored font, and the relationship between those sections and student contributions should be discussed in cover letters that accompany the essay submission.

In addition, during the course of the semester, each student will be asked to carry out exercises in collaboration with other students. To nurture such an environment, we will consider any disruptive or disrespectful acts (such talking on a cell phone, or texting during class) to be a form of cheating.

We consider academic dishonesty to be a serious offense and the maximum punishments allowed will be pursued in all scenarios. This includes completing any quizzes, or scantron forms with the help of another student or for scantron forms completed by another student who is not you. If similar work is submitted, all parties involved will receive a zero for their assignment. Make your work your own, be original. Good luck and enjoy your semester!

Tentative Schedule of Topics, Assignments, and Exams

Date	Topic/Assignments
	Week 1
	Introductions, Astronomy Survey,Pre-assessment, Office Hours, Tour of Universe
	Discussion of Syllabus, Popsicles, Day-to-day class structure
	Watch *Cosmic Voyage*: https://www.youtube.com/watch?v=qxXf7AJZ73A
	AN: Math Review, Section 3 — http://www.astronomynotes.com/mathrev/s3.htm
	AN: Chapter 1, all sections — http://www.astronomynotes.com/chapter1/
	WA: http://en.wikipedia.org/wiki/Scientific_notation
	WA: http://en.wikipedia.org/wiki/Names_of_large_numbers
	LT: Sun size (105-107), Milky Way Scales (123-125)
	Week 2 – Patterns in the Sky
	AN: Chapter 3, all sections EXCEPT Angles, Coordinates, Planetary Motions
	AN: – http://www.astronomynotes.com/nakedeye/chindex.htm
	WA: http://en.wikipedia.org/wiki/Celestial_sphere
	WA: http://en.wikipedia.org/wiki/Circumpolar_star
9/8	LT: Position, Motion
	LT: Seasonal Stars
	WA: http://en.wikipedia.org/wiki/Sidereal_day
	("Sidereal time and solar time" section only)
9/13	LT: Solar vs. Sidereal Day, Ecliptic
	WA: http://en.wikipedia.org/wiki/Moon_phases
	LT: The Cause of Moon Phases, Predicting Moon Phases
	LT: Path of the Sun
	WA: http://en.wikipedia.org/wiki/Seasons
	LT: Seasons
	AN: Chapter 4, section on Kepler's Laws of Planetary Motion
	AN: – http://www.astronomynotes.com/history/s7.htm#A5
	LT: Kepler's Second Law
	LT: Kepler's Third Law
	Week 3 – Gravity, Light, Midterm Exam
	AN: Chapter 5, all sections – http://www.astronomynotes.com/gravappl/chindex.htm
	(AN: Chapter 6, all sections – http://www.astronomynotes.com/relativity/chindex.htm)

Date	Topic/Assignments
	LT: Newton's Laws and Gravity
	Review Session
	Midterm Exam 1 – Scales, Patterns in the Sky, Gravity
	AN: Chapter 11, section 4 only – http://www.astronomynotes.com/starprop/s4.htm
	WA: http://en.wikipedia.org/wiki/Magnitude_(astronomy)
	WA: http://en.wikipedia.org/wiki/Apparent_magnitude
	WA: http://en.wikipedia.org/wiki/Absolute_magnitude (Introduction and prologue to
	WA: Stars and Galaxies sections only)
	LT: Apparent and Absolute Magnitudes of Stars
	AN: Chapter 7, sections 1–3 – http://www.astronomynotes.com/light/chindex.htm
	LT: Electromagnetic Spectrum of Light
	LT: Telescopes and Earth's Atmosphere
	AN: Chapter 7, section 4 – http://www.astronomynotes.com/light/s4.htm
	LT: Blackbody Radiation
	LT: Types of Spectra
	AN: Chapter 7, sections 7–10 – http://www.astronomynotes.com/light/chindex.htm
	LT: Light and Atoms
	Week 4 – Nature of Light, Evolution and Structure of the Solar System,Stars, exam
	LT: Analyzing Spectra
	LT: Doppler Shift
	LT: Observing Retrograde Motion
	WA: http://en.wikipedia.org/wiki/Solar_system
	WA: http://en.wikipedia.org/wiki/Portal:Solar_System
	LT: Temperature and Formation of Our Solar System
	WA: http://en.wikipedia.org/wiki/Extrasolar_planets (esp. Detection Methods section)
	LT: Motion of Extrasolar Planets
	AN: Chapter 9, section 1-12
	Watch *"The Great Planet Debate"* between Niel DeGrasse Tyson and Mark Sykes, moderated by Ira Flato
	Review Session
	Midterm Exam 2 – Solar System
	AN: Chapter 11, sections 1–11 – http://www.astronomynotes.com/starprop/chindex.htm
	LT: Luminosity, Temperature, and Size

Date	Topic/Assignments
	Week 5 - Sun and Stars
	AN: Chapter 11, sections 12–15 – http://www.astronomynotes.com/starprop/chindex.htm
	LT: H-R Diagram
	AN: Chapter 12, all sections – http://www.astronomynotes.com/starsun/chindex.htm
	LT: Star Formation and Lifetimes
	AN: Chapter 13, all sections – http://www.astronomynotes.com/evolutn/chindex.htm
	LT: Stellar Evolution
	Week 6 – Stars and Milky Way, Exams
	LT: Parallax and Distance
	AN: Chapter 15, all sections – http://www.astronomynotes.com/galaxy/chindex.htm
	LT: Galaxy Classification
	AN: Chapter 16, all sections – http://www.astronomynotes.com/cosmolgy/chindex.htm
	LT: Looking at Distance Objects
	LT: Expansion of the Universe
	Big Bang
	Dark Matter
	Dark Energy
	Finals Week