Topics in Astronomy: Space Physics, PHYS 4610.001

Spring 2026: Lecture: PHYS 112, MW 3:00-4:20 PM

Instructor Information

Dr. Rebekah Purvis, she/her
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Office: Physics Building, Room 209E
Office Hours: Th 2-3 pm

Course Description and Objectives

This course is an introduction to space physics. Topics include: the Sun, the inner heliosphere, the outer heliosphere, the Sun-Earth connection, space weather throughout the solar system, space exploration, and space policy. No prior computational experience is required. Physics topics include mechanics, electricity and magnetism, thermodynamics, nuclear and atomic physics, plasma physics, fluid dynamics, and particle acceleration.

Objectives:

This course fosters skills associated with:

1. Critical thinking – analysis, evaluation, and synthesis of information
2. Effective communication – development, interpretation, and expression of ideas through written, oral, and graphical means
3. Quantitative skills – the ability to compute and manipulate quantitative data and reach meaningful conclusions
4. Teamwork – the ability to consider different points of view and to work effectively as a team

Required/Recommended Materials

Required:

- A laptop or desktop with admin privileges to download software
- This course has digital components. To fully participate in this class, students will need a computer or tablet with internet access to reference content on the Canvas Learning Management System. If circumstances change, you will be informed of other technical needs to access course content. Information on how to be successful in a digital learning environment can be found at Learn Anywhere (https://online.unt.edu/learn). Note: There are computers in the PIC (209) for use during regular PIC hours (posted outside door).

Recommended:

- A scientific calculator
- Digital or paper notebook to organize notes, ideas, and projects

How to Succeed in this Course

1. Come to class and pay attention. Communicate with your teacher and classmates to help you process new information and connect to previous knowledge.
2. Prioritize exploration in and out of the classroom. Time spent researching a topic and thinking about possibilities is where you really learn how to apply the physics you learned in previous courses.
3. Practice. It is very important to keep up with readings and data collection. When you read books and papers, ask yourself what you are supposed to be learning and try to identify what you don't understand.
4. Get help right away when you need it. Office hours are free help sessions!

I plan to provide all important course announcements in lecture, but there may be times that I need to communicate something to you before the next lecture. I will utilize Canvas Announcements for this, so be sure to have your notifications turned on.

Course Expectations:

As the instructor in this course, I am responsible for

- providing course materials that will assist and enhance your achievement of the stated course goals, guidance,
- providing timely and helpful feedback within the stated guidelines, and
- assisting in maintaining a positive learning environment for everyone.

As a student in this course, you are responsible for

- reading and completing all requirements of the course in a timely manner,
- working to remain attentive and engaged in the course and interact with your fellow students, and
- assisting in maintaining a positive learning environment for everyone.

I value the many perspectives students bring to our campus. Please work with me to create a classroom culture of open communication, mutual respect, and inclusion. All discussions should be respectful and civil. Although disagreements and debates are encouraged, personal attacks are unacceptable. Together, we can ensure a safe and welcoming classroom for all. If you ever feel like this is not the case, please stop by my office and let me know. We are all learning together.

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Access website (http://www.unt.edu/oda). You may also contact ODA by phone at (940) 565-4323.

Assessing Your Work and Course Structure

Your final grade will be calculated as follows:

In class activities	40%
Historical Event Project	15%
Space Exploration Project	15%
CCMC Modeling Challenge Project	15%
Space Weather Monitoring	15%

Late work is not accepted. Extra credit will be available and posted in the "Extra Credit Opportunities" module in Canvas.
Letter grades are assigned as follows:
A = 90.0 to 100 B = 80.0 to 89
C = 70.0 to 79 D = 60.0 to 69
F = below 60

In class activities

In this course you will participate in data collection (through a variety of methods, including data mining and citizen science), data analysis, discussions, and debates. These activities may be in groups or as an individual. Problem solving is an important component of learning science. Short problems sets will be assigned throughout the course that will require numerical solutions. Unless told specifically, your solutions can be analytical or computational.

In class activities may be assessed formally or informally, including peer-reviews and evaluations.

Projects

In lieu of quizzes/exams, you will complete projects from each major unit. Details of these projects will be provided later in the semester.

Academic Integrity

To create a culture of trust in this class, we must all agree to have academic integrity. What does that mean, exactly? We will establish the rules together.

Statement on use of AI in this course

Students in my physics and astronomy courses have shared that they like to use GenAI as a partner in learning. Students shared that they have conversations by asking questions ("Was there ever water on the surface of Mars?") or get help with math by giving it a specific question ("How do you find the acceleration of an object with a mass of 2 kg that experiences a net force of 10 Newtons?"). While I am somewhat confident that GenAI will give you correct answers to these questions, I have seen examples where it gives super wrong answers or the correct answer with incorrect or confusing steps. So, while I encourage you to use this tool to help you study, maintain a critical eye, ask it to give you sources, and reach out if the information you get seems to contradict something we learned in class or does not make sense.

Writing in this course: you may use a tool to check your original written work for grammar/clarity. It is my expectation that the materials you submit in this course are your original work with proper citations.

I will always disclose how I use GenAI, and I expect the same from you. In accordance with the UNT Honor Code, unauthorized use of GenAI tools is prohibited. Using GenAI content without proper credit or substituting your own work with GenAI undermines the learning process and violates academic integrity. If you're unsure whether something is allowed, please seek clarification.

Please refer to the Academic Integrity Policy (PDF) (https://policy.unt.edu/policy/06-049).

Course Schedule

Physics 4610 Calendar Spring 2026 (May be revised as necessary)

Weeks 1-2	1/12 – 1/21	The Sun and charged particles Intro to space exploration Colloquium Speaker Tues, Jan 20 3:30-4:30 pm
Weeks 3-6	1/26 – 2/18	The heliosphere Space missions and space policy Space Exploration Project
Weeks 7-11	2/23 – 4/1	The magnetosphere Space weather Historical Event Project
Weeks 12-14	4/6 – 4/22	CCMC Modeling Challenge
Week 15	4/27 – 4/29	Presentations – Space Weather Monitoring

There is no final exam in this course