

**University Physics -II: PHYS 2326**  
**Spring 2025 Syllabus**

**Lecture**

**Meeting Times:** MW 11 AM to 12:15 PM — **Location:** online

**Instructor:** Anirban Bhattacharjee

**Office:** WSB317 — **Email:** axb14ku@sulross.edu — **Office Hours:** By  
**appointment, Online only**

### **Course Description:**

University Physics -2 is a calculus based survey course in general physics. Emphasis is placed upon the concepts of physics rather than mathematical relationships. It provides a broad introduction to Physics including: (1) Electricity and Magnetism; (2) Temperature, heat and thermal properties of matter; (3) Optics; (4) Atomic Physics;

### **Resources:**

#### **Required:**

<https://openstax.org/details/books/university-physics-volume-2>

Loose-leaf paper – for in-class assignments

A simple scientific calculator

#### **Optional:**

University Physics(12th Ed./13rd Ed.) by

Francis W. Sears, Hugh D. Young, Mark Zemansky, and Roger A Freedman.

Schaum's Outline of College Physics, 11th Edition (Schaum's Outline Series) by

Frederick Bueche & Eugene Hecht

ht

### **Course Objectives:**

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 basic concept of Electricity, Magnetism, Thermodynamics and Optics.
- Describe how data is collected from experiments, and what quantities can be measured/inferred, and formulate conclusions from the results of those experiments.
- Understand basic - yet crucial - physical laws, and the processes that govern natural events
- Integrate concepts from maths and physics to explain relationships and able to converse with other students using proper scientific terminology.

### Instructional Philosophy of the Course:

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

*-Active engagement with nearly daily group activities.* It is a demonstrated fact that you can only learn a limited amount of information from lecture alone, no matter how clear or entertaining. Therefore, this course is composed of a series of mini-lectures. In order to nurture a collaborative and productive environment, I will insist that **all electronic devices** be **turned off** during the class. Communication with the outside world during class will be considered disruptive and disrespectful to the rest of the students (and could also be considered cheating – see **Academic Honesty**). Anyone caught using any of these devices during class will be asked to **leave**.

*-Attendance at all classes is expected and very strongly encouraged.* Because this course is built around daily activities to accompany the lecture, your attendance and full participation at each class period will be an essential component of your success in the course. Periodically we will administer unscheduled questionnaires in class that will be collected during class and used to establish a participation grade. These questionnaires will not be given a letter or numeric grade, rather you will be given credit for what you complete on an all or nothing basis. I will be keeping attendance throughout the course, not necessarily for grading purposes (though good attendance can help you in borderline grade cases) but mostly because it is helpful for me when evaluating myself to know what attendance was like.

*-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. Therefore, it is imperative to your success in this course that you complete the assigned readings prior to coming to class. 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.

### 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).

The portion of the grade in the lecture section will come from three sources: (1) Exams, (2) Presentation, and (3) Homework. Exams will account for 50% of the final grade. There will be four exams. The top three will count toward the grade (50% each) and **the lowest score will be dropped**. There will be no make ups for the exams and all of them are mandatory. These exams can be part in-class and take home. The exams will test your understanding of key concepts in physics. A list of these concepts can be found in this syllabus. Along with each exam, we will also ask for opinions regarding what you like, dislike, and ask for suggestions for improving the class.

Homework will be 40% of the final grade. Regular Homework will be assigned throughout the semester. You will be asked to make a presentation on a topic we will be covering during the class. This presentation will happen during the last month of classes and will last for 15 minutes plus 5 minutes will be devoted for questions from the audience. In addition you will be asked to write a one-page summary which will highlight the key points covered in your presentation. This presentation will be 10% of your final grade. As mentioned above in the **Instructional Philosophy of the Course** section, I will periodically ask you to write a short paragraph on loose-leaf paper in class on a topic of our choosing. The topic may be related to the assigned reading, to a current event in physics, or to a key concept covered in that class period. These will be collected and perused by the instructors. Answers demonstrating a command of the assigned reading or concepts will be given full credit. No numerical or letter grade will be assigned to these questionnaires. In cases of university-sanctioned excused absences (e.g., university athletics, religious holidays), it is up to you to inform me of the absence **well in advance of the date**, supplying both the dates and your name. If have done so and there are quizzes on those dates, you will not be penalized for missing them.

The final grade will be computed using the scores from the top three midterm exams, HWs, and participation and class presentation in the following manner:

Grading Scheme	
Total Points	Grade
90–100	A
80–89.999...	B
70–79.999...	C
60–69.999...	D
<59.9999	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.

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.

### 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.

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.

### **1. Students with Special Needs:**

Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the Student's responsibility to initiate a request. Please contact me, Ms. Rebecca Greathouse Wren, M.Ed., LPC-S, Director/Counselor, Accessibility Services Coordinator, Ferguson Hall (Suite 112) at 432.837.8203; mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas 79832. Students should then contact the instructor as soon as possible to initiate the recommended accommodations.

## Tentative Schedule of Topics, Assignments, and Exams

Topic/Assignments
Week 1 – Introductions & wave
Introductions, wave, Sound
Week 2 – Thermodynamics
Doppler Shift Introduction to Thermodynamics, history Temperature, Coefficients of expansion
Week 3 – Thermodynamics cont.
Heat Transfer, Laws of Thermodynamics Engines
Week 4 – Thermodynamics cont.
Entropy History of electricity Electrostatics
Week 5 – Electrocity
Charges, Inverse Square Law, Electric Field, Potential
Week 6 – Review and Midterm Exam
Review Session Mid-term 1 Capacitor
Week 7 – Capacitors
Capacitors, Introduction to Inductors and Resistor Current
Week 8 – Electricity
Ohm's Law Resistivity Kirchoff's Laws

Topic/Assignments
Week 9 – Magnetism and Review
History, Magnetic Field Magnetic Force, Torque, Earth's Magnetic Field Review
Week 10 – Mid-Term and Electromagnetism
Midterm Charge in a magnetic field, Faraday's Law and Lenz's Law
Week 11 – Electromagnetism
Varying Electric Fields, Generators, Motional EMF RL, LC, RLC circuits.
Week 12 –Electromagnetism
AC currents and Circuits, Power, Transformers Maxwells Prediction and Laws, EM waves and light
Week 13 – Midterm and Review
Diffraction Reflection , Refraction Mid-Term
Week 14 –Optics
Polarization Interference, Quantum Nature of Light
Week 15 – Modern Physics
Atomic Physics Quantum Physics
Week 16 –Exam