



Physics (PHYSICS) 1B Syllabus

Course Name

PHYSICS 1B

Physics I – Semester B

Course Information

PHYSICS 1B is the second semester of this two-semester course.

This course will provide students with opportunities to learn and practice critical scientific skills within the context of relevant scientific questions. Topics include the nature of science, math for physics, energy, kinetics, force and motion, momentum, gravitation, chemistry for physics, thermodynamics, electricity, magnetism, waves, nuclear physics, quantum physics, and cosmology.

Scientific inquiry skills are embedded in the instruction, wherein students learn to ask scientific questions, form and test hypotheses, and use logic and evidence to draw conclusions about the concepts. Lab activities reinforce critical thinking, writing, and communication skills and help students develop a deeper understanding of the nature of science.

Prerequisites

This course is recommended for students in Grades 9-12.

Course Delivery Method

Online. You will access the course by logging into your Blackboard course and clicking the link to the course content (Apex link inside the course).

Contacting Your Instructor

You may contact your instructor through the Blackboard messaging system. Technical support is available 24/7 at [TTU K-12](#).

Course Objectives

After completing this course, you should be able to:

1. conduct investigations using safe, environmentally appropriate, and ethical practices;
2. use a systematic approach to answer scientific laboratory and field investigative questions;
3. use critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom;
4. know and apply the laws governing motion in a variety of situations;
5. understand the nature of forces in the physical world; and
6. understand that changes occur within a physical system and apply the laws of conservation of energy and momentum.

PHYSICS I addresses the required Texas Essential Knowledge and Skills (TEKS). These can be found at the [Texas Education Agency](#) website.

Textbook and Materials

Textbook(s)

- No required textbooks
- All course material is found within the Blackboard course

Materials

- No additional materials are required.

Technical Requirements

- Internet access – preferably high speed (for accessing Blackboard)
- Email
- Word processing software such as Microsoft Word
- Adobe Reader (download from [Adobe.com](#))
- Audio and video capabilities (for watching/listening to course content)

Technical Skill Requirements

Be comfortable with the following:

- using a word processor
- Internet search engines and browsers

Course Organization

This course consists of five units with corresponding practice activities, labs, end-of-unit questions, unit quizzes, and a final exam. All lessons will be submitted electronically.

Each lesson contains the following:

- Introduction and Instructions
- Learning Objectives and Curriculum Standards
- Learning Activities
- Assignments

Each lesson includes several activities that present content knowledge. Each lesson also includes multiple graded assignments to ensure that you learn the content that has been presented in the activities. Some of the assignments are automatically-graded quizzes, and some are written assignments or activities that your instructor will grade. Be sure you read all instructions carefully and ask your instructor for help if something is not clear.

Course Outline

Please note that some assignments will be hidden from you when you start the course. As you move through the lessons and complete assignments, more will unlock for you. Items with an asterisk (*) indicate that these are summative assessments for the course.

Unit	Topic	Approximate Time for Completion
Unit 1	Chemical Physics	Three weeks
Lesson 1	Chemistry for Physics	
Lesson 2	Introduction to States of Matter	
Lesson 3	Doing Science: Chemical Physics	
Lesson 4	Wrap-Up	
Unit 2	Thermodynamics	Three weeks
Lesson 1	Laws of Thermodynamics	
Lesson 2	Energy Change	
Lesson 3	Doing Science: Thermodynamics	
Lesson 4	Wrap-Up	
Unit 3	Electricity and Magnetism	Three weeks
Lesson 1	Electricity	
Lesson 2	Electrical Circuits	

Unit	Topic	Approximate Time for Completion
Lesson 3	Magnetism and Electromagnetism	
Lesson 4	Doing Science: Electricity and Magnetism	
Lesson 5	Wrap-Up	
Midterm Exam	*Midterm Exam	
	Covers Units 1-3	
Unit 4	Waves	Three weeks
Lesson 1	Introduction to Wave Motion	
Lesson 2	Sound and Light	
Lesson 3	Optics	
Lesson 4	Doing Science: Waves	
Lesson 5	Wrap-Up	
Unit 5	Modern Physics	Three weeks
Lesson 1	Nuclear Physics	
Lesson 2	Quantum Physics	
Lesson 3	Cosmology	
Lesson 4	Doing Science: Modern Physics	
Lesson 5	Wrap-Up	
Unit 6	Semester Review & Wrap-Up	Three weeks
Lesson 1	Review – Semester 2	
Final Exam	*Final Exam (Covers Units 1-5)	

Course Detailed Description

1. Unit Overview: Chemical Physics

1.1. Lesson Overview: Chemistry for Physics

1.1.1. Study: Atomic Structure and the Periodic Table

Learn about the structure of an atom; learn how to use the periodic table to find information about atoms; learn about the history of atomic theory.

Duration: 45 mins

1.1.2. Quiz: Atomic Structure and the Periodic Table

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

1.1.3. Study: Chemical Bonds

Learn how molecules are different from atoms; learn how molecules form; learn how molecules bond to other molecules.

Duration: 45 mins

1.1.4. Quiz: Chemical Bonds

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

1.1.5. Journal: Elements in Daily Life

Write about topics in physics that connect to daily life.

Duration: 40 mins; Scoring: 20 points

1.2. Lesson Overview: Introduction to States of Matter

1.2.1. Study: Movement in Matter

Learn about the various states of matter in terms of kinetic molecular theory; learn why molecules move and how their movements can be measured.

Duration: 45 mins

1.2.2. Quiz: Movement in Matter

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

1.2.3. Study: Fluid Dynamics and Buoyancy

Learn about and apply Archimedes' and Bernoulli's principles; learn about and apply Pascal's principle; learn about the unique properties of water.

Duration: 45 mins

1.2.4. Quiz: Fluid Dynamics and Buoyancy

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

1.2.5. Practice: Chemical Physics

Practice problem-solving skills related to concepts in the lesson.

Duration: 1 hr 30 mins; Scoring: 25 points

1.3. Lesson Overview: Doing Science: Chemical Physics

1.3.1. Study: The People of Science

Learn about the process of scientific inquiry.

Duration: 40 mins

1.3.2. Quiz: The People of Science

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

1.3.3. Lab: Fluids

Use scientific methods and skills to perform a lab experiment.

Duration: 1 hr 30 mins; Scoring: 50 points

1.3.4. Discuss: Fluids Lab

Discuss the results of your lab.

Duration: 20 mins; Scoring: 15 points

1.4. Lesson Overview: Chemical Physics Wrap-Up

1.4.1. Review: Unit Review

Prepare for the unit test by reviewing key concepts and skills.

Duration: 30 mins

Unit 1 Checklist Assignment – to be completed in Blackboard

Unit 1 Test – to be completed in Blackboard

2. Unit Overview: Thermodynamics

2.1. Lesson Overview: Laws of Thermodynamics

2.1.1. Study: Potential Energy in Chemical Reactions

Learn what enthalpy and entropy are; learn the difference between exothermic and endothermic reactions; learn how to draw a potential energy diagram for a chemical reaction.

Duration: 45 mins

2.1.2. Quiz: Potential Energy in Chemical Reactions

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

2.1.3. Study: First Law of Thermodynamics

Learn about the first and second laws of thermodynamics and how to apply them; learn about differences between open, closed, and isolated systems.

Duration: 45 mins

2.1.4. Quiz: First Law of Thermodynamics

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

2.1.5. Study: Second Law of Thermodynamics

Learn how to compare and contrast different methods of heat flow.

Duration: 45 mins

2.1.6. Quiz: Second Law of Thermodynamics

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

2.2. Lesson Overview: Energy Change

2.2.1. Study: Heat Flow

Learn how work is done in a heat engine and what factors affect its efficiency.

Duration: 45 mins

2.2.2. Quiz: Heat Flow

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

2.2.3. Study: Heating, Cooling, and Phase Changes

Learn how to solve problems using specific heat capacity and latent heat values; learn how to determine the final temperature when two objects of different temperatures are in contact.

Duration: 45 mins

2.2.4. Quiz: Heating, Cooling, and Phase Changes

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

2.2.5. Practice: Thermodynamics

Practice problem-solving skills related to concepts in the lesson.

Duration: 1 hr 30 mins; Scoring: 25 points

2.2.6. Journal: Endothermic and Exothermic Reactions

Write about topics in physics that connect to daily life.

Duration: 40 mins; Scoring: 20 points

2.3. Lesson Overview: Doing Science: Thermodynamics

2.3.1. Study: Scientific Models

Learn about the process of scientific inquiry.

Duration: 40 mins

2.3.2. Quiz: Scientific Models

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

2.3.3. Lab: Thermodynamics

Use scientific methods and skills to perform a lab experiment.

Duration: 1 hr 30 mins; Scoring: 50 points

2.3.4. Discuss: Thermodynamics Lab

Discuss the results of your lab.

Duration: 20 mins; Scoring: 15 points

2.4. Lesson Overview: Thermodynamics Wrap-Up

2.4.1. Review: Unit Review

Prepare for the unit test by reviewing key concepts and skills.

Duration: 30 mins

Unit 2 Checklist Assignment – to be completed in Blackboard

Unit 2 Test – to be completed in Blackboard

3. Unit Overview: Electricity and Magnetism

3.1. Lesson Overview: Electricity

3.1.1. Study: Electrostatics

Learn how to determine the force between two electric charges; learn how to calculate an electric field; learn how to use the right-hand rule to determine the direction of an electric force.

Duration: 45 mins

3.1.2. Quiz: Electrostatics

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.1.3. Study: Electrical Potential and Capacitance

Learn the difference between an electric field; potential energy; potential difference; and capacitance; learn how to perform calculations on electrical systems using these concepts.

Duration: 45 mins

3.1.4. Quiz: Electrical Potential and Capacitance

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.2. Lesson Overview: Electrical Circuits

3.2.1. Study: Current and Resistance

Learn about relationships between current; voltage; resistance; and power; learn how to solve problems using Ohm's law and how to calculate energy dissipation in a resistor.

Duration: 45 mins

3.2.2. Quiz: Current and Resistance

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.2.3. Study: Series Circuits

Learn how to diagram series circuits; learn how to determine the current; resistance; or voltage in a circuit; differentiate between complete; open; and short circuits.

Duration: 45 mins

3.2.4. Quiz: Series Circuits

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.2.5. Study: Parallel and Combined Circuits

Learn how to diagram parallel and combined circuits; learn how to determine the current; resistance; or voltage in a parallel circuit.

Duration: 45 mins

3.2.6. Quiz: Parallel and Combined Circuits

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.2.7. Journal: Circuits in Your Home

Write about topics in physics that connect to daily life.

Duration: 40 mins; Scoring: 20 points

3.3. Lesson Overview: Magnetism and Electromagnetism

3.3.1. Study: Magnetism

Learn about properties of magnetic fields.

Duration: 45 mins

3.3.2. Quiz: Magnetism

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.3.3. Study: Electromagnetism

Learn how magnetic fields can produce electric fields, and vice versa; learn about properties of electromagnetic waves.

Duration: 45 mins

3.3.4. Quiz: Electromagnetism

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.3.5. Practice: Electricity and Magnetism

Practice problem-solving skills related to concepts in the lesson.

Duration: 1 hr 30 mins; Scoring: 25 points

3.4. Lesson Overview: Doing Science: Electricity and Magnetism

3.4.1. Study: Testing Scientific Solutions

Learn about the process of scientific inquiry.

Duration: 40 mins

3.4.2. Quiz: Testing Scientific Solutions

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

3.4.3. Lab: Circuit Building

Use scientific methods and skills to perform a lab experiment.

Duration: 1 hr 30 mins; Scoring: 50 points

3.4.4. Discuss: Circuit Building

Discuss the results of your lab.

Duration: 20 mins; Scoring: 15 points

3.5. Lesson Overview: Electricity and Magnetism Wrap-Up

3.5.1. Review: Unit Review

Prepare for the unit test by reviewing key concepts and skills.

Duration: 30 mins

Unit 3 Checklist Assignment – to be completed in Blackboard

Unit 3 Test – to be completed in Blackboard

Midterm Exam (Covers Units 1-3) – to be completed in Blackboard

4. Unit Overview: Waves

4.1. Lesson Overview: Introduction to Wave Motion

4.1.1. Study: Introduction to Waves

Learn about different types of waves; about properties of waves; and about how waves move; learn how to solve problems involving wave speed; frequency; and wavelength.

Duration: 45 mins

4.1.2. Quiz: Introduction to Waves

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

4.1.3. Study: Wave Interactions

Learn about how waves interact with media and with other waves; learn the differences between constructive and deconstructive interference.

Duration: 45 mins

4.1.4. Quiz: Wave Interactions

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

4.2. Lesson Overview: Sound and Light

4.2.1. Study: Sound

Learn about the properties of sound waves; about the Doppler effect with respect to sound waves; and about practical applications of sound waves in technology and engineering.

Duration: 45 mins

4.2.2. Quiz: Sound

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

4.2.3. Study: Light

Learn about the regions of the electromagnetic spectrum and how electromagnetic waves travel; learn how to solve problems involving electromagnetic wave speed; frequency; and wavelength; learn about engineering applications of electromagnetic waves.

Duration: 45 mins

4.2.4. Quiz: Light

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

4.2.5. Journal: Sounds You Hear

Write about topics in physics that connect to daily life.

Duration: 40 mins; Scoring: 20 points

4.3. Lesson Overview: Optics

4.3.1. Study: Introduction to Optics

Learn how to draw and interpret ray diagrams; learn about the process of image formation; learn how light reflects and refracts.

Duration: 45 mins

4.3.2. Quiz: Introduction to Optics

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

4.3.3. Study: Lenses and Mirrors

Learn how to solve problems using lens and mirror equations.

Duration: 45 mins

4.3.4. Quiz: Lenses and Mirrors

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

4.3.5. Practice: Waves

Practice problem-solving skills related to concepts in the lesson.

Duration: 1 hr 30 mins; Scoring: 25 points

4.4. Lesson Overview: Doing Science: Waves

4.4.1. Study: Applications of Electromagnetic Radiation

Learn about the process of scientific inquiry.

Duration: 40 mins

4.4.2. Quiz: Applications of Electromagnetic Radiation

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

4.4.3. Lab: Optics

Use scientific methods and skills to perform a lab experiment.

Duration: 1 hr 30 mins; Scoring: 50 points

4.4.4. Discuss: Optics Lab

Discuss the results of your lab.

Duration: 20 mins; Scoring: 15 points

4.5. Lesson Overview: Waves Wrap-Up

4.5.1. Review: Unit Review

Prepare for the unit test by reviewing key concepts and skills.

Duration: 30 mins

Unit 4 Checklist Assignment – to be completed in Blackboard

Unit 4 Test – to be completed in Blackboard

5. Unit Overview: Modern Physics

5.1. Lesson Overview: Nuclear Physics

5.1.1. Study: Nuclear Structure

Learn how competing forces within the nucleus determine its stability; learn how to differentiate between nuclear and chemical reactions; learn how to apply Einstein's mass-energy equivalence formula to nuclear reactions.

Duration: 45 mins

5.1.2. Quiz: Nuclear Structure

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

5.1.3. Study: Radioactivity and Half-Life

Learn about the processes of radioactive decay and the factors that determine the level of danger from various radiation sources; learn how to solve problems using half-life calculations; learn about useful and peaceful applications for nuclear processes.

Duration: 45 mins

5.1.4. Quiz: Radioactivity and Half-Life

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

5.1.5. Study: Fission and Fusion

Learn about fission and fusion; learn about common examples of each; learn how forces in the nucleus affect the likelihood of fission or fusion occurring.

Duration: 45 mins

5.1.6. Quiz: Fission and Fusion

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

5.2. Lesson Overview: Quantum Physics

5.2.1. Study: Atomic Physics and Quantization

Learn about the dual nature of light and key experiments that led to the current understanding of the nature of light; learn about the concept of quantization.

Duration: 45 mins

5.2.2. Quiz: Atomic Physics and Quantization

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

5.2.3. Study: Introduction to Relativity

Learn about the importance of the concept of relativity and the difference between general and special relativity; learn about the connection between Newton's laws and Einstein's special theory of relativity; learn about the difference between quantum and Newtonian mechanics.

Duration: 45 mins

5.2.4. Quiz: Introduction to Relativity

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

5.3. Lesson Overview: Cosmology

5.3.1. Study: Cosmology

Learn about the development of the big bang theory.

Duration: 45 mins

5.3.2. Quiz: Cosmology

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

5.3.3. Journal: What Do You Think about the Big Bang?

Write about topics in physics that connect to daily life.

Duration: 40 mins; Scoring: 20 points

5.3.4. Practice: Modern Physics

Practice problem-solving skills related to concepts in the lesson.

Duration: 1 hr 30 mins; Scoring: 25 points

5.4. Lesson Overview: Doing Science: Modern Physics

5.4.1. Study: Evaluating Scientific Claims

Learn about the process of scientific inquiry.

Duration: 40 mins

5.4.2. Quiz: Evaluating Scientific Claims

Take a quiz to assess your understanding of the material.

Duration: 20 mins; Scoring: 20 points

5.4.3. Lab: Nuclear Physics

Use scientific methods and skills to perform a lab experiment.

Duration: 1 hr 30 mins; Scoring: 50 points

5.4.4. Discuss: Nuclear Physics Lab

Discuss the results of your lab.

Duration: 20 mins; Scoring: 15 points

5.5. Lesson Overview: Modern Physics Wrap-Up

5.5.1. Review: Unit Review

Prepare for the unit test by reviewing key concepts and skills.

Duration: 30 mins

Unit 5 Checklist Assignment – to be completed in Blackboard

Unit 5 Test – to be completed in Blackboard

6. Unit Overview: Semester 2 Review and Exam

6.1. Lesson Overview: Semester 2 Review and Exam

6.1.1. Review: Semester 1

Prepare for the final exam by reviewing key concepts and skills.

Duration: 1 hr

Final Exam (Covers Units 1-5) – to be completed in Blackboard

Course Credit

Each lesson will consist of completing and submitting one or more assignments. The **Assignment** sections at the end of each lesson will specifically detail what to complete and submit for each lesson. Assignments may include quizzes (multiple choice, true/false, matching), essay or short answer questions, written assignments, laboratory experiments, and/or offline activities.

The course grade will be calculated as follows:

- 50% coursework average;

- 50% summative assessment average, including the final exam;
- A passing course grade is 70 or higher.

Students must attempt all assignments in the course. The final exam will not be available until all assignments have been accepted and graded by the teacher.

Students who score below 70% on the final exam will be eligible for one re-exam opportunity.

Coursework

The graded assignments within each lesson are formative in nature. This means that they are designed to assist you in applying and demonstrating the lesson concepts, as well as identifying areas in which you need additional review. You may use all the lesson's learning activities to assist you as you complete the graded assignments.

Summative Assessments

Summative assessments are those that allow you to demonstrate mastery of the course objectives. For summative assessments, you will NOT be allowed to use the learning materials. These are opportunities for you to show what you have learned by that point in the course.

Summative assessments may be proctored using the online proctoring system Proctorio. Information about Proctorio is provided in **Remote Proctoring** in the Syllabus section of your course. The summative assessments for this course are as follows:

- Summative Assessments (**20% of Course Grade**)
 - Midterm Exam
- Summative Final Exam (**30% of Course Grade**)

Course Completion

- Students may not complete the course in less than 30 days.
- All courses expire six months after the enrollment date.

Academic Integrity

It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension.

“Scholastic dishonesty” includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of

essentially the same written assignment for two courses without the prior permission of the instructor) or the attempt to commit such an act.

Student Expectations

You will be expected to log into the Blackboard course regularly to be aware of possible announcements/reminders and to pace your progress in the course.

Students are expected to maintain an online environment conducive to learning, which includes “netiquette” (Internet etiquette). Please review the basic rules for [Online Discussion Netiquette](#). Ensure that your email messages, discussion board postings, and other electronic communications are thoughtful and respectful. Diverse opinions are welcome in this course, and you are expected to demonstrate an open mind and courtesy when responding to the thoughts and ideas of others.

The following are prohibited:

- making offensive remarks in email or the discussion board;
- using inappropriate language or discussing inappropriate topics online;
- spamming;
- hacking;
- using TTU or Blackboard email or discussion boards for commercial purposes;
- using all caps (considered shouting in online communications); and
- cyber-bullying or online harassment of any type.

Inappropriate behavior shall result in consequences ranging from a request to correct the problem, to removal from the course or even the university, depending on the severity of the behavior. Disciplinary actions will be taken according to the TTU K-12 Student Handbook.

Communication

- You can expect a reply from your instructor within 2 business days.
- Use the Blackboard Course Messages tool for sending messages to your instructor.

Submitting Assignments

You will submit all assignments through the Blackboard Assignment Tool, rather than by mail or email.

Technical Difficulties

Getting Help

For student assistance with Blackboard, visit [TTU K-12 Support](#).

Computer Problems

A working computer is necessary for online coursework. Computer problems will not be accepted as a valid reason for failure to complete course activities within the allotted time frame. Identify a second computer, before the course begins, that you can use if you experience computer problems.

Server Problems

When the Blackboard server needs to be taken down for maintenance, the Blackboard administrator will post an announcement in your course informing you of the time and date. If the server experiences unforeseen problems, your course instructor will notify you.

Lost or Corrupted Files

You must keep/save a copy of every project/assignment on an external disk or personal computer. In the event of any kind of technology failure (e.g., Blackboard server crash or virus infection, students' own computer problems, loss of files in cyberspace, etc.) or any disputes, the instructor may request or require you to resubmit the files. In some instances, the instructor may need to open another attempt within Blackboard, so communication with your instructor is critical in these circumstances.