PHYS-120: GENERAL PHYSICS 1

Effective Term
Fall 2026

CC Approval
11/07/2025

AS Approval
11/13/2025

BOT Approval
11/20/2025

SECTION A - Course Data Elements

Send Workflow to Initiator
No

CB04 Credit Status
Credit - Degree Applicable

Discipline

Minimum Qualifications	And/Or
Physical Sciences (Master's Degree)	

Subject Code
PHYS - Physics
Course Number
120

Department
Physics

Division
Science and Engineering (SE)

Full Course Title
General Physics 1

Short Title
General Physics 1

CB03 TOP Code
1902.00 - Physics, General

CB08 Basic Skills Status
NBS - Not Basic Skills

CB09 SAM Code
E - Non-Occupational

Rationale
Fractional units (dangling units) fixed by re-coding the contact hours. See appended faculty comments. Updates to textbook, small language improvements throughout.

SECTION B - Course Description

Catalog Course Description
This algebra-based physics course covers mechanics, fluids, wave motion, and heat. Biological and medical applications are emphasized.

SECTION C - Conditions on Enrollment

Open Entry/Open Exit
No

Repeatability
Not Repeatable

Grading Options
Letter Grade or Pass/No Pass

Allow Audit
No

Requisites

Prerequisite(s)
Eligibility for MATH-C2210 or appropriate placement.

Requisite Justification

Requisite Description
Non-course Requisite

Level of Scrutiny
Content Review

Upon entering this course, students should be able to:
1. Analyze and investigate properties of functions.
2. Synthesize results from the graphs and/or equations of functions.
3. Graph the elementary functions, examine their basic properties, and apply transformations to the graphs of functions.
4. Recognize the relationship between functions and their inverses graphically and algebraically.
5. Solve and apply rational, linear, polynomial, radical, absolute value, exponential and logarithmic equations.
6. Solve linear, nonlinear, and absolute value inequalities.
7. Solve systems of equations.
8. Apply techniques for finding zeros of polynomials and roots of equations.
9. Apply functions and other algebraic techniques to model real world applications.
10. Analyze conic sections algebraically and graphically.
11. Use formulas to find sums of finite and infinite series.
12. Identify special triangles and their related angle and side measures.
13. Evaluate the trigonometric function of an angle in degree and radian measure.
14. Manipulate and simplify a trigonometric expression.
15. Solve trigonometric equations, triangles, and applications.
16. Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs.
17. Evaluate and graph inverse trigonometric functions.
18. Prove trigonometric identities.
19. Convert between polar and rectangular coordinates and equations.
20. Graph polar equations.
21. Calculate powers and roots of complex numbers using DeMoivre's Theorem.
22. Represent a vector (a quantity with magnitude and direction) in the form and ai+bj.

SECTION D - Course Standards

Is this course variable unit?
No

Units
4.00

Lecture Hours
36.00

Lab Hours
54.00

Activity Hours
36.00

Outside of Class Hours
90

Total Contact Hours
126

Total Student Hours
216

Distance Education Approval

Is this course offered through Distance Education?
Yes

Online Delivery Methods

DE Modalities	Permanent or Emergency Only?
Entirely Online	Permanent
Hybrid	Permanent
Online with Proctored Exams	Permanent

SECTION E - Course Content

Student Learning Outcomes

	Upon satisfactory completion of the course, students will be able to:
1.	Solve problems qualitatively and communicate reasoning using concepts from Newtonian mechanics, thermodynamics, and wave motion.
2.	Solve quantitative problems while demonstrating a thorough understanding of the application of Newtonian mechanics, thermodynamics, and wave motion.
3.	Implement laboratory experiment techniques correctly during the investigation of the lecture topics and express the results clearly in writing.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1.	Use the units of metric measurement and be able to convert from one unit to another.
2.	Solve problems in kinematics using the concepts of velocity and acceleration.
3.	Use the trigonometric functions to solve vector problems.
4.	Analyze force and motion using Newton's Laws of Motion.
5.	Draw free body diagrams to find unknown forces.
6.	Use the concepts of centripetal force and Kepler's Laws of satellite motion to solve problems.
7.	Use the conservation of energy and momentum in solving motion and collision problems.
8.	Analyze a physical situation using concepts of work and energy.
9.	Analyze torque, angular motion, and gyroscopic motion for static and dynamic extended systems.
10.	Solve complex statics problems involving multiple forces.
11.	Analyze and solve problems in areas of simple harmonic motion and wave motion.
12.	Calculate a Doppler shift in frequency.
13.	Use the decibel to solve problems concerning the ear and hearing.
14.	Solve perfect gas law and calorimetry problems.
15.	Use the laws of thermodynamics to solve heat engine problems.
16.	Demonstrate understanding of the processes of heat transfer.

17.	Analyze real-world experimental data, including appropriate use of units and significant figures.
18.	Relate the results of experimental data to the physical concepts discussed in the lecture portion of the class.

Course Content

1. Introduction
   a. Science and creativity
   b. Physics and its relation to other fields
   c. Models, theories and laws
   d. Measurement and uncertainty
   e. Units, standards and the SI system
   f. Order of magnitude: rapid estimating
   g. Mathematics
2. Describing Motion: Kinematics in One Dimension
   a. Speed
   b. Changing units
   c. Reference frames and coordinate systems
   d. Average velocity and displacement
   e. Instantaneous velocity
   f. Vectors and scalars
   g. Acceleration
   h. Uniformly accelerated motion
   i. Falling bodies
3. Kinematics in Two or Three Dimensions: Vectors
   a. Addition of vectors-graphical methods
   b. Subtractions of vectors, and multiplication of a vector by a scalar
   c. Analytic method for adding vectors: components
   d. Relative velocity-vectors in problem solving
   e. Projectile motion
   f. Solving problems involving projectile motion
   g. Projectile motion is parabolic
4. Motion and Force: Dynamics
   a. Force
   b. Newton's first law of motion
   c. Mass
   d. Newton's second law of motion
   e. Weight-the force of gravity and the normal force
   f. Solving problems with Newton's laws: vector forces and free-body diagrams
   g. Problems involving friction, inclines
   h. Laws or definitions
   i. Problem solving - a general approach
5. Circular Motion: Gravitation
   a. Kinematics of uniform circular motion
   b. Dynamics of uniform circular motion
   c. Nonuniform circular motion
   d. Centrifugation
   e. Newton's law of universal gravitation
   f. Gravity near the earth's surface; geophysical applications
   g. Satellites and "weightlessness"
   h. Kepler's laws and Newton's synthesis
6. Work and Energy
   a. Work done by a constant force
   b. Work done by a varying force
   c. Kinetic energy and the work-energy principle
   d. Potential energy
   e. Conservative and non-conservative forces
   f. Mechanical energy and its conservation
   g. Problem solving using conservation of mechanical energy

   h. Other forms of energy; energy transformations and the law of conservation of energy
   i. Energy conservation with dissipative forces: solving problems
7. Linear Momentum
   a. Momentum and its relation to force
   b. Conservation of momentum
   c. Collisions and impulse
   d. Conservation of energy and momentum in collisions
   e. Elastic collisions in one dimension-solving problems using energy and momentum conservation
   f. Elastic collisions in two or three dimensions
   g. Inelastic collisions
   h. Center of mass
   i. Center of mass and translational motion
8. Rotational Motion
   a. Angular quantities
   b. Kinematic equations for uniformly accelerated rotational motion
   c. Torque
   d. Rotational dynamics; torque and rotational inertia
   e. Rotational kinetic energy
   f. Angular momentum and its conservation
9. Bodies in Equilibrium: Elasticity and Fracture
   a. Statics-the study of forces in equilibrium
   b. The conditions for equilibrium
   c. Solving statics problems
   d. Applications to muscles and joints
   e. Stability and balance
   f. Elasticity; stress and strain
   g. Fracture
   h. Spanning a space: arches and domes
10. Fluids
   a. Density and specific gravity
   b. Pressure in fluids
   c. Atmospheric pressure and gauge pressure
   d. Pascal's principle
   e. Measurement of pressure; gauges and the barometer
   f. Buoyancy and Archimedes' principle
   g. Fluids in motion; flow rate and the equation of continuity
   h. Bernoulli's equation
   i. Applications of Bernoulli's principle
   j. Viscosity
   k. Flow in tubes: Poiseuille's equation, blood flow, Reynolds number
   l. Object moving in a fluid; sedimentation and drag
   m. Surface tension and capillarity
   n. Pumps; the heart and blood pressure
11. Vibrations and Waves
   a. Simple harmonic motion
   b. Energy in the simple harmonic oscillator
   c. Vertical spring derivations
   d. The reference circle: the period and sinusoidal nature of SHM
   e. The simple pendulum
   f. Damped harmonic motion
   g. Forced vibrations; resonance
   h. Wave motion
   i. Types of waves
   j. Energy transported by waves
   k. Reflection and interference of waves
   l. Standing waves; resonance
   m. Refraction and diffraction
12. Sound

a. Characteristics of sound
b. Intensity of sound
c. Intensity related to amplitude and pressure amplitude
d. The ear and its response; loudness
e. Sources of sound: vibrating strings and air columns
f. Quality of sound, and noise
g. Interference of sound waves; beats
h. Doppler effect
i. Shock waves and the sonic boom
j. Applications; ultrasound and medical imaging

13. Temperatures and Kinetic Theory
    a. Atoms
    b. Temperature
    c. Thermal equilibrium and the zeroth law of thermodynamics
    d. Thermal expansion
    e. Thermal stresses
    f. The gas laws and absolute temperature
    g. The ideal gas law
    h. Problem solving with the ideal gas law
    i. Ideal gas law in terms of molecules: Avogadro's number
    j. Kinetic theory and the molecular interpretation of temperature
    k. Distribution of molecular speeds
    l. Real gases and changes of phase
    m. Vapor pressure and humidity
    n. Diffusion
14. Heat
    a. Heat as energy transfer
    b. Distinction between tempera ture, heat, and internal energy
    c. Internal energy of an ideal gas
    d. Specific heat
    e. Calorimetry-solving problems
    f. Latent heat, and problem solving
    g. Heat transfer: conduction
    h. Heat transfer: convection
    i. Heat transfer: radiation
15. The Laws of Thermodynamics
    a. The first law of thermodynamics
    b. First law of thermodynamics applied to some simple systems
    c. Human metabolism and the first law
    d. The second law of thermodynamics-introduction
    e. Heat engines
    f. Refrigerators, air conditioners, and heat pumps
    g. Entropy and the second law of thermodynamics
    h. Order to disorder
    i. Unavailability of energy; heat death
    j. Evolution and growth; "time's arrow"

Methods of Instruction

Methods of Instruction

Types	Examples of learning activities
Discussion	Classroom discussion of example problems. This may include demonstration by the instructor or student presentations on the whiteboard.
Lab	Physical and simulated laboratory experiments. Possible activities include: observation, use of equipment, data collection, data analysis, and interpretation of results.

Lecture	Presentation of course material using standard methods, for example but not limited to: speaking, work on the whiteboard, videos, lecture slides, and demonstrations.

Online Adaptation

Types	Examples of learning activities
Discussion	Synchronous or asynchronous class discussion of example problems. This may include discussion posts, demonstration of solved problems by the instructor, or students working in groups to solve problems.
Lab	Participation in lab simulations and/or analysis and observation of video experiments. Possible activities include: observation, simulated use of equipment, data collection, data analysis, and interpretation of results.
Lecture	Synchronous or asynchronous video lecture using standard methods which may include but are not limited to: speaking, lecture slides, demonstrations, and video footage of physical phenomena.

Instructor-Initiated Online Contact Types

Announcements/Bulletin Boards
Chat Rooms
Discussion Boards
E-mail Communication
Telephone Conversations
Video or Teleconferencing

Student-Initiated Online Contact Types

Chat Rooms
Discussions
Group Work

Course design is accessible

Yes

Methods of Evaluation

Methods of Evaluation

Types	Examples of classroom assessments
Exams/Tests	Exams include symbolic, numerical, conceptual, and short paragraph questions.
Projects	Projects may include submitted example problem solving generated in groups, review of student note taking, and submitted practice exam drafts.
Homework	Numerical, symbolic, and conceptual homework will be assigned in addition to written laboratory reports.
Lab Activities	Lab includes data collection, analysis, and discussion. Results are summarized in the lab report.

Assignments

Reading Assignments

Example reading assignment:

Read section 2.1-2.4 of the textbook. While reading, you should take notes on the important concepts and equations. You should try to work your way through the example problems, using the solutions as much as needed. Take care to explain the steps to yourself as you go.

Writing Assignments

Example Lab Report Requirements:

1) Cover Page (Typed): Include Your Name, Lab Exp. #, Lab Title, Date, and list of Lab Partners.

2) Procedure (Typed): In your own words describe the general procedure(s) for this experiment. The procedure can be in an outline format, paragraphs, or any other way that can best convey the procedure used to carry out the experiment, make measurements, and obtain the required results. Please: Do Not Just Copy the Procedure from the Lab Manual.

3) Data Sheet(s) Section: Include your recorded lab data sheets. Do Not Forget to include units, correct number of significant figures, and make sure your entries are legible.

4) Graph Section: Any graphs assigned are to be done on the computer with software that includes Regression Analysis by the method of least squares. The regression equation must be printed on the top of the graph. Each graph must be labeled with a Title and Axes description with units.

5) Calculations Section: Hand calculations, which includes providing units for each factor, term and results. Any conversions or geometric calculations are to be included. Intermediate calculations are to be provided. Your goal should be to write up your calculations so someone else can understand them.

6) Question Answer Section (Typed): Answers to assigned lab questions must be typed and spell checked.

7) Analysis and Conclusion (Typed): In this section, you must critically analyze your results, experiment procedure, measurement techniques, and include a conclusion that explains if the experiment objectives were met or not. Explain why or why not. You are expected to show clear logic and understanding of the final results and their physical meaning.

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SECTION F - Textbooks and Instructional Materials

Material Type

Open Educational Resource (OER)

Author

P. P. Urone, R. Hinrichs, et. al.

Title

College Physics 2e

Edition/Version

Web version

Publisher

OpenStax

Year

2025

ISBN #

ISBN-13: 978-1-711470-83-2

Material Type

Manual

Author

Wilson, Jerry

Title

Physics Laboratory Experiments 8th edition

Publisher
Cengage Learning

Year
2015

SECTION G - Diversity, Equity and Inclusivity

How does your course and/or course outline of record reflect strategies for accommodating and engaging diverse student populations, advancing equitable outcomes, and fostering inclusion for all students?
Multiple types of activities and content delivery are included. Courses include policies for flexible deadlines and/or lowest scores dropped. In class, students are referred to student support services.

Course Codes (Admin Only)

CB00 State ID
CCC000564138

CB10 Cooperative Work Experience Status
N - Is Not Part of a Cooperative Work Experience Education Program

CB11 Course Classification Status
Y - Credit Course

CB13 Special Class Status
N - The Course is Not an Approved Special Class

CB23 Funding Agency Category
Y - Not Applicable (Funding Not Used)

CB24 Program Course Status
Program Applicable

Allow Pass/No Pass
Yes

Only Pass/No Pass
No