



AP Physics 1 (PHYS 110/110L)

Fall 2022 – Spring 2023

SCI03111/L – SCI03112/L



BALL STATE
UNIVERSITY

Instructor



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Office Hours:

Monday: 9:30am – 11:00am

Tuesday: 2:00pm – 3:30pm

Wednesday: 9:30am – 11:00am

Thursday: By Email

Friday: 9:30am – 11:00am

Email me for alternative meeting arrangements.

Required Materials

- Ranking Task Exercises in Physics (O’kuma)
- College Physics for AP Courses – OpenStax (Online Text)
 - <https://openstax.org/details/books/college-physics-ap-courses>
- Computer Access w/ Internet

Meeting Times

MWF: 12:00pm – 1:00pm (Class)

T: 11:00am – 1:00pm (Lab)

BSU Credits

Ball State University:

College of Science and Humanities: Department of Physics and Astronomy

Course Credits: 4

Course Name: PHYS 110/110L

Course Title: General Physics 1

Course Requirements and Specifications

Prerequisite: Precalculus and math placement test score or permission of instructor or co-requisite enrollment in Academy Precalculus for AP.

Co-requisite: AP Physics I Lab (SCI3111L/3112L)

Credit: 1.5 credits per semester

Offered: Fall/Spring Sequence

Course Content Overview

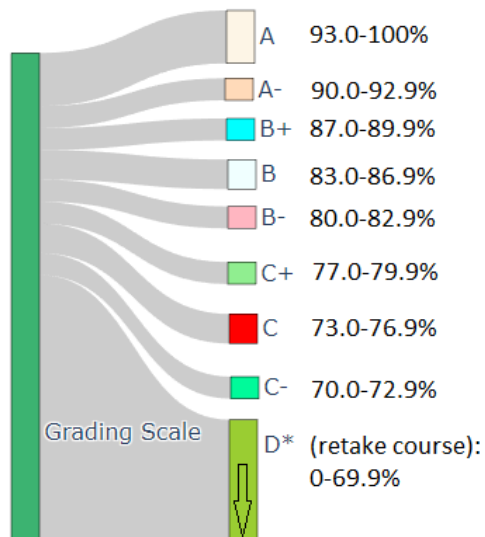
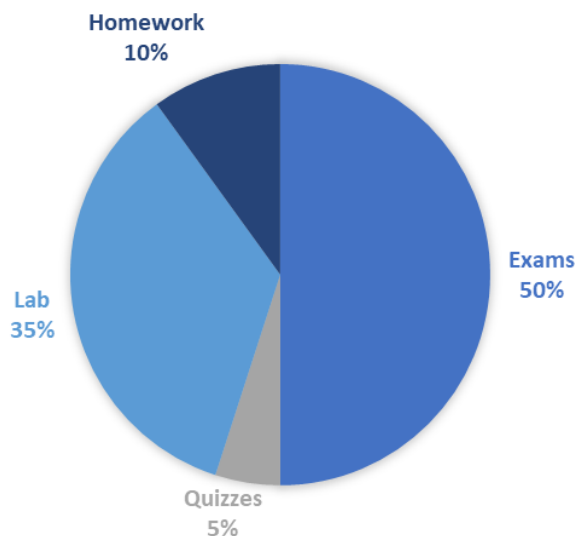
Welcome to AP Physics I: General Physics 1!

This class proceeds at an accelerated pace and provides a physical introduction to the main principles of physics, which include Newtonian mechanics, oscillations and sound, electricity and magnetism, kinetic theory and thermodynamics, fluids, optics and modern physics. Emphasis will be given to linear and rotational applications to kinematics, forces, and momentum, as well as energy and power, gravitation, harmonic motion, and introductory electric circuits.

Knowledge of geometry, algebra and some trigonometry is required for this course. Laboratory investigations emphasize concepts and inquire in order to develop proficiency in problem solving and in the application of fundamental principles to a wide variety of situations. This course is intended for those students whose career goals include life or earth science, pre-medicine, as well as other fields not directly related to science. Students will prepare for and are encourage to take the AP Physics I exam in May.

* Ball State University offers 4 college credit hours in PHYC 110 to students who complete this Academy course. Refer to the Dual Credit section for details on enrollment and fees.

Grade Calculation & Scale

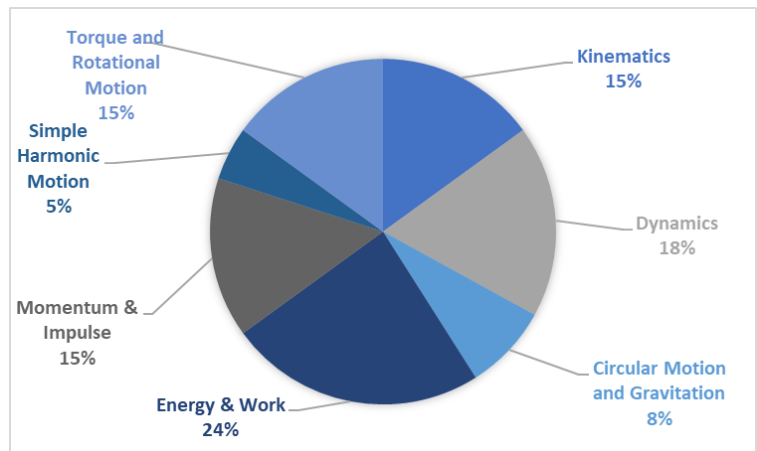


Course Content & Mastery Goals for Exams

Exams, including the final exam, will be parsed into mastery goals for grade calculations. These parsed categories are listed below for the fall and spring semesters, respectively. The benefit of assessing and grading in this way is to afford students the opportunity to provide evidence of learning of a concept (such as Kinematics) multiple times and not allow previous, less successful attempts to haunt their final grade for the course. A final grade should reflect what a student KNOWS, independent of their journey to get there.

Fall & Spring Semester Concepts

Kinematics	15%
Dynamics	18%
Circular Motion and Gravitation	8%
Energy & Work	24%
Momentum & Impulse	15%
Simple Harmonic Motion	5%
Torque and Rotational Motion	15%
	100%



Scientific Practices

Modeling	Use representations and models to communicate scientific phenomena and solve scientific problems
Mathematical Routines	Use mathematics appropriately
Scientific Questioning	Engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course
Experimental Methods	Plan and implement data-collection strategies in relation to a particular scientific question
Data Analysis	Perform data analysis and evaluation of evidence
Argumentation	Work with scientific explanations and theories
Making Connections	Connect and relate knowledge across various scales, concepts, and representations in and across domains

Fall 2022 Tentative Semester Schedule

Week	Lecture	Lab
1	PB&Js and The Scientific Process	Measure Twice, Cut Once Lab (Measurement Uncertainty Lab)
2	Understanding the Basics (mass, inertia, moment of inertia, and change)	Understanding Δ Lab (Measuring displacement and speed)
3	Complicating Simple Values – linearly and angularly (1-D Measures and Time)	1-D Determining g Lab
4	X and Y (Vectors, Scalars, Units)	2-D Determining g Lab
5	Fantastical Forces and Where to Find Them (Individual Forces and Newton)	Projectile Motion Lab
6	Fantastical Forces and How to Put Them Back because Now they're getting complicated (Net Force)	Projectile Motion Lab w/ Force Meters
7	Have you heard of Momentum? Well, I have a story for you ... (Conservation of Momentum)	Force Lab but Harder MORE Challenging! (Friction Lab)
8	Momentum When it isn't conserved	Friction Lab Continued
9	Momentum and Friends (Impulse)	Insurance Claims on Car Accident Lab
10	Hooke's Law and Hooke, who was an awesome dude	Springs! Lab
11	Wait – Why did you tell us this before???	Simple Energy Exercises
12	What we did before but easier (Conservation of Energy)	Energy: Insurance Claims on Car Accident Lab
13	When Energy isn't conserved (Work and Energy)	Introducing Work Lab
14	NO SCHOOL – THANKSGIVING	NO SCHOOL – T-DAY
15	Introduction to Angular Momentum	Angular Measurements Lab
16	Because regular mechanics was too easy (Angular Kinematics and Centripetal Acceleration)	Race cars and Curvy Roads Lab
17	Review for Final (Late Work Deadline)	Review for Final
18	FINALS WEEK	Extra Credit Due

Spring 2023 Tentative Semester Schedule

Week	Lecture	Lab
1	Applying Kinematics Angularly (Angular Kinematics and Centripetal Acceleration)	Orbital Lab
2	Conservation of Angular Momentum	When Physics Got Too Easy Lab (Net Torque = 0 Lab)
3	Torque, the New Enemy (When Angular Momentum is not conserved)	Applying Torque Lab
4	Linear, Angular, and Energy Considerations	Projectile Motion Revisited
5	Motion that is Harmonious	Pendulums – what are they hiding from us?
6	Waves Mechanics (Superposition and standing waves)	Making Waves Stand Lab
7	Simple Harmonic Springs	Harmonic Spring Lab
8	Waves and Sound and Light ... OH MY!	Speed of Sound
9	Doppler Effect and applying what we thought we knew	Phet Sound Lab
10	NO SCHOOL – SPRING BREAK	NO SCHOOL – Spring Break!
11	Reviewing: Linear and Angular Kinematics	Water Balloon Challenge: Day 1 Calculations
12	Reviewing: Dynamics Linear and Angular	Water Balloon Challenge: Day 2 Testing / Calculations
13	Reviewing: Momentum & Impulse	Water Balloon Challenge: Day 3 Round 1 and Start of Round 2
14	Reviewing: Energy & Work	Water Balloon Challenge: Day 3 Round 2 and Final Challenges
15	Reviewing: Torque and Rotational Motion	Debate Project Day 1
16	Reviewing: Circular Motion and Gravitation	Debate Project Day 2
17	Reviewing: Simple Harmonic Motion	Debate Project Day 3
18	Practice Exam and Final Review of All Topics AP Exam Preparation (Late Work Deadline)	Final Review and AP Exam Preparation
19	FINALS WEEK May 11 th – AP Physics I Exam Check this link for more information: https://apcentral.collegeboard.org/exam-administration-ordering-scores/exam-dates	Extra Credit Due

Classroom Policies*

*Subject to change as the need arises.

Laptop Policy

While in class or lab, please keep computer use restricted to classroom-relevant tasks.

Laptops or tablets are required for lab sessions.

Laptops or tablets are also required for some homework, quizzes, and other activities.

Laptops or tablets are permitted but not required during class for note-taking or other class-related needs.

Withdrawal Deadlines

If you wish to drop your class(es), you must do so by August 26, 2022.

The withdrawal deadline is October 2022 and will be announced once published by the University Registrar.

Dropping/Withdrawing from a class at your high school does not drop/withdraw you from your BSU Dual Credit class. Instructions for dropping/withdrawing can be found in the Dual Credit Student and Parent Handbook.

Attendance Policy

Students arriving after the start of class may receive a Tardy. Students arriving after 20 minutes (or not at all!) may receive an Absence. Student is responsible for all information missed due to not being present.

Late Work Policy

Late work is defined as work that is submitted more than 24 hrs late. Any work not submitted automatically is scored as a zero (0 pts.).

If work is submitted but it has been more than 24 hrs since it was due, the work will be graded with a 50% deduction of points in the gradebook, regardless of delay or reason.

Last day to submit late work will be the Friday BEFORE finals week. After this time, all zeroes (0 pts.) will remain and cannot be made-up or submitted for points.

Make-up Policies

Make-up exams may only be taken if the student received an excused absence for the missed test.

There are no make-ups for Labs. The lowest Lab grade will be exempted at the end of the semester.

Additional Points

Email me one, school-appropriate, cute photo of a pet (if pet is not your pet, please acquire permission to photograph and submit before doing so). These photos will be presented to the class during the in-class final exam review.

Deadline: The Friday BEFORE finals week each semester. Worth: +1% on any mastery exam category of the student's choice at the end of each semester.

Lab Reports

Data collection will be done during class only and no make-up labs will be permitted.

Labs will be conducted as a small group, 2 – 3 people per group.

Lab Reports are due each week by each member of the group. Each report is to be written separately but collaboratively discussed.

This means you are writing your own report, but you are free to discuss and compare each other's work before submission.

(Be careful to not plagiarize. Discussions should be consultations only.)

Lab Reports will have the following sections (at minimum) and must be submitted digitally on Canvas as a PDF or .DOCX file.*

*subject to change as needed

Element of the Report	Criteria
1. Brief statements of the following: <ol style="list-style-type: none"> a. Concepts used b. Equations used (if any) c. Purpose of the lab (What are you measuring or testing?) 	<p>This section should be brief (about 1 to 2 paragraphs long)</p> <p>It should be less about listing things off and more about explaining what is happening</p>
2. <u>Detailed</u> Procedure & Equipment Used	Explain it as if someone else's grade depended on repeating your procedure.
3. Your Data and Error Analysis (if applicable) & Sample Calculations	<p><u>This should not be</u> RAW data.</p> <p>This should be a data summary (such as graphs or averages) with errors. Sample calculations should include <u>brief outlines</u> of how your data summary information was calculated, not all calculations.</p>
4. Results and conclusions	What are the results of your experiment? What did the lab ask you to determine? Did you determine this?
5. <u>Detailed</u> Discussion of results	<p>What do your results <u>mean</u>?</p> <p>This section should be more than 2 paragraphs detailing what your results mean by reflecting on concepts used, data collected, and what was measured.</p>
6. What would you or think you should have done differently?	<p>Think of ways in which you could have either improved data collection or learned more about the phenomena investigated.</p> <p>Consider alternative methods or concepts that could have been used instead.</p>
7. Raw Data	This is ALL raw data, including any pictures taken during lab, numbers, tables, and unused graphs.

Labs will focus on providing skill development in the following scientific practices.

Lab reports focus on writing skills, an essential aspect of any professional skillset.

Resources Available to You

The Writing Center

All writers improve with practice and feedback, so as a student in this course, you are encouraged to use the Writing Center (in Robert Bell 295, Bracken Library, or online) to get additional feedback on your writing. To schedule a free appointment to discuss your writing, go to www.bsu.edu/writingcenter.

Online and in-person appointments are available seven days a week; however, plan ahead because appointments book quickly!

The Learning Center

The Learning Center offers free Tutoring and Academic Coaching for many courses at Ball State. Students can make appointments for online (Zoom) or in-person (NQ 350) appointments. Unvaccinated students are required to wear masks and practice physical distancing in the Learning Center.

To make an appointment, visit my.bsu.edu and click on “TutorTrac” in the Additional Tools section, or just go directly to <https://ballstate.go-redrock.com>.

Testing accommodations for students with disabilities are available for students who have received the appropriate documentation from Disability Services. Tests may be administered in the Learning Center.

Supplemental Instruction is available in select courses. If you have an SI leader for your course, that person will provide students with information the first week of school regarding weekly study sessions.

For more information about all of our programming, visit <https://bsu.edu/learningcenter> or call (765) 285-1006.

Important Information You May Need to Know

Dual Credit-High School Credit Policy Statement

Students may choose to enroll in Ball State’s Dual Credit Program to earn college credit for PHYC 110, General Physics 1, from Ball State at a reduced rate of tuition (\$250 flat fee). Students who are eligible for free or reduced lunch this academic year may enroll at no charge if verified by the school.

To enroll in Ball State’s Dual Credit Program, students should have a 3.0 GPA on a 4.0 scale and complete the application & registration process before the given deadline. Ball State will bill students via postal mail; no money should be submitted to the high school. College credit can only be earned during the semester (or, in the case of year-long classes, during the academic year) in which the student is enrolled. Late enrollments are not permitted.

Whether college credit earned through dual credit courses will be accepted by another institution of higher education is determined by the college or university to which a student is seeking admission. Before enrolling through Ball State’s

Dual Credit Program, students should check directly with that institution to determine if a course will be accepted and how it will be counted toward graduation requirements. Refunds will not be issued if Ball State credits are not able to be transferred. In most cases, students will need to earn a C or better to transfer credit from Ball State to another institution. Grades of D or lower earned in Ball State Dual Credit courses are recorded on a student’s Ball State transcript but may not be able to transfer.

The rigor of this course will be periodically reviewed by Ball State University faculty in an effort to maintain the high quality of education that each student receives. To learn more about Ball State’s Dual Credit Program, visit bsu.edu/dualcredit, call 765-285-1581 or email dualcredit@bsu.edu.

Indiana Academy Diversity Statement

The Indiana Academy for Science, Mathematics, and Humanities is committed to being an inclusive educational community that values diversity in policy and practice. We aim to foster an educational environment where students, faculty, and staff exchange ideas freely, engage in critical thinking, and reexamine their personal perspectives. To create an environment where this respectful and productive dialogue is possible, we do not allow discrimination on the basis of race, ethnicity, sex, geographic origin, gender, gender identity, sexual orientation, disability, religion, age, or nationality. The affirmation, appreciation, and inclusion of multiple cultures ensures that all students, faculty, staff, and the wider Indiana Academy community will be able to thrive in our multicultural academic and residential environment.

Ball State University aspires to be a university that attracts and retains a diverse faculty, staff, and student body. We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse as

expressed in our Beneficence Pledge and through university resources found at <http://cms.bsu.edu/campuslife/multiculturalcenter>.

BSU Student Rights and Responsibilities

While enrolled in Ball State's Dual Credit Program, you are expected to abide by the academic rules of behavior befitting a university student. You should read the Dual Credit Student and Parent Handbook, located at <https://bsu.edu/dualcredit>

In particular, review the Code of Student Rights and Responsibilities, focusing on the policies regarding student rights and responsibilities, behavior, academic integrity, and related procedures.

The Dual Credit Student and Parent Handbook includes information regarding student qualifications, prerequisites, available courses, responsibilities, financial aid stipulations, transferability, withdrawal, refund and billing policies and more. It is important that you review the information contained in it.

Policy on the Americans with Disabilities Act (ADA)

If you need course adaptations or accommodations because of a disability, please contact the Office of Disability Services. The Office of Disability Services coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability services can be contacted at 765-285-5293 or dsd@bsu.edu.

Title IX – Sexual Misconduct

Ball State University is committed to establishing and maintaining an effective, safe, and nondiscriminatory educational environment in which all individuals are treated with respect and dignity. For information about Ball State University's Interim Title IX Policy and Procedures, please visit our website. Please note that the University's policy and procedures have undergone significant revisions starting with the 2020-21 school year and ongoing.

Consistent with the University's Notice of Nondiscrimination and in accordance with the U.S. Department of Education's implementing regulations for Title IX of the Education Amendments of 1972 ("Title IX"), Ball State University prohibits sexual harassment that occurs within its education programs and activities.

This prohibition extends to all applicants for admission or employment and to all students (any status) and all employees (any status). An individual who is found to have committed sexual harassment in violation of this policy is subject to the full range of University discipline, up to and including termination of employment or expulsion. The University will provide persons who have experienced sexual harassment with ongoing remedies as reasonably necessary to restore or preserve access to the University's education program and activities.

Inquiries concerning the specific application of Title IX at Ball State should be directed to Ms. Katie Slabaugh, Associate Dean of Students/Title IX Coordinator in the Frank A. Bracken Administration Building, room 238, 765-285-1545, kslabaugh@bsu.edu. Persons can also contact the U.S. Department of Education Office for Civil Rights, Washington, D.C. 20202-1328, 1-800-421-3481, ocr@ed.gov.

Student Academic Ethics Policy

Actions which include but are not limited to cheating, plagiarism, falsely claiming to have completed work, cooperating with another person in academic dishonesty, knowingly destroying or altering another student's work, or attempting to commit an act of academic dishonesty that violates the Student Academic Ethics Policy (<http://www.bsu.edu/associateprovost/academicethics>).

The consequences of academic dishonesty are determined on a case-by-case basis by each instructor and may include but are not limited to one or more of the following academic sanctions: informal meeting, removal from dual credit course, dismissal from the university, or other appropriate consequence.

Syllabus Change Policy

This syllabus is a guide to the course and may be subject to change with reasonable advanced notice as course needs arise.