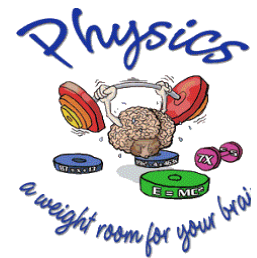




AP Physics C – Mechanics

Syllabus

Mr. Webber
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www.physics-is-phun.org/home



Introduction

You can't play a game if you don't know the rules, and the more you know the rules the more you enjoy the game. Physics is the study of nature's "rules" – the rules and laws governing the universe in which you are a part. So, to learn physics is to learn about ourselves and the arena of physical and natural laws that govern all aspects of our lives, from the atoms within our cells to the motions of galaxies and the energies in distant quasars!

AP Physics C: Mechanics examines, in depth, topics in Classical (Newtonian) Mechanics, to prepare you for the AP Physics Exam in May of 2024. My goal is not to teach to the test; rather, it is to teach the subject and cognitive skills that go along with it. When striving for that goal, testing becomes secondary and a natural extension of the learning process.

This course will also teach you to become critical thinkers and develop analytical reasoning that will give you problem-solving skills that apply across all disciplines. To that end, an inquiry-based instructional environment is utilized, one in which the traditional practice of "I do-we do-you do" is reversed. There will be many practice problems, assessments, and homework assignments – it is imperative that you complete all work to the best of your ability. Physics is learned by doing, not by watching.

Course Description

The AP Physics C: Mechanics is a national calculus-based course in physics. This course is equivalent to and intended for physics, math, and/or engineering majors and is designed to prepare students for the AP Physics C: Mechanics Exam given in May. The emphasis is on understanding of the concepts and skills and using the concepts and formulae to solve problems. Students coming out of the courses should have a strong conceptual understanding of physics and well-developed skills in performing and analyzing data and problems. They should also be able to apply their understanding to approach and solve problems that are essentially new to them.

Expectations

According to the College Board AND based on my experience, students are expected to give a minimum of one hour of study to AP Physics every night. This time should be used to organize class notes, rework proofs and derivations, and work on assessments. Tests and exams will require additional time, as will final preparation for the AP Exam at the end of the course. You will be signing a College Board Contract acknowledging your understanding of these expectations.

This course also has Saturday sessions, organized with other Advanced Placement courses. These Saturday sessions are recitations – a forum to ask questions and go over problems. You are encouraged to take advantage of these opportunities.

Cell Phone Policy

No cell phones, tablets, or earbuds are allowed in the classroom – keep them quiet and put away! Anyone caught using a cell phone will face discipline as outlined in the 2023-2024 Student Handbook.

Units of Study

All topics are introduced using trigonometry and algebra, then as mastery of basic ideas is attained the topic is expanded to include differential and integral calculus. Calculus-based topics are taught throughout the course where appropriate.

SEMESTER 1

Introduction`

- Units and measurement
- Unit conversion (dimensional analysis)
- Graphing
- Basic calculus review
- Scalars and vectors

Kinematics

- Motion in one direction
- Motion in two directions
- Projectile motion

Dynamics: Newton's Laws of Motion

- Force
- Force diagrams (free body diagrams)
- Newton's three laws
- Weight and normal force
- Uniform circular motion
- Newton's law of universal gravitation
- Satellites and weightlessness
- Kepler's Laws
- Escape velocity
- Gravitational potential energy

Work and Energy, part 1

Grading

Formative Assessments: 20%

SEMESTER 2

Work and Energy, part 2

- Work done by a constant force
- Work done by a varying force
- Kinetic energy
- Potential energy
- Work and kinetic energy/Work-Energy Theorem
- Power
- Conservative and nonconservative forces
- Law of conservation of energy

Linear Momentum and Collisions

- Center of mass
- Impulse and momentum
- Types of collisions
- Conservation of momentum

Rotational

- Constant angular speed
- Constant angular acceleration
- Relation between linear and angular quantities
- Moment of inertia
- Torque
- Conservation of angular momentum
- Rotational kinetic energy
- Rotation and Translation

Oscillations

- Simple harmonic motions
- Springs
- Simple pendulum
- Physical pendulum

Summative Assessments: 80%

Materials

Textbooks:

- Primary textbook: “Physics for Scientists and Engineers, 5th Edition” by Raymond Serway and John W. Jewett. New York: Brooks/Cole, 1999. Found on the course website.
- “College Physics” by Eugenia Etkina, Michael Gentile, and Alan Van Heuvelen. Pearson.
- “College Physics for AP Courses” by Irina Lyublinskaya (Principle Author). Open Stax. Found on the course website.
- “Quantitative Skills in the AP Sciences” published by the College Board. Found on the course website.
- Note: Much of the information and theories will be presented in class. Attendance is very important for a course of this magnitude.

Student Supply Information: Notebook and binder, pencil (mechanical serves best), calculator (scientific). These should be brought to every class.

Website

The course has a website, which you may access at www.physics-is-phun.org/home and then select “AP Physics C: Mechanics” from the main menu. Assessments, textbooks, classroom materials, a calendar, and other tools are there for you to utilize. A password is required to enter the AP Physics C sections, which will be provided.

AP Physics C: Mechanics Late Work and Missed Test Policies

- Work is expected to be turned in on the due date. In the case of an excused absence, assignments are due the day you return. Late work is subject to a 25% penalty. No work will be accepted after a unit test.
- If you miss a laboratory exercise or demonstration with an excused absence, you may be exempted from the work (to be determined by the instructor).
- If you miss a summative assessment (test or exam) and have an excused absence, you have one week to make up that test. Make-up time is by appointment only and will not happen during class time.

General Classroom Guidelines

- We practice and expect respect at all times – to our teacher, our classmates, and ourselves.
- We come to class prepared and excited to learn.
- We appreciate the value of education.
- We work to maintain a positive learning environment.
- We strive to do our best.
- We believe in academic integrity.
- We will keep our classroom and supplies neat.

General Classroom Procedures

- We arrive to class on time, enter in a respectful way, and begin any bell work.
- We raise our hands to be recognized.
- We do not leave our seats unless given permission.
- We do not leave our trash on the floor. Trash is to be thrown out at the end of class.
- We do not eat, drink, or chew gum in this classroom.
- No cell phones or tablets!

General Classroom Policies

- Work is to be turned in on the due date.
- No work will be accepted after the unit test.
- A missed test with an excused absence must be made up within one week – Not during class. If the absence is excused, full credit may be earned; if unexcused, a maximum score of 75% may be earned.
- You are responsible for work from any absence.
- Any act of cheating results in a grade of 0 and possible removal from AP courses.
- Do not arrive late for class. Four tardies per quarter yields a referral.
- Behavior that is not compliant with the student handbook will be addressed by the procedures outlined in the handbook.

NOTES:

Please read and fill out this acknowledgement page and return to Mr. Webber.

I, _____, have read the syllabus for AP Physics C. I
Name of Student
understand Mr. Webber's Guidelines, Procedures, and Policies, including the use of cell phones
and tablets, and the expectations of me, including the time and work expected outside of class.
I also understand the discipline and academic consequences for not living up to those
expectations. I recognize that the science of physics is very demanding and rigorous and that
it will require discipline, planning, and studying on my part.

Signature of Student

Date

As the parent(s)/guardian(s) of the above named student, I/we also understand the Guidelines,
Procedures, and Policies of Mr. Webber's class. In addition, I/we understand the academic
demands of the course and will provide support to our student, Mr. Webber, and the class as a
whole.

Signature of Parent/Guardian

Date

Parent/Guardian Email

Phone