

# Classical High School

## AP Physics C: Mechanics

Syllabus 2021-2022

Instructor: Mr. Butler

Text: “*University Physics*” 13<sup>th</sup> Edition      Author: *Young & Freedman*

Prerequisite: Completion of Calculus AB w/minimum grade of B-

Required Materials: Scientific Calculator, Slot Folder, Lab Notebook, Pencils

Website: [Physica.cloud](https://www.physica.cloud)

### Course Description

AP Physics C: Mechanics is a full year, introductory, calculus-based physics course designed to present students with the opportunity to study physics at the college level. The application of calculus, depth of concept development, pace of topics covered, and inquiry-based lab experiments combine to give students the experience of learning the concepts of mechanics as presented in a first year college or university physics course. This course is designed to introduce students to fundamental physical concepts in a sound and rigorous manner while successfully preparing them for the AP Physics C: Mechanics exam in May. This AP Physics course will follow the Physics C: Mechanics sequence of topics outlined in the *Advanced Placement Program Course Description Handbook*.

### Course Approach

The major goal of this course is to prepare the student to achieve a high score on the *AP Physics C: Mechanics Exam*. Additional goals of the AP Physics course include developing students' critical thinking skills and systematic problem solving strategies. Through the analysis of a wide variety of physical phenomena, students are encouraged to make careful observations, question information, analyze and interpret data to discover patterns; to think beyond the obvious, validate their statements and conclusions using physical laws and principles and to observe natural phenomena with new insight.

### Calculus Review

To start the year on a solid mathematical footing, all students should read and complete the assignments in ***Quick Calculus: A Self-Teaching Guide by Danile Kleppner and Norman Ramsey***. This book helps students learn or review basic differentiation and integration calculus techniques that are used extensively in the course. These techniques are essential in being able to successfully develop and derive meaningful solutions to problems encountered in the course.

### Summer Reading

During the summer break students will read one book that relates to the science and nature of physics. Below is listed the book students should read this summer. An assessment covering the material from the book will be given during the first quarter.

30-Sec Physics, B. Clegg (Waived for Summer 2021)

### Evaluation

<u>Quarter:</u>		<u>Midterm:</u>		<u>Final:</u>	
Tests	60 %	1 <sup>st</sup> Quarter	40 %	Final Exam	10 %
AP Exam Prep	20 %	2 <sup>nd</sup> Quarter	40 %	Midterm Exam	10 %
Laboratory	20 %	Midterm Exam	20 %	Quarter Grades	80 %

Tests: At least one assessment will be given for each major topic covered. The tests will focus on assessing student knowledge and understanding of underlying and foundational principles and the application of those principles. Tests typically consist of questions of a conceptual nature given in a multiple choice format and/or those involving application of the principles through problem solving.

Retests: Retests are provided to students who receive a failing test grade on the first attempt. In order to take advantage of the retest option, the student must use the concept correlation formative assessment tool provided by the instructor. The student must also revisit/re-learn the concepts and principles for which their understanding was weak. The highest grade after retest will be a 70.

Retests are given only after:

- (1) a review of test questions and answers with instructor to identify concepts of weakness.
- (2) the student revisits and restudies specific course material for which their understanding was weak.
- (3) completion of a Concept Correlation identifying specific places within the resources where “missed” concepts and principles may be found.

### Concept Correlations

As per College Board protocol, test questions are not released and students may not copy test questions in any way. After a test is corrected and handed back, students have the opportunity to review the test questions and answers with the instructor. The instructor will provide feedback to explain the questions and answers. These test review sessions are valuable to support students in identifying and understanding “missed” concepts. A “concept correlation” is provided to students who receive a failing test grade and identifies the concept, principle or application of each test question. Students correlate questions they missed on the test with the items on the concept correlation sheet. The concept correlation serves as an individual study guide identifying concepts to revisit for deeper understanding.

### Absences

Due to the amount of material and pace with which it is covered, students who are absent can easily fall behind. The student is responsible for any assignments missed/owed during an absence. On the day the student returns from an absence, he/she is expected to see the instructor to get the assignments missed and to turn in any assignments that are owed.

### Make-Up Policy

Tests/Retests: Students who are absent on the day of a test/retest may make up that test/retest in an alternate version on the day they return to school, provided the absence is excused. No test/retest make-up is allowed for an unexcused absence.

Labs: Due to the time involved in lab preparation, setup, and break-down, a make-up for a lab may not always be possible. In this case, an alternate assignment related to the lab will be assigned.

## Due Dates

**The importance of assignment due dates cannot be overemphasized.  
It has been shown that adhering to assignment due dates promotes a greater level  
of success by affording the following:**

- (1) receive timely feedback regarding strengths and weaknesses gauged to concept understanding and application**
- (2) keep pace with the course so as not to fall behind on course material**
- (3) ensure timely preparation for tests and retests**

**Be aware that late assignments will be accepted with reduced credit!**

## Homework/Assignments

**This is an advanced course taught at the college level!** The student should expect to devote the requisite amount of time each day working on physics assignments. Additional study time will most likely be necessary when preparing for tests and the midterm-final exam.

### Homework assignment categories:

- ✓ Physica Resources
- ✓ Textbook Assignments
- ✓ Laboratory Reports
- ✓ Cooperative Group Assignments
- ✓ Test Concept Correlations
- ✓ MyAP Online Assignments

## AP Exam Prep

### Questions/Exercises/Problems

Questions, exercises and problems are designed to provide the student with valuable opportunities to apply the principles studied in class. These are an important and essential component of the learning experience in physics. Successful understanding and application of the physical principles studied depends to a large extent on devoting adequate time solving and answering the assigned exercises, problems and questions whether from textbook, free-response or online platform modes.

### Problem Sets

Problem sets are an important component of the course. They provide valuable opportunities for students to apply the principles they are learning, to check for understanding and to practice taking AP exam type questions. A self-assessment tool will be used for problem sets.

- Newtonian Tasks
- MyAP College Board online platform questions.
- Textbook questions, exercises and problems for students to work individually/cooperatively

## Focus Questions

Upon entering the class each day, students are expected to immediately begin their work in physics by answering a focus question. The focus question is designed to engage students, activate their prior knowledge and relate to the topics being studied in the upcoming or previous lessons. A short session involving direct questioning, analysis and reflective discussion will follow.

## Laboratory

Conducting laboratory experiments and writing scientific laboratory reports are an integral part of the AP Physics course. Approximately 20% of instructional time is devoted to doing laboratory work. This includes pre-lab discussions, designing and setting up lab apparatus and equipment, running the labs and collecting experimental data and class discussion of lab results. In this AP Physics course, laboratory experiments have been designed primarily to test and verify those laws and principles which are being covered in class. In addition, it is hoped that through these laboratory investigations, students will acknowledge for themselves the significance of those laws and principles as being the fundamental means by which we account for and explain natural phenomena.

Depending on class size, lab teams of three to four students will be assigned to conduct experiments, collect the data and to produce the lab report. Lab partners need to work cooperatively to discuss their observations and results and to interpret those results. Each team must work collaboratively and is responsible for writing one lab report. Each team member receives the same lab report grade. It is assumed that each team's lab report will be a product involving individual creativity! A laboratory report format will be given to you by your instructor. This format will outline the method for writing lab reports.