



ERIC HAMBER SECONDARY SCHOOL

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The Eric Hamber Secondary School community is honoured to be working together on the ancestral and unceded territories of the x^wməθk^wəyəm | Musqueam, Sk̓wx̓wú7mesh Úxwumixw | Squamish & səliłwətał | Tsleil-Waututh Nations.

AP Physics C

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COURSE DESCRIPTION

AP Physics C is a calculus-based, university-level physics course, especially appropriate for students planning to specialize or major in physical science or engineering. The course is divided into two halves: 1) Mechanics and 2) Electricity and Magnetism. Mechanics covers kinematics; dynamics; circular motion and gravitation; energy; momentum; simple harmonic motion; and torque and rotational motion. Electricity and Magnetism covers electrostatics; conductors, capacitors, and dielectrics; electric circuits; magnetic fields; and electromagnetism. Strong emphasis is placed on solving a variety of challenging problems, some requiring calculus, as well as continuing to develop a deep understanding of physics concepts. This course prepares students to write both the AP Physics C: Mechanics exam and the AP Physics C: Electricity and Magnetism exam.

COURSE STRUCTURE

The course framework specifies what students must know, be able to do, and understand to qualify for college credit or placement.

BIG IDEAS:

The big ideas serve as the foundation of the course and allow students to create meaningful connections among concepts. They are often abstract concepts or themes that become threads that run throughout the course. Revisiting the big ideas and applying them in a variety of contexts allows students to develop deeper conceptual understanding. Below are the big ideas of the course and a brief description of each.

CHANGE	FORCE INTERACTIONS	FIELDS	CONSERVATION
Interactions produce changes in motion.	Forces characterize interactions between objects or systems.	Fields predict and describe interactions.	Conservation laws constrain interactions.
Indigenous knowledge and perspectives are an important part of the historical foundation of both BC and Canada and are integrated into every subject in the curriculum. All students will have opportunities to better understand and respect a variety of cultures, both their own and others.			

SCIENCE PRACTICES:

The science practices are central to the study and practice of physics. Students should develop and apply the described practices on a regular basis over the span of the course.

Visual Representations	• Describe the physical meaning (includes identifying features) of a representation. • Describe the relationship between different types of representations of the same physical situation. • Demonstrate consistency between different types of representations of the same physical situation. • Select relevant features of a representation to answer a question or solve a problem. • Describe the effects of modifying conditions or features of a representation of a physical situation.
Question and Method	• Identify a testable scientific question or problem. • Make a claim or predict the results of an experiment. • Identify appropriate experimental procedures (which may include a sketch of a lab setup). • Make observations or collect data from representations of laboratory setups or results. • Identify or describe potential sources of experimental error. • Explain modifications to an experimental procedure that will alter results.
Representing Data and Phenomena	• Select and plot appropriate data. • Represent features of a model or the behaviour of a physical system using appropriate graphing techniques, appropriate scale, and units. • Sketch a graph that shows a functional relationship between two quantities. • Create appropriate diagrams to represent physical situations.
Data Analysis	• Identify and describe patterns and trends in data or a graph. • Demonstrate consistency between different graphical representations of the same physical situation. • Linearize data and/or determine a best fit line or curve. • Select relevant features of a graph to describe a physical situation or solve problems. • Explain how the data or graph illustrates a physics principle, process, concept, or theory.
Theoretical Relationships	• Select an appropriate law, definition, mathematical relationship, or model to describe a physical situation. • Determine the relationship between variables within an equation when an existing variable changes. • Determine the relationship between variables within an equation when a new variable is introduced. • Determine or estimate the change in a quantity using a mathematical relationship. • Derive a symbolic expression from known quantities by selecting and following a logical algebraic pathway.
Mathematical Routines	• Extract quantities from narratives or mathematical relationships to solve problems. • Apply an appropriate law, definition, or mathematical relationship to solve a problem. • Calculate an unknown quantity with units from known quantities by selecting and following a logical computational pathway. • Assess the reasonableness of results or solutions.

Argumentation	• Make a scientific claim. • Support a claim with evidence from experimental data. • Support a claim with evidence from physical representations. • Provide reasoning to justify a claim using physical principles or laws. • Explain the connection between experimental results and larger physical principles, laws, or theories. • Explain how potential sources of experimental error may affect results and/or conclusions.
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COURSE CONTENT:

The course content is organized into commonly taught units of study that provide a suggested sequence for the course and detail required content and conceptual understandings that colleges and universities typically expect students to master to qualify for college credit and/or placement. This content is grounded in big ideas, which are cross-cutting concepts that build conceptual understanding and spiral throughout the course.

AP PHYSICS C: MECHANICS	
Kinematics	• Kinematics: Motion in One Dimension • Kinematics: Motion in Two Dimensions
Newton's Laws of Motion	• Newton's Laws of Motion: First and Second Law • Circular Motion • Newton's Laws of Motion: Third Law
Work, Energy, and Power	• Work-Energy Theorem • Force and Potential Energy • Conservation of Energy • Power
Systems of Particles and Linear Momentum	• Center of Mass • Impulse and Momentum • Conservation of Linear Momentum, Collisions
Rotation	• Torque and Rotational Statics • Rotational Kinematics • Rotational Dynamics and Energy • Angular Momentum and Its Conservation
Oscillations	• Simple Harmonic Motion, Springs, and Pendulums
Gravitation	• Gravitational Forces • Orbits of Planets and Satellites

AP PHYSICS C: ELECTRICITY AND MAGNETISM	
Electrostatics	• Charge and Coulomb's Law • Electric Field and Electric Potential • Electric Potential Due to Point Charges and Uniform Fields • Gauss's Law • Fields and Potentials of Other Charge Distributions
Conductors, Capacitors, Dielectrics	• Electrostatics with Conductors • Capacitors • Dielectrics
Electric Circuits	• Current and Resistance • Current, Resistance, and Power • Steady-State Direct-Current Circuits with Batteries and Resistors Only • Capacitors in Circuits
Magnetic Fields	• Forces on Moving Charges in Magnetic Fields • Forces on Current Carrying Wires in Magnetic Fields • Fields of Long Current Carrying Wires • Biot–Savart Law and Ampère's Law
Electromagnetism	• Electromagnetic Induction (Including Faraday's Law and Lenz's Law) • Inductance (Including LR circuits) • Maxwell's Equations

CORE COMPETENCIES:

Activities in this course will help you develop your skills with BC's Core Competencies, a cross-curricular set of skills that you develop in different ways in every subject area.

COMMUNICATION	THINKING	PERSONAL AND SOCIAL
Develop the set of abilities that will allow you to effectively share ideas, gather new information, and interact with others. • Communicating • Collaborating	Develop the skills and processes that will allow you to think both critically and creatively. • Creative Thinking • Critical Thinking	Develop an understanding of yourself as a person and as a learner, so you can reach your goals, take pride in your identity, and contribute positively to your community. • Positive Personal & Cultural Identity • Personal Awareness & Responsibility • Social Responsibility

Students will have opportunities to reflect on the Core Competencies by using evidence of learning within this course.

For more information about what you will be learning: <https://apcentral.collegeboard.org/media/pdf/ap-physics-c-mechanics-course-and-exam-description.pdf>

CLASSROOM EXPECTATIONS

REQUIRED MATERIALS:

- Binder
- Lined and Graph Paper
- Pencil and Eraser
- Black and Red Pens
- Ruler
- Scientific and/or Graphing Calculator

CLASSROOM EXPECTATIONS:

Absences

If you are absent for a class, you must bring a note signed by your parents indicating the date on which you were absent and the reason for your absence. Notes must also include a contact phone number where the parent may be reached.

Academic Honesty

It is your obligation to inform yourself of the applicable standards for academic honesty. You must be aware that standards in this class may be different from those in other schools or classes. If you are in any doubt as to the standard of academic honesty on a particular assignment, then you must consult with me as soon as possible, and in no case should you submit an assignment if you are not clear on the relevant standard of academic honesty.

Cheating, which may include, but is not limited to:

- use of or participation in unauthorized collaborative work
- use or possession in an examination of any materials or devices other than those permitted by the teacher
- use, possession, or facilitation of unauthorized means to complete an examination (e.g. receiving unauthorized assistance from another person, or providing that assistance)
- obtaining or providing information concerning all or part of an exam prior to the exam
- altering test answers after submission for grading, altering grades after that have been awarded, or altering other academic records

In addition to following classroom rules, students are expected to follow the VSB Codes of Conduct. Please refer to the Eric Hamber Student Handbook for more details: <https://www.vsb.bc.ca/eric-hamber/page/1599/code-of-conduct>.

ASSESSMENT AND EVALUATION

As learning is an individual journey, assessment and evaluation is cumulative. This means that the grade on a written report reflects your current level of achievement at that point in the course and will continually be adjusted throughout the learning process.

The purpose of assessment is to facilitate learning and move it forward in an equitable and inclusive way. Assessment helps students answer three questions about their learning:

Where am I now?

Where am I going?

How do I get there?

GRADING:

Student progress towards the learning targets of this course is evaluated using the following assessment categories and weighting:

FINAL REPORT	
Tests	40%
Labs	15%
AP Problem Sets	8%
MyOpenMath	5%
Quizzes	2%
Final Exam: Mechanics	15%
Final Exam: E&M	15%

COMMUNICATING STUDENT LEARNING:

The reporting dates can be found on the school calendar: <https://www.vsb.bc.ca/eric-hamber/page/1635/calendar>. Families may receive further updates through email or phone calls. Please note that the Interim Report will contain comments, while the Mid-Semester and Final Reports will also include a grade.

AP EXAMS:

The AP Physics C course will prepare students to write the AP Physics C: Mechanics and AP Physics C: Electricity and Magnetism exams in May. Students are responsible for the cost of the exams. Students who do well on the exams may receive college credit. The AP Physics C exam marks will not be included in the course mark.

WORK HABITS:

Work habits are important to develop and contribute to both academic and personal success. Work habits can include aspects related to responsibility, self-regulation, respect, collaboration, and participation. Work habits may be commented upon and are separated from the academic grade.

I look forward to getting to know you better this year and to starting our learning journey together. Please contact me to share any needed information or if you have any further questions.