



## Physics 12

### Course Outline

#### Course Overview

Physics 12 explores the world of motion and fields. It is designed to build on the knowledge the student gained in physics 11. The course focuses on four big ideas. Measurements of motion depends on our frame of reference. Forces can cause linear and circular motion. Momentum is conserved within a closed isolated system. Forces and energy interactions occur within fields. Physics 12 emphasizes real-life applications and helps students connect their learning to the world around them. Several virtual labs deepen student understanding of content and scaffold important lab writing skills. There is also one final home project that expands on one or more areas from the course. Physics 11 should be taken prior to physics 12 to ensure all necessary skills are developed.

#### Course Content and Suggested Timelines

The suggested timeline is for students aiming to complete the course in one semester (5 months). Double the timeframes for two semesters (10 months).

#### **Introductory Unit – Optional (Suggested time: 1 week)**

In this unit, you may review some important math skills so you can be successful in this course. These include: scientific notation, unit conversions, graphing, algebra, and trigonometry.

#### **Unit 1 – Motion and Relativity (Suggested time: 2 week)**

The big idea for this unit is: Measurement of motion depends on our frame of reference. This unit deals with relative motion and Einstein's theory of relativity. You will learn about vector and scalar properties, frames of reference in the non-relativistic world, and non-relativistic relative velocity. Then you will dive into Einstein's world to see how motion changes at speeds close to the speed of light. You will start your journey with a look at what Special relativity is and where we use it in our daily lives. Then you will learn about the relativistic time effect, mass effect and length effect. Finally you will delve into another one of Einstein's famous equations  $E = mc^2$ .

## **Unit 2 - Forces (Suggested time: 2 week)**

The big idea for this unit is: Forces can cause linear and circular motion. This unit deals with contact forces and the factors that affect the size and direction of motion. You will learn about translational and rotational equilibrium and solve static equilibrium problems. You will also learn about circular motion, and how it arises from forces.

## **Unit 3 - Momentum (Suggested time: 2 week)**

The big idea for this unit is: Momentum is conserved within a closed and isolated system. In this unit, you will learn about momentum in one and two dimensions by exploring collisions and explosions. You will also learn about impulse and its effect on objects. Finally, you will learn how momentum and energy are related.

## **Unit 4 – Gravitational Fields (Suggested time: 1 week)**

The big idea for this unit is: Forces and energy interactions occur within fields.

This big idea is spread over 4 units. In this short unit you will learn about Newton's law of gravity, potential energy and gravitational field strength including examples like satellites and surface gravity.

## **Unit 5 – Electric Fields (Suggested time: 3 week)**

The big idea for this unit is: Forces and energy interactions occur within fields.

This big idea is spread over 4 units. In this unit you will learn about static electricity, charging by induction, conduction and friction, Coulomb's law, electric potential, voltage and examples like the Cathode Ray Tube.

## **Unit 6 – Magnetic Fields (Suggested time: 2 week)**

The big idea for this unit is: Forces and energy interactions occur within fields.

This big idea is spread over 4 units. In this unit you will learn about current, magnetic fields and magnetic forces are related. Solve problems involving magnetic fields and forces including examples like the current balance and mass spectrometers.

## **Unit 7 – Electromagnetic Induction (Suggested time: 2 week)**

The big idea for this unit is: Forces and energy interactions occur within fields.

This big idea is spread over 4 units. In this unit you will learn about magnetic flux, induced EMF, Lenz's law including examples such as motors, generators and transformers.

## Course Materials

A textbook is not required for this course. There is an online textbook for this course that is linked in the “course information and resources” section of the course.

If you would prefer to have a hard copy textbook then I would recommend “**Physics: Principles and Problems,**” by Merrill. If you are a cross-enrolled student, then I would recommend checking with your home school library to see if they can lend you a copy.

The curriculum for this course can be found at: [Physics 12 new curriculum](#)

## Assessment Information

Show Your Learning	15%
Topic Quizzes	15%
Unit Tests	20%
Labs / Project	30%
Midterm Exam	10%
Final Exam	10%

### Show Your Learning: (15%)

For each unit there are at least three Show Your Learning assignments. These assignments are displayed on the course website and can be accessed directly from there. You may use your notes and other resources to help you with the assignment. These assignments are to be done on paper so you can show all your work. When you have completed your assignment, you will need to either scan them or photograph the pages so you can upload them directly to Moodle. Once the assignments have been marked you can view the mark and feedback in your gradebook.

### Topic quizzes: (15%)

At the end of each section you will be given a brief quiz on the topic learned. You may use your notes and other resources to answer them. You have 1 attempt on each quiz. Your quiz mark will be given to you immediately and your gradebook will be updated.

### Unit Tests: (20%)

There are seven unit tests in this course. Please note that all unit tests are "CLOSED BOOK" tests, which means that you are not permitted to use any other reference materials to help answer the questions.

**You are permitted to use your formula sheet and your calculator.** Your unit tests must be **supervised by a parent or trusted adult.** A supervisor form can be found in the motion and relativity unit before you write your first unit test. This needs to be filled out and the passwords will be sent to that supervisor.

### Labs: (30%)

Labs are an important part of science and are necessary to build lab-specific skills. This course contains virtual interactive labs as well as one final project. The virtual interactive labs help you make connections between the course material and real-life physics. In addition, these labs guide you in writing a laboratory report. The final project is to be done at home and you will be able to choose between several projects.

**Midterm: (10%)**

There will be a midterm exam for physics 12 covering the Motion and relativity unit, the Forces units, and the momentum unit. The exam is CLOSED BOOK, which means that you are not permitted to use any other reference materials to help answer the questions. ***You are permitted to use your formula sheet and your calculator.*** Your Midterm exam is to be ***INVIGILATED by an EBUS approved invigilator.*** Please **contact me AT LEAST 1 week prior** to when you want to write your midterm exam.

**Final Exam: (10%)**

There will be a final exam for physics 12 covering only the fields unit. The exam is CLOSED BOOK, which means that you are not permitted to use any other reference materials to help answer the questions. ***You are permitted to use your formula sheet and your calculator.*** Your Final exam is to be ***INVIGILATED by an EBUS approved invigilator.*** Please **contact me AT LEAST 1 week prior** to when you want to write your final exam.

**Supervised and Invigilated Exams:**

Supervised exams are exams that can be taken at home with parent or other adult supervision. All unit tests are to be supervised by an adult.

Invigilated exams are exams that need to be invigilated by EBUS approved invigilators. There are two invigilated exams for physics 12: the midterm and the final exam.

**When students are not meeting the learning outcomes/ falling behind**

When students fall behind the expected pace or plan, they will be contacted via email or phone and if there is no improvement or response, parents will also be contacted. If deemed necessary, contact with the student's home school may also occur to help determine a solution.

Students are expected to let the course teacher know when they are struggling with course content. In response, the course teacher will provide appropriate help or strategies to support learning. The course teacher will also provide feedback on course work to support learning and help students improve. Parents will be made aware if their child is actively working but struggling to meet the learning outcomes of the course.

Students falling behind in a manner where it does not appear that they will complete the course within a year will be sent reminder emails. Without a response or renewed efforts in the course, the student may be assigned an F or withdrawn. Should they begin actively working in the course, the student may be given an alternate completion date.

**Expectations**

- Adhere to the EBUS Academic Integrity Policy
- Contact your teacher when help is needed
- Review feedback from assignments and tests, where applicable
- Work to complete the course in a timely manner
- Communicate respectfully
- Review weekly progress reports

**Reporting to Parents:**

There are 3 term report cards that can be downloaded from the student dashboard. A notice will go out when these report cards are available.

Every 2 weeks that EBUS is in session the teacher will send out a progress report showing the student's progress.

**Contacting Your Teacher:**

Your teacher will be available Monday to Friday during regular school hours. If you are having trouble with any concepts, you can contact your teacher, as indicated by the course page.

Steph Sedgwick (email): [ssedgwick@sd91.bc.ca](mailto:ssedgwick@sd91.bc.ca).