ORIGINAL COURSE IMPLEMENTATION DATE:	December 1996
REVISED COURSE IMPLEMENTATION DATE:	September 2018
COURSE TO BE REVIEWED (six years after UEC approval)**:**	April 2023

Course outline form version: 10/27/2017

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: PHYS 093	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Provincial-Level Physics **Course Short Title:**	
Faculty: Faculty of Access and Continuing Education	**Department:** Upgrading and University Preparation

Calendar Description:

This university preparatory course, which is equivalent to B.C. Physics 12, covers mechanics, electrostatics, electromagnetism, and waves and optics.

Prerequisites (or NONE):	(One of Applications of Mathematics 11, Principles of Mathematics 11, Pre-Calculus 11, Foundations of Mathematics 11, MATH 084, or MATH 085) and (one of Physics 11, PHYS 083, or PHYS 100).
Corequisites (if applicable, or NONE):	NONE
Pre/corequisites (if applicable, or NONE):	NONE

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number: N/A

Cross-listed with: N/A

Dual-listed with: N/A

Equivalent course(s): N/A

Special Topics

This course is offered with different topics:

☒ No ☐ Yes

If yes, different lettered courses may be taken for credit:

☐ No ☐ Yes, repeat(s) ☐ Yes, no limit

Transfer Credit

Transfer credit already exists: *(See **bctransferguide.ca**.)*

☒ No ☐ Yes

Submit revised outline for rearticulation:

☒ No ☐ Yes

Typical Structure of Instructional Hours

Lecture/seminar hours	60
Tutorials/workshops	9
Supervised laboratory hours	21
Experiential (field experience, practicum, internship, etc.)	
Supervised online activities	
Other contact hours:	
Total hours	**90**

Labs to be scheduled independent of lecture hours: ☒ No ☐ Yes

Grading System

☒ Letter Grades ☐ Credit/No Credit

Expected Frequency of Course Offerings:

Annually

Department / Program Head or Director: Greg St. Hilaire	**Date approved:**	January 10, 2018
Faculty Council approval	**Date approved:**	January 31, 2018
Dean/Associate VP: Sue Brigden	**Date approved:**	January 31, 2018
Campus-Wide Consultation (CWC)	**Date of posting:**	February 16, 2018
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	February 23, 2018

Learning Outcomes:

Upon successful completion of this course, students will be able to:

A. Kinematics in Two Dimensions
- Use the language and concepts of kinematics to describe motion in two dimensions
- Resolve, add and subtract vectors
- Analyze and solve kinematical problems in two dimensions

B. Dynamics in Two Dimensions
- Use the language and concepts of dynamics to describe forces, energy and momentum
- Analyze and solve problems involving dynamics in two dimensions using free body diagrams
  - Two-dimensional equilibrium – translational and rotational
  - Momentum conservation in two dimensions: elastic and inelastic collisions
  - The Work-Energy theorem and energy conservation
  - Uniform circular motion

C. Electrostatics
- Use the language and concepts of physics to describe electrostatic phenomena
- Analyze and solve electrostatic force and electric field problems in two dimensions
- Analyze and solve electric potential and electric potential energy problems

D. Electromagnetism
- Use the language and concepts of physics to describe electromagnetic phenomena
- Analyze and solve problems involving magnetic forces and magnetic fields in two dimensions
- Analyze and solve problems involving electromagnetic induction – Faraday's Law and Lenz's law
- Describe devices that operate using electromagnetic induction

E. Waves and Optics
- Use the language and concepts of physics to describe wave phenomena
- Define and distinguish between amplitude, wavelength, frequency, wave speed and period
- Analyze and solve problems involving wave phenomena – refraction, reflection, total internal reflection
- Describe various wave phenomena and the conditions which produce them
- Construct ray diagrams for optical systems involving mirrors and lenses

Laboratories:

There will be one laboratory from each topic and a **minimum** of seven laboratories. Successful students will be able to:

- Collect data through observation:
  - Record a measurement to the appropriate level of precision
  - Recognize that all measured values have an uncertainty
- Construct graphs:
  - Choose appropriate scales
  - Determine line of best fit
  - Label correctly
- Draw conclusions from observations and data:
  - Identify and discuss sources of error
  - Calculate and interpret the slope of a line
  - Relate conclusion to objectives
- Calculate experimental error:
  - Determine % error and % difference where appropriate
- Complete formal lab reports

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.)*

The course will be presented using a variety of techniques: classroom lectures; laboratory experiments; activities; films; and demonstrations.
Close coordination will be maintained between the theoretical and laboratory work.
Weekly assignments will be used to evaluate the rate of learning and the depth of the student's comprehension.
The labs will integrated into the class schedule.
Regular class sessions will also consist of lab related demonstrations and activities.
The experiments will be used to interact with the students on a more personal level. This time can be used to give individual help.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Wilson, Buffa, Lou	College Physics	☐	Pearson	2009
2.	Urone, Hinrichs	College Physics	☐	Openstax	2016

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Scientific calculator

Typical Evaluation Methods and Weighting

Final exam:	30%	Assignments:	10%	Field experience:	%	Portfolio:	%
Midterm exam:	20%	Project:	%	Practicum:	%	Other:	%
Quizzes/tests:	20%	Lab work:	20%	Shop work:	%	Total:	100%

Details (if necessary):

Typical Course Content and Topics

- Kinematics in Two Dimensions
- Dynamics in Two Dimensions
- Electrostatics
- Electromagnetism
- Waves and Optics