OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

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

<table>
<thead>
<tr>
<th>Course Code and Number: PHYS 093</th>
<th>Number of Credits: 4</th>
<th>Course credit policy (105)</th>
</tr>
</thead>
</table>

**Course Full Title:** Preparatory University Physics II  
**Course Short Title (if title exceeds 30 characters):**

**Faculty:** Faculty of Access and Continuing Education  
**Department (or program if no department):**  
Upgrading and University Preparation

**Calendar Description:**  
This university preparatory course, which is equivalent to B.C’s high school Physics 12 course, 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

**Equivalent Courses (cannot be taken for additional credit):**  
Former course code/number: N/A  
Cross-listed with: N/A  
Equivalent course(s): N/A

*Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.*

**Transfer Credit:**  
Transfer credit already exists: ☑ Yes ☒ No

Transfer credit requested (OReg to submit to BCCAT):  
☑ Yes ☒ No (if yes, fill in transfer credit form)

Resubmit revised outline for articulation: ☑ Yes ☒ No  
To find out how this course transfers, see bctransferguide.ca.

**Total Hours:** 90

**Typical structure of instructional hours:**

<table>
<thead>
<tr>
<th>Lecture hours</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars/tutorials/workshops (in-class)</td>
<td>9</td>
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<tr>
<td>Laboratory hours (in class)</td>
<td>21</td>
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<tr>
<td>Field experience hours</td>
<td></td>
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<tr>
<td>Experiential (practicum, internship, etc.)</td>
<td></td>
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<tr>
<td>Online learning activities</td>
<td></td>
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<tr>
<td>Other contact hours:</td>
<td></td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
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</table>

**Special Topics:**  
Will the course be offered with different topics?  
☑ Yes ☒ No

If yes, different lettered courses may be taken for credit:  
☑ No ☐ Yes, repeat(s) ☐ Yes, no limit

*Note: The specific topic will be recorded when offered.*

**Maximum enrolment (for information only):** 24

**Expected frequency of course offerings (every semester, annually, every other year, etc.):** Annually

**Department / Program Head or Director:** Greg St. Hilaire  
**Date approved:** February 2017

**Faculty Council approval**  
**Date approved:** March 10, 2017

**Campus-Wide Consultation (CWC):**  
**Date of posting:** n/a

**Dean/Associate VP:** Sue Brigden  
**Date approved:** March 10, 2017

**Undergraduate Education Committee (UEC) approval**  
**Date of meeting:** April 21, 2017
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
     o Two-dimensional equilibrium – translational and rotational
     o Momentum conservation in two dimensions: elastic and inelastic collisions
     o The Work-Energy theorem and energy conservation
     o 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:
  o Record a measurement to the appropriate level of precision
  o Recognize that all measured values have an uncertainty

• Construct graphs:
  o Choose appropriate scales
  o Determine line of best fit
  o Label correctly

• Draw conclusions from observations and data:
  o Identify and discuss sources of error
  o Calculate and interpret the slope of a line
  o Relate conclusion to objectives

• Calculate experimental error:
  o 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.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☒ No ☐
### Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

<table>
<thead>
<tr>
<th>Author (surname, initials)</th>
<th>Title (article, book, journal, etc.)</th>
<th>Current ed.</th>
<th>Publisher</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wilson, Buffa, Lou</td>
<td>College Physics</td>
<td></td>
<td>Pearson</td>
<td>2009</td>
</tr>
<tr>
<td>2. Urone, Hinrichs</td>
<td>College Physics</td>
<td></td>
<td>Openstax</td>
<td>2016</td>
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<td>3.</td>
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### Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)

- Scientific calculator

### Typical Evaluation Methods and Weighting

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<td>Final exam:</td>
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<td>Assignments:</td>
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<td>Practicum:</td>
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<td>Quizzes/tests:</td>
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<td>Field experience:</td>
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<td>Shop work:</td>
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### Typical Course Content and Topics

A. Kinematics in Two Dimensions
B. Dynamics in Two Dimensions
C. Electrostatics
D. Electromagnetism
E. Waves and Optics

**Details (if necessary):**