**ORIGINAL COURSE IMPLEMENTATION DATE:** April 1999
**REVISED COURSE IMPLEMENTATION DATE:** September 2020
**COURSE TO BE REVIEWED** (six years after UEC approval)**:** February 2025
Course outline form version: 05/18/2018

# OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

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

| | |
|---|---|
| **Course Code and Number:** PHYS 083 | **Number of Credits:** 3 Course credit policy (105) |

**Course Full Title:** Adult Basic Education Advanced-Level Physics
**Course Short Title:** ABE Advanced Physics
*(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)*

| | |
|---|---|
| **Faculty:** Faculty of Access and Continuing Education | **Department:** Upgrading and University Preparation |

**Calendar Description:**

A university preparatory course equivalent to Physics 11. Introduces concepts of measurement, kinematics, dynamics, electricity, heat, waves, and optics.

Note: Students with credit for PHYS 083 cannot take PHYS 100 for further credit.

| | |
|---|---|
| **Prerequisites (or NONE):** | None |
| **Corequisites (if applicable, or NONE):** | None |
| **Pre/corequisites (if applicable, or NONE):** | One of the following: MATH 084, MATH 085, Principles of Mathematics 11 or 12, Applications of Mathematics 11 or 12, Foundations of Mathematics 11 or 12, Pre-calculus 11 or 12, Apprenticeship and Workplace Mathematics 11 or 12, Workplace Mathematics 11, or Apprenticeship Mathematics 12.<br>Note: Students with other Mathematics 11 or 12 courses, or who are currently enrolled in a Mathematics 11 course, may contact the instructor to request permission to register. |

**Antirequisite Courses** *(Cannot be taken for additional credit.)*
Former course code/number:
Cross-listed with:
Dual-listed with:
Equivalent course(s): **PHYS 100**
*(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)*

**Typical Structure of Instructional Hours**

| | |
|---|---|
| Lecture/seminar hours | 66 |
| Tutorials/workshops | |
| Supervised laboratory hours | 24 |
| 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

**Special Topics** *(Double-click on boxes to select.)*
This course is offered with different topics:
☒ No ☐ Yes *(If yes, topic will be recorded when offered.)*

**Independent Study**
If offered as an Independent Study course, this course may be repeated for further credit: *(If yes, topic will be recorded.)*
☒ No ☐ Yes, repeat(s) ☐ Yes, no limit

**Transfer Credit**
Transfer credit already exists: *(See **bctransferguide.ca**.)*
☒ No ☐ Yes
Submit outline for (re)articulation:
☒ No ☐ Yes *(If yes, fill in transfer credit form.)*

**Grading System**
☒ Letter Grades ☐ Credit/No Credit

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

**Expected Frequency of Course Offerings:**
Annually *(Every semester, Fall only, annually, etc.)*

| | | |
|---|---|---|
| **Department / Program Head or Director:** Greg St. Hilaire | **Date approved:** | January 10, 2020 |
| **Faculty Council approval** | **Date approved:** | January 10, 2020 |
| **Dean/Associate VP:** Sue Brigden | **Date approved:** | January 10, 2020 |
| **Campus-Wide Consultation (CWC)** | **Date of posting:** | n/a |
| **Undergraduate Education Committee (UEC) approval** | **Date of meeting:** | February 28, 2020 |

**Learning Outcomes:**

After completion of Phys 083 students will meet the outcomes described for Physics Advanced Level in the 2019-2020 ABE Articulation guide available at https://www2.gov.bc.ca/assets/gov/education/post-secondary-education/adult-education/abe_guide.pdf

**A. Measurement**

- Solve problems involving SI units
- Maintain the correct number of significant numbers in calculations
- Use uncertainties in measurement
- Define vector and scalar quantities

**B. Kinematics**

- Use the language and concepts of kinematics to describe motion
- Analyze and solve kinematics in one dimension
- Construct and interpret displacement versus time curves
- Construct and interpret velocity versus time graphs
- Solve problems involving uniform acceleration

**C. Dynamics**

- Use the language and concepts of dynamics to describe forces and energy
- Analyze and solve dynamics in one dimension using free body diagrams
- Apply Newton's laws of motion in one dimension
- Solve problems involving:
  i. Friction forces
  ii. Gravity forces including Newton's Law of Universal Gravitation
- Analyze and solve problems in kinetic and potential energy
- Analyze and solve problems in energy conservation
- Solve problems involving work and power
- Solve problems involving impulse and conservation of momentum in one dimension.

**D. Electricity**

- Use the language and concepts of electricity to describe electrical phenomena
- Analyze and solve problems using Coulomb's law
- Analyze and solve problems involving Ohm's law
- Define and distinguish between electric potential difference, resistance and current
- Solve simple DC resistance problems involving series, parallel and combination circuits

**E. Heat**

- Use the language and concepts of thermodynamics to describe the transfer of heat energy
- Define and distinguish between temperature, heat energy and specific heat capacity
- Analyze and solve problems in heat energy
- Demonstrate an understanding of the different mechanisms of heat transfer

**F. Waves and Optics**

- Use the language and concepts of physics to describe wave phenomena:
  i. Define and distinguish between amplitude, wavelength, frequency, wave speed, and period
  ii. Analyze and solve problems involving wave phenomena – refraction, reflection, and total internal reflection
  iii. Describe various wave phenomena and the conditions which produce them
  iv. Solve problems involving lens equation and mirror equation
  v. Construct ray diagrams for mirrors and lenses.

**Options:**

The following topics may be useful to students going on to further physics courses:

- Atomic and nuclear physics
- Modern physics

**Laboratories:**

There should be one laboratory from each topic and a minimum of seven laboratories. Laboratory skills must include:

- Collecting data through observation:
  - Record a measurement to the appropriate level of precision
  - Recognize that all measured values have an uncertainty
- Constructing graphs:
  - Choose appropriate scales
  - Determine line of best fit
  - Label correctly
- Drawing conclusions from observations and data:
  - Identify and discuss sources of error
  - Calculate and interpret the slope of a line
  - Relate conclusion to objectives
- Calculating experimental error:
  - Determine % error and % difference where appropriate
- Completing 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. At least seven classes will be formal three-hour lab sessions.

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

**Typical Text(s) and Resource Materials** *(If more space is required, download Supplemental Texts and Resource Materials form.)*

| | Author (surname, initials) | Title (article, book, journal, etc.) | Current ed. | Publisher | Year |
|---|---|---|---|---|---|
| **1.** | | https://www.openstaxcollege.org/textbooks/college-physics-ap | ☐ | | |
| **2.** | Sandner & Gore | Phys 083: UFV, Edvantage Interactive | ☐ | UFV | 2012 |
| **3.** | | | ☐ | | |
| **4.** | | | ☐ | | |
| **5.** | | | ☐ | | |

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

N/A

**Typical Evaluation Methods and Weighting**

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

**Details (if necessary):**

**Typical Course Content and Topics**

A. **Part 1: Kinematics and Dynamics**
   1. Introduction
      a. Measurement
      b. Unit systems
      c. Mathematics with powers of ten
      d. Prefixes
   2. Collecting Data, Analysis of Data, and Graphing
      a. Common graph shapes and their analysis
      b. Presenting data tables
      c. The making of some easy kinematic graphs
      d. Slopes
   3. Kinematics
      a. Analysis of position (x) vs. time (t) graphs
      b. Analysis of speed (v) vs time (t) graphs
      c. Develop the kinematic equations
      d. Using the three standard kinematic equations
   4. Vectors (Graphical Method Only)
      a. Drawing and labelling
      b. Addition
      c. Subtraction
      d. Relative velocities
      e. Circular motion (graphical)
   5. Dynamics and Kinematics
      a. Newton's laws
      b. Translational motion with applied forces
      c. Centripetal force
   6. Conservation Laws (1 Dimension only)
      a. Energy and work
      b. Momentum

B. **Part 2: Optics**
   7. Light
      a. Properties
      b. Historical Significance
   8. Reflection and Image Formation
      a. Laws of Reflection

   b. Plane Mirrors
   c. Parabolic Mirrors
9. Refraction and Image Formation
   a. Snell's Law
   b. Convex Lenses
   c. Concave Lenses
   d. Colour
10. Diffraction and Interference (optional)
   a. Adding Waves
   b. Two slit diffraction
   c. Single slit diffraction
   d. Parallel Plate Interference
11. Models of Light (optional)
   a. Particle Model
   b. Wave Model

**Laboratories:**

There should be at least one laboratory from each of the following core topics and a minimum of seven laboratories.

A. Measurement
B. Kinematics
C. Dynamics
D. Electricity
E. Heat