



Introduction to Physics 2 - PHYS 104

University Studies Program

Course Outline

COURSE IMPLEMENTATION DATE: Pre 1998
OUTLINE EFFECTIVE DATE: September 2017
COURSE OUTLINE REVIEW DATE: March 2022

GENERAL COURSE DESCRIPTION:

This course builds on PHYS 103. Electric and magnetic fields are used as examples of vector fields, and the concept of flux and Gauss's theorem are used to calculate the electric field in simple cases. Line integrals and the gradient are introduced as a means of going between electric field and potentials. Students are taught the uses for resistors, capacitors, and inductors and how to do calculations for circuits which use them. Ideas from relativity and quantum mechanics are introduced.

Program Information: This course is required for majors in Math, Physics, Engineering and Chemistry. It is usable for Associate of Science and Arts.

Delivery: This course is delivered face-to-face.

COTR Credits: 3

Hours for this course: 90 hours

Typical Structure of Instructional Hours:

Instructional Activity	Duration
Lecture Hours	45
Seminars / Tutorials	
Laboratory / Studio Hours	45
Practicum / Field Experience Hours	
Other Contact Hours	
Total	90

Practicum Hours (if applicable):

Type of Practicum	Duration
On-the-job Experience	N/A
Formal Work Experience	N/A
Other	N/A
Total	

Course Outline Author or Contact:

Trevor Beugeling, MASC, BEng, BSc

Signature

APPROVAL SIGNATURES:

Department Head
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Department Head Signature

Dean Signature

EDCO

Valid from: September 2017 – March 2022

Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT:

Prerequisites: PHYS 103; MATH 104 is a required course, either taken prior or concurrently

Corequisites: N/A

Flexible Assessment (FA):

Credit can be awarded for this course through FA

Yes No

Learners may request formal recognition for prior learning at the College of the Rockies through one or more of the following processes: External Evaluation, Worksite Assessment, Demonstration, Standardized Test, Self-assessment, Interview, Products/Portfolio, Challenge Exam. Contact an Education Advisor for more information.

Transfer Credit: For transfer information within British Columbia, Alberta and other institutions, please visit <http://www.cotr.bc.ca/Transfer>

Students should also contact an academic advisor at the institution where they want transfer credit.

Prior Course Number: N/A

Textbooks and Required Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

Halliday, David, Resnick, Robert, and Walker, Jearl. *Fundamentals of Physics*. 10th ed. Wiley, 2013.

Please see the instructor's syllabus or check COTR's online text calculator <http://go.cotr.bc.ca/tuition/tCalc.asp> for a complete list of the currently required textbooks.

LEARNING OUTCOMES:

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

- understand the concept of a vector field in general and electric and magnetic fields in particular;
 - calculate the electric field for a system of static charges;
 - understand the concept of flux and calculate the flux through an equipotential surface of an electric field with a high degree of symmetry;
 - understand Gauss's law and use it to calculate the electric field when there is a high degree of symmetry;
 - use a line integral to calculate the electric potential; use the gradient to find the electric field given the electric potential;
 - understand capacitance and be able to calculate capacitance for a number of simple geometric configurations;
 - use Kirchhoff's laws to calculate the currents in simple circuits with capacitors, resistors, and inductors;
 - understand the Biot-Savart law and its relationship to Ampère's circuit law;
 - understand Faraday's law of induction and how it relates to the operating principles of transformers, inductors, electrical motors, and generators; and
 - be able to do simple calculations in the special theory of relativity and quantum mechanics.
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COURSE TOPICS:

- Coulomb's law and electric fields
- Flux, Gauss's Law and its relationship to the divergence theorem
- Electric potential as a line integral of the electric field; the electric field as the gradient of the electric potential
- Capacitance
- Current, resistance, circuits. Kirchhoff's laws
- Magnetic fields. The Biot-Savart law. Ampère's circuit law
- Induction and inductance. Faraday's law
- Maxwell's equations
- Modern physics: relativity and quantum theory

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

EVALUATION AND ASSESSMENT:

Assignments	% Of total Grade
Labs	20%
Assignments/Quizzes	20%
Midterms	30%
Final Exam	<u>30%</u>
Total	100%

Please see the instructor syllabus for specific classroom policies related to this course, such as details of evaluation, penalties for late assignments, and use of electronic aids.

Note: Satisfactory completion of Laboratory is necessary to receive a grade in this course.

EXAM POLICY:

Students must attend all required scheduled exams that make up a final grade at the appointed time and place.

Individual instructors may accommodate for illness or personal crisis. Additional accommodation will not be made unless a written request is sent to and approved by the appropriate Department Head prior to the scheduled exam.

Any student who misses a scheduled exam without approval will be given a grade of "0" for the exam.

COURSE GRADE:

Course grades are assigned as follows:

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Mark (Percent)	≥ 90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	< 50

A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

ACADEMIC POLICIES:

See www.cotr.bc.ca/policies for general college policies related to course activities, including grade appeals, cheating and plagiarism.

COURSE CHANGES:

Information contained in course outlines is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational, employment, and marketing needs. The instructor will endeavour to provide notice of changes to students as soon as possible. The instructor reserves the right to add or delete material from courses.