COQUITLAM COLLEGE
Established 1982

COURSE OUTLINE

Last Revised: September 2019

COURSE INFORMATION

Course Title: Principles of Physics II **Course Number:** PHYS 102 **Credits:** 3

Total Weeks: 14 (Fall, Spring)
12 (Summer)

Total Hours: 78

Course Level: ☒ First Year ☐ Second Year
☐ New ☐ Revised Course
☐ Replacement Course

Department: Sciences **Department Head:** S. Girdhar **Former Course Code(s) and Number(s) (if applicable):** N/A

Pre-requisites (If there are no prerequisites, type NONE): PHYS 101 and MATH 101; MATH 102 recommended

Co-requisite Statement (List if applicable or type NONE): NONE

Precluded Courses: N/A

COURSE DESCRIPTION

This course follows PHYS 101 as the second course in a general survey of physics and includes a survey and introduction to electricity, magnetism, optics, and some modern physics. A weekly three-hour lab is included as an integral part of the course, bridging theory and experiment.

LEARNING OUTCOMES

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

- Understand the characteristics and behavior of electric charges, their fields and potentials.
- Understand the characteristics of both AC and DC electric currents and circuits
- Understand the behavior of series and parallel electric circuits, the symbols R, C, and L
- Analyze and solve circuit problems containing resistors, capacitors, and inductors
- Apply Kirchhoff's rules to DC circuits
- Understand the interactions between electric and magnetic fields and the electric charges in motion
- Understand electromagnetic induction
- Explain the operation of electric generators and motors
- Recognize Maxwell's equations
- Describe the propagation of light and the laws of reflection and refraction
- Understand and apply Fermat's and Huygens' principles
- Draw ray diagrams for lenses and mirrors
- Apply the basic equations to find images, distinguish between real and virtual objects/images
- Identify focal length, focal plane, principal focus, aberrations
- Understand the significance of index of refraction
- Determine the critical angle and the angle of polarization
- Describe Huygens' and Fraunhoffer diffraction; use a diffraction grating to find wavelength of light of different colors
- Understand the nature of light polarization

INSTRUCTION AND GRADING

Instructional (Contact) Hours:

Type	Duration
Lecture	39
Seminars/Tutorials	
Laboratory	39
Field Experience	
Other (*specify):*	
Total	78

Grading System: Letter Grades ☒ Percentage ☐ Pass/Fail ☐ Satisfactory/Unsatisfactory ☐ Other ☐

Specify passing grade: 50%

Evaluation Activities and Weighting (total must equal 100%)

Assignments: 10% *Specify number of, variety, and nature of assignments:*	Lab Work: 20%	Participation: % *Specify nature of participation:*	Project: % *Specify nature of project:*
Quizzes/Test: %	Midterm Exam: 30%	Final Exam: 40%	Other: % *Specify:*

TEXT(S) AND RESOURCE MATERIALS

Provide a full reference for each text and/or resource material and include whether required/not required.

Physics for Scientists and Engineers, by P.A. Tipler and G. Mosca, 6th edition.

COURSE TOPICS

List topics and sequence covered.

Week	Topic	Chapter
Week 1	Introduction. The electric charge, Coulomb's law, the electric field. Gauss' law	21.1 – 21.6
Week 2	Electric potential, potential difference and potential energy, equipotential surfaces and charge sharing	22.1 – 22.5
Week 3	Capacitance, the parallel-plate capacitor, combinations of capacitors. Dielectrics. Storage of electrostatic charge.	21.4 – 24.5
Week 4	Electric current, resistance, and Ohm's law. Combination of resistors. Kirchhoff's rules, RC circuits. Voltmeters, ammeters, and ohmmeters.	25.1 – 25.6
Week 5	The magnetic field. Force exerted by a magnetic field on a moving charge. Motion of a point charge in the magnetic field.	26.1 – 26.3

Week 6	Sources of the magnetic fields. The Biot-Savart law, Ampere's law.	27.1 – 27.5
Week 7	Magnetic induction, induced IMF, Faraday's law, LR circuits, ferromagnetism, paramagnetism, and diamagnetism. **MIDTERM EXAM**	28.1 – 28.8
Week 8	AC circuits. AC current in resistors, inductors, and capacitors. RCL circuits.	29.1 – 29.6
Week 9	Light. Speed of light, Huygens' principle, reflection, and refraction of light. Geometric optics. Plane and spherical mirrors.	31.1 – 31.5
Week 10	Refraction and dispersion of light. Polarization of light. Thin lenses.	32.1 – 32.4
Week 11	Interference and diffraction of light. Michelson interferometer, two slits interference pattern, single slit diffraction pattern.	33.1 – 33.5
Week 12	Special relativity, Michelson-Morley experiment. The Lorenz transformation, time dilation and length contraction.	Lecture notes
Week 13	Quantum physics. Black body radiation, photoelectric effect, the uncertainty principle. The hydrogen atom.	Lecture notes
Week 14	**FINAL EXAM**	

NOTES

1. Students are required to follow all College policies. Policies are available on the website at: Coquitlam College Policies
2. To find out how this course transfers, visit the BC Transfer Guide at: bctransferguide.ca