Physics, Grade 12 University Preparation SPH 4U Course Outline

Victoria Park Collegiate Institute, TDSB
The Ontario Curriculum: The Ontario Curriculum: Science 2008
Grade 12, University Preparation, 1.0 credit
Prerequisites: Grade 11, University Preparation Physics
Assistant Curriculum Leaders:
S. Reichling, K. Thorne, Science Office room 221; extension 20095

Course Description

This course enables students to deepen their understanding of physics concepts and theories. Students will continue their exploration of energy transformations and the forces that affect motion, and will investigate electrical, gravitational, and magnetic fields and electromagnetic radiation. Students will also explore the wave nature of light, quantum mechanics, and special relativity. They will further develop their scientific investigation skills, learning, for example, how to analyse, qualitatively and quantitatively, data related to a variety of physics concepts and principles. Students will also consider the impact of technological applications of physics on society and the environment.

Resources

Text: Physics, published by Irwin
Note: Textbooks are lent to students and must be returned by the end of the semester.
Replacement cost if lost is $125.00

Curriculum Expectations

A. Scientific Investigation Skills and Career Exploration:

Throughout this course, students will:
A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);
A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

B. Dynamics

By the end of this course, students will:
B1. analyse technological devices that apply the principles of the dynamics of motion, and assess the technologies' social and environmental impact;
B2. investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems;
B3. demonstrate an understanding of the forces involved in uniform circular motion and motion in a plane.

C. Energy and Momentum

By the end of this course, students will:
C1. analyse, and propose ways to improve, technologies or procedures that apply principles related to energy and momentum, and assess the social and environmental impact of these technologies or procedures;
C2. investigate, in qualitative and quantitative terms, through laboratory inquiry or computer simulation, the relationship between the laws of conservation of energy and conservation of momentum, and solve related problems;

C3. demonstrate an understanding of work, energy, momentum, and the laws of conservation of energy and conservation of momentum, in one and two dimensions.

D. Gravitational, Electric, and Magnetic Fields

By the end of this course, students will:

D1. analyse the operation of technologies that use gravitational, electric, or magnetic fields, and assess the technologies' social and environmental impact;

D2. investigate, in qualitative and quantitative terms, gravitational, electric, and magnetic fields, and solve related problems;

D3. demonstrate an understanding of the concepts, properties, principles, and laws related to gravitational, electric, and magnetic fields and their interactions with matter.

E. The Wave Nature of Light

By the end of this course, students will:

E1. analyse technologies that use the wave nature of light, and assess their impact on society and the environment;

E2. investigate, in qualitative and quantitative terms, the properties of waves and light, and solve related problems;

E3. demonstrate an understanding of the properties of waves and light in relation to diffraction, refraction, interference, and polarization.

F. Revolutions in Modern Physics: Quantum Mechanics and Special Relativity

F1. analyse, with reference to quantum mechanics and relativity, how the introduction of new conceptual models and theories can influence and/or change scientific thought and lead to the development of new technologies;

F2. investigate special relativity and quantum mechanics, and solve related problems;

F3. demonstrate an understanding of the evidence that supports the basic concepts of quantum mechanics and Einstein's theory of special relativity.

Course Content

Unit	**Timeline**
Dynamics	25 hours
Energy and Momentum	23 hours
Electric, Gravitational and Magnetic Fields	20 hours
The Wave Nature of Light	22 hours
Revolutions in Modern Physics	20 hours

**Times listed are approximate. Order of instruction may vary.*

Course Evaluation

Learning Skills

Students will be assessed on the following Six Learning Skills;

Responsibility, Organization, Independent Work, Collaboration, Initiative, Self-Regulation

Teaching/Assessment and Evaluation Strategies

A range of instructional strategies will be used to address student needs. Some of these strategies include direct instruction, interactive instruction, experiential learning and independent study. Students are given opportunities to learn through assessment before evaluations.

Summative evaluation for this course is based on a final exam.

Achievement Chart

- **Knowledge and Understanding – K & U (35%)**
  Assessment/Evaluation may include quizzes, homework checks, tests, problem sets, assignments, etc.
- **Communication – C (20%)**
  Assessment/Evaluation may be based on laboratory reports, written reports, essays, oral presentations, in-class questions and answers, terminology, etc.
- **Thinking and Investigation – T& I (25%)**
  Assessment/Evaluation may include scientific inquiry, technical skills, open ended test questions, concept maps, formulating questions, etc.
- **Application – A (20%)**
  Assessment/Evaluation may include research, projects, debates, interviews, analyzing issues, assessing impacts and proposing courses of action, etc.

70% Grade on Course Work

Dynamics

Task	Achievement Chart Focus			
	K&U	T/I	C	A
Dynamics Assessment	x	x		
Lab/Assignment	x	x	x	
Unit Test	x	x	x	x

Energy and Momentum

Task	Achievement Chart Focus			
	K&U	T/I	C	A
Energy & Momentum Assessment	x	x		
Lab/Assignment	x	x	x	
Unit Test	x	x	x	x

Electric, Gravitational and Magnetic Fields

Task	Achievement Chart Focus			
	K&U	T/I	C	A
Fields Assessment	x	x		
Lab/Assignment	x	x	x	
Unit Test	x	x	x	x

The Wave Nature of Light

Task	Achievement Chart Focus			
	K&U	T/I	C	A
Light Assessment	x	x		
Lab/Assignment	x	x	x	
Unit Test	x	x	x	x

Revolutions in Modern Physics

Task	Achievement Chart Focus			
	K&U	T/I	C	A
Modern Physics Assessment	x	x	x	x

****** Above task list subject to changes. Many of the above tasks will include Higher Order Thinking Skills (HOTS).

**Lab and lab activities involve skills. Evaluation of labs and skills are done on those actually performed by the student. Lab materials are seldom available after the activity. Regular attendance is critical for participation in and evaluation of these labs and skills.

30% Grade Based on Common Course-Culminating Activities
All students will write a final exam during exam week at the end of the course. A doctor's note will be required for absences from culminating activities and exams. For more detail, please consult the Student Agenda.

Late Assignments/Missed Evaluations
5% per school day will be deducted for late assignments at the teacher's discretion
Missed tests or quizzes may result in a mark of zero if appropriate documentation is not provided. Chronic absences from evaluations may result in referral to administration.

Grade Reports throughout the Year
The grade for each term/reporting period is based on the evaluations that have been conducted to that point in the course. They will be based on the most consistent level of achievement to that time. The students' grades may change when all work is evaluated by the end of the course. An interim report will be sent home in October/March.
Midterm reports will be sent home with the students approximately half way through the semester.

Accommodations
Accommodations refer to the teaching strategies, supports, and/or services that are required in order for a student to access the curriculum and demonstrate learning. Students who have an IEP are entitled to the accommodations specified in their plans.
The following considerations apply to each of the units in this course: *Instructional and assessment activities must take into account the strengths, needs, learning expectations and accommodations as identified in the Individual Education Plan whether students are formally identified or not.* (Regulation 181/98)

Policies and Procedures
See the Victoria Park C.I. Student Agenda for additional details on School Policies on Homework, Attendance, Lateness, Missing and Late Assignments and Assessments, Course Modifications and Academic Honesty.