



**Ontario eSecondary School  
Course Outline  
2018-2019**

<b>Ministry of Education Course Title: Physics, Grade 11, University Preparation</b>	
<b>Ministry Course Code: SPH3U</b>	
<b>Course Type: University Preparation</b>	
<b>Grade: 11</b>	
<b>Credit Value: 1.0</b>	
<b>Prerequisite(s): Science, Grade 10, Academic</b>	
<b>Department: Science</b>	
<b>Course developed by: Rick Kibalenko</b>	<b>Date: September 20, 2017 Revised: April 1, 2019</b>
<b>Length: One Semester</b>	<b>Hours: 110</b>
This course has been developed based on the following Ministry documents: 1. <i>The Ontario Curriculum, Grades 11 and 12 Science, Revised 2008</i>	

## **COURSE DESCRIPTION/RATIONALE**

This course develops students' understanding of the basic concepts of physics. Students will explore kinematics, with an emphasis on linear motion; different kinds of forces; energy transformations; the properties of mechanical waves and sound; and electricity and magnetism. They will enhance their scientific investigation skills as they test laws of physics. In addition, they will analyse the interrelationships between physics and technology, and consider the impact of technological applications of physics on society and the environment.

## **OVERALL CURRICULUM EXPECTATIONS**

### **UNIT 1:**

By the end of this course, students will:

1. analyse technologies that apply concepts related to kinematics, and assess the technologies' social and environmental impact
2. investigate, in qualitative and quantitative terms, uniform and non-uniform linear motion, and solve related problems
3. demonstrate an understanding of uniform and non-uniform linear motion, in one and two dimensions

### **UNIT 2:**

By the end of this course, students will:

1. analyse and propose improvements to technologies that apply concepts related to dynamics and Newton's laws, and assess the technologies' social and environmental impact
2. investigate, in qualitative and quantitative terms, net force, acceleration, and mass, and solve related problems
3. demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension.

### **UNIT 3:**

By the end of this course, students will:

1. analyse technologies that apply principles of and concepts related to energy transformations, and assess the technologies' social and environmental impact
2. investigate energy transformations and the law of conservation of energy, and solve related problems
3. demonstrate an understanding of work, efficiency, power, gravitational potential energy, kinetic energy, nuclear energy, and thermal energy and its transfer (heat)

### **UNIT 4:**

By the end of this course, students will:

1. analyse how mechanical waves and sound affect technology, structures, society, and the environment, and assess ways of reducing their negative effects
2. investigate, in qualitative and quantitative terms, the properties of mechanical waves and sound, and solve related problems
3. demonstrate an understanding of the properties of mechanical waves and sound and of the principles underlying their production, transmission, interaction, and reception.

### **UNIT 5:**

By the end of this course, students will:

1. analyse the social, economic, and environmental impact of electrical energy production and technologies related to electromagnetism, and propose ways to improve the sustainability of electrical energy production
2. investigate, in qualitative and quantitative terms, magnetic fields and electric circuits, and solve related problems
3. demonstrate an understanding of the properties of magnetic fields, the principles of current and electron flow, and the operation of selected technologies that use these properties and principles to produce and transmit electrical energy

## COURSE CONTENT

<i>Unit</i>	<i>Length</i>
<b>Unit A: Scientific Investigation Skills and Career Exploration</b>	Throughout the course In the form of investigations and inquiry-based activities
Unit 1: Kinematics	34 hours
Unit 2: Forces	16 hours
Unit 3: Energy and Society	30 hours
Unit 4: Waves and Sound	18 hours
Unit 5: Electricity and Magnetism	13 hours
Exam	3 Hours
<b>Total</b>	<b>110 Hours</b>

## UNIT DESCRIPTIONS

### Unit 1- Kinematics

1. Motion involves a change in the position of an object over time.
2. Motion can be described using mathematical relationships.
3. Many technologies that apply concepts related to kinematics have societal and environmental implications

### Unit 2 – Forces

1. Forces can change the motion of an object.
2. Applications of Newton’s laws of motion have led to technological developments that affect society and the environment

### Unit 3 – Energy and Society

1. Energy can be transformed from one type to another.
2. Energy transformation systems often involve thermal energy losses and are never 100% efficient.
3. Although technological applications that involve energy transformations can affect society and the environment in positive ways, they can also have negative effects, and therefore must be used responsibly.

### Unit 4 – Waves and Sound

1. Mechanical waves have specific characteristics and predictable properties.
2. Sound is a mechanical wave.
3. Mechanical waves can affect structures, society, and the environment in positive and negative ways.

### Unit 5 – Electricity and Magnetism

1. Relationships between electricity and magnetism are predictable.
2. Electricity and magnetism have many technological applications.
3. Technological applications that involve electromagnetism and energy transformations can affect society and the environment in positive and negative ways.

## TEACHING AND LEARNING STRATEGIES

### The students will experience a variety of activities:

**Teacher demonstrations** (research skills, etc.) through video conferencing, email, or telephone conversations with subject teacher, or videos provided of a teacher or student demonstrating the concepts and skills being studied. This helps the student and teacher create an atmosphere of trust and respect to aid in the online learning environment.

**Video presentations** and technological aids (research) with videos embedded to enrich the course content and clarify concepts and skills being studied. Also the use of online pre-approved quizzes and games to help a student become more familiar with the concepts and skills being studied.

**Diagnostic and review activities** (audio and video taping) can be student-lead or teacher lead to work as a review for students through audio and video made to share among each other to help reinforce the concepts and skills being studied.

**Brainstorming, charts and graphs** are a great way for students to demonstrate their knowledge of subject matter through graphic organizers, pictures, and texts. This is communicated through assignments in Moodle.

**Oral presentations** in an online environment we have the equipment to have student either live video conference oral presentations, or make videos and submit them for their oral presentations. These oral presentations can be viewed by fellow students (when appropriate) and the teacher. Students can learn from one another, and from their teacher. Such activities include dramatic readings and performances.

**Charts and graphs** are used to present effective learning opportunities of concepts and skills to students who would benefit from visual objects to learn. Every student learns differently, and it is used to help students discover another way to present their information such as graphic organizers, lists, and pictures.

### Individual Activities

The teacher should provide a variety of individual assignments to expand and consolidate the learning that takes place in the whole-class and small group activities. Individual activities allow the teacher to accommodate interests and needs and to access the progress of individual students. The teacher plays an important role in supporting these activities through the provision of ongoing feedback to the students, both orally and in writing. Teachers are encouraged to include individual activities such as the following in the course:

**Research** is completed in an online environment by teaching the students first about plagiarism rules and giving examples of good sources to use. The students are not only limited to the online search for information, but have resources available by links on the Moodle page of information that has been scanned and uploaded.

**Individual assignments** are worked on at a student's own pace. The teacher can support the student in these activities with ongoing feedback.

**Oral presentations** are facilitated through the use of video conferencing and video recording.

**Practical extension and application of knowledge** helps students develop their own voice, and gives them the ability to make personal connections, and connections to the world throughout their course. Students are given a variety of reading and viewing texts to give them many chances to apply their new concepts, skills, and knowledge.

**Ongoing project work** is something that is valued in the earning of an English credit. The ongoing project can be submitted to the teacher for ongoing feedback in both written and oral work.

**Reading** students are able to read a variety of texts online. The students may print out the reading material to use it to highlight, take notes, and have with them when a computer is not available.

**Written assignments** are used to allow students to develop their skills in writing, comprehension, and communication. With the online format students submit their work, and have a chance to get feedback from the teacher, and submit their best work. This can be demonstrated with reading responses, personal writing, report writing, essay writing, script writing, business and technical writing, and individual research assignments.

## **ASSESSMENT, EVALUATION, AND REPORTING**

**Assessment:** The process of gathering information that accurately reflects how well a student is achieving the identified curriculum expectations. Teachers provide students with descriptive feedback that guides their efforts towards improved performance.

**Evaluation:** Assessment of Learning focuses on Evaluation which is the process of making a judgement about the quality of student work on the basis of established criteria over a limited, reasonable period of time.

**Reporting:** Involves communicating student achievement of the curriculum expectations and Learning Skills and Work Habits in the form of marks and comments as determined by the teacher's use of professional judgement.

## **STRATEGIES FOR ASSESSMENT**

Assessment practices can nurture students' sense of progress and competency and information instruction. Many diagnostic tools, e.g. checklists and inventories, are used at regular intervals throughout the units to encourage students' understanding of their current status as learners and to provide frequent and timely reviews of their progress. Assessment of student acquisition of listening and talking, reading and viewing and writing skills also occurs regularly through unobtrusive teacher observation and conferencing.

Units conclude with performance tasks, e.g., interviews and from essays that build towards and prepare students for the end-of-course culminating task in Unit Five. Teachers are encouraged to share goals with students early in the course and to connect unit learning experiences frequently and explicitly with big ideas, overall expectations, and performance tasks, i.e. check bricks; teacher-adapted generic rubrics available in many sources, including the *Ontario Secondary School Literacy Course (OSSLC) Profile*, so that they are more task-specific. The teacher might ask: "What does the criteria look like for this particular task?" Or "What does limited effectiveness look like?" The teacher could involve students in the discussion, modification, or creation of rubrics, and teach students to use rubrics as a learning tool that can support the writing process and practice.

## **ASSESSMENT ACTIVITIES**

- Homework assignments
- Individual conference meetings
- Discussion Forums
- Diagnostic tests and writing tasks
- Completed Templates & Graphic Organizers
- Editing Checklists
- Reflections
- Oral presentations
- Tests & Exam
- Evaluations
- Virtual labs (live)
- Gizmos Simulations

## EVALUATION

The final grade will be determined as follows:

- ❑ Seventy per cent of the grade will be based on evaluation conducted throughout the course. This portion of the grade should reflect the student’s most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.
- ❑ Thirty per cent of the grade will be based on a final evaluation administered at or towards the end of the course. This evaluation will be based on evidence from one or a combination of the following: an examination, a performance, an essay, and/or another method of evaluation suitable to the course content. The final evaluation allows the student an opportunity to demonstrate comprehensive achievement of the overall expectations for the course.

*(Growing Success: Assessment, Evaluation and Reporting in Ontario Schools. Ontario Ministry of Education Publication, 2010 p.41)*

<b>Weightings</b>	
<b>Course Work</b>	<b>70</b>
Knowledge/Understanding	17.5
Thinking/Inquiry	17.5
Communication	17.5
Application	17.5
<b>Final</b>	<b>30</b>
Final Exam	20
Research Project	5
Portfolio	5

## TERM WORK EVALUATIONS (70%):

Evaluation Item	Description	Category
Virtual Physics labs	Throughout each unit several Virtual Labs are assigned. It is the responsibility of the student to complete these virtual labs to gain an understanding and “discover” what they are learning. It also allows them to practice the steps in scientific inquiry. The quizzes after each Virtual Lab will assess the student’s comprehension of their performance.	K,T,C,A
Checkpoints	Checkpoints supplement lessons and are used to assess whether or not students are meeting criteria for success. It is imperative each Checkpoint is completed and submitted before the students move on to the next one.	K,T,C, A
Unit Test(s)	Unit tests are based on curriculum expectations and cover the entirety of each unit.	K,T,C,A

## **FINAL EVALUATIONS (30%):**

Evaluation Item	Description	Category
Final Exam	A final, written examination, covering all curriculum expectations for the course.	K,T,C,A
Portfolio	A portfolio that is collection of the students work and shows evidence of growth.	K, T, C, A
Research Assignment	A research assignment that allows the student to demonstrate understanding and real-world application of physics concepts used throughout the course	K, T, C, A

## **CONSIDERATION FOR PROGRAM PLANNING**

Students learn best when they are engaged in a variety of ways of learning. Guidance and career education courses lend themselves to a wide range of approaches in that they require students to research, think critically, work cooperatively, discuss relevant issues, and learn through practice in a variety of settings. Helping students become self-directed, lifelong learners is a fundamental aim of the guidance and career education curriculum. When students are engaged in active and experiential learning strategies, they tend to retain knowledge for longer periods and develop meaningful skills. Active and experiential learning strategies also enable students to apply their knowledge and skills to real-life issues and situations.

### **ANTIDISCRIMINATION EDUCATION IN GUIDANCE AND CAREER EDUCATION**

Classroom teachers are the key educators of students who have special education needs. They have a responsibility to help all students learn, and they work collaboratively with special education teachers, where appropriate, to achieve this goal. Special Education Transformation: The Report of the Co-Chairs with the Recommendations of the Working Table on Special Education, 2006 endorses a set of beliefs that should guide program planning for students with special education needs in all disciplines. Those beliefs are as follows: All students can succeed. Universal design and differentiated instruction are effective and interconnected means of meeting the learning or productivity needs of any group of students. Successful instructional practices are founded on evidence-based research, tempered by experience.

### **PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS**

Ontario schools have some of the most multilingual student populations in the world. The first language of approximately 20 per cent of the students in Ontario's English language schools is a language other than English. Ontario's linguistic heritage includes several Aboriginal languages; many African, Asian, and European languages; and some varieties of English, such as Jamaican Creole. Many English language learners were born in Canada and raised in families and communities in which languages other than English were spoken, or in which the variety of English spoken differed significantly from the English of Ontario classrooms. Other English language learners arrive in Ontario as newcomers from other countries; they may have experience of highly sophisticated educational systems, or they may have come from regions where access to formal schooling was limited. When they start school in Ontario, many of these students are entering a new linguistic and cultural environment.

### **THE ROLE OF TECHNOLOGY IN THE ENGLISH PROGRAM**

Information and communications technologies (ICT) provide a range of tools that can significantly extend and enrich teachers' instructional strategies and support students' language learning. ICT tools include multimedia resources, databases, Internet websites, digital cameras, and word-processing programs. Tools such as these can help students to collect, organize, and sort the data they gather and to write, edit, and present reports on their findings. Information and communications technologies can also be used to connect students to other schools, at home and abroad, and to bring the global community into the local classroom. Whenever appropriate, therefore, students should be encouraged to use ICT to support and communicate their learning.

## ACCOMMODATIONS

Accommodations will be based on meeting with parent, teachers, administration and external educational assessment report. The following three types of accommodations may be provided:

- Instructional accommodations:** such as changes in teaching strategies, including styles of presentation, methods of organization, or use of technology and multimedia.
- Environmental accommodations:** such as preferential seating or special lighting.
- Assessment accommodations:** such as allowing additional time to complete tests or assignments or permitting oral responses to test questions.

Other examples of modifications and aids, which may be used in this course, are:

- Provide step-by-step instructions.
- Help students create organizers for planning writing tasks.
- Permit students a range of options for reading and writing tasks.
- Where an activity requires reading, provide it in advance.
- Provide opportunities for enrichment.