North Vancouver Online Learning

Course Plan: Physics 11
Teacher Name: Mr. Naresh Chand
Contact information: nchand@sd44.ca (*Moodle / Remind messaging preferred)

Course Description:

Physics 11 is a course designed to introduce the main ideas, principles, and unifying concepts in physics; to develop an understanding of the analytical and experimental methods of inquiry used in science; and to promote an understanding of how physics applies to everyday life for those students who intend to go on to careers in the basic or applied sciences. It includes the study of kinematics motion, dynamics (forces), momentum, energy (mechanical, heat and light), waves, nuclear fission and fusion, and relativity. Students will develop some of the skills that scientists have used throughout the centuries to answer questions about their reality. For the complete Ministry curriculum Physics 11 document go to: https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/curriculum/science/en_science_11_physics.pdf

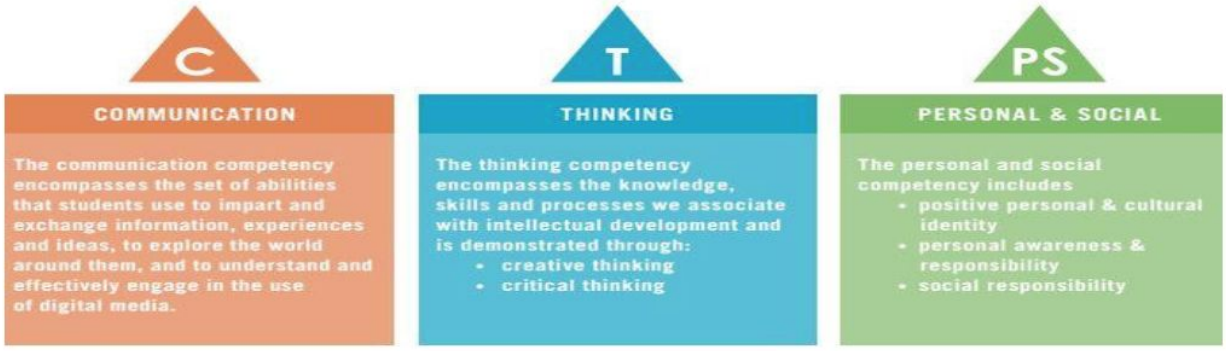
BIG IDEAS:

The Big Ideas consist of generalizations and principles and the key concepts important in an area of learning. They reflect the “Understand” component of the Know-Do-Understand model of learning. The big ideas represent what students will understand at the completion of the curriculum for their grade. They are intended to endure beyond a single grade and contribute to future understanding. Students will explore and understand the following four Big Ideas throughout the Physics 11 course:

An object’s **motion** can be predicted, analyzed, and described.	**Forces** influence the motion of an object.
Energy is found in different forms, is conserved, and has the ability to do work.	Mechanical **waves** transfer energy but not matter.

CORE COMPETENCIES:

A Core Competency is a skill that all learners need to have to be successful in all aspects of their life. There are 3 core competencies: Communication (Communicating & Collaborating), Thinking (Critical Thinking, Creative Thinking), and Personal & Social (Positive Personal & Cultural Identity, Personal Awareness & Responsibility, and Social Responsibility).



Course Expectations:

Communication:

Please check the courseware regularly for updates and changes as it will evolve over the semester / year.

While this course is primarily asynchronous (self directed one way communication) hopefully, there will be opportunities to make the course more synchronous (teacher directed two way communication) by utilizing discussion boards, virtual classroom time as well as other on-line tools.

Be sure to use your Moodle message system for communication and I will do my best to respond in a timely manner.

Resources:

There is no text required for this course. All information is delivered online using a variety of methods (videos, interactive tutorials, text, external links to other websites)
A supplemental paper text book can be offered if necessary.

Exam Supervision

All unit exams are "closed book" and require supervision. Please make sure to use the “Test Sign Up” button to book a time to come into a OLCentre at Mountainside or go to your school’s* OL Centre (*if in North Vancouver) to write your assessments. **(*Due to CoVid restrictions, the process for “Exam Supervision” has been adjusted. Please contact your teacher for full details)**

Assignments

Before you write a unit exam, you must send me all assignments and labs leading up to the exam. Digital copies are preferred and should be submitted in the drop boxes in the course.

Assignment and lab submissions MUST be very neat and well organized. All "Learning Guide" assignments MUST be self assessed and a marking rubric attached to the front of each one before submitting.

You also need to put a check mark beside each answer indicating that you got it right and you know what you are doing. If you can't mark it right, you should be asking for help. Any corrections should be written down in a different pen or pencil.
Please check an example of a Learning Guide homework submission.

I assume that you will do all the required assignments. Success on the Unit, and Final Exams depends upon exposure to a large variety of questions and lots of practice.

LEARNING STANDARDS: Curricular Competencies

Students are expected to be able to do the following:

Questioning and predicting
• Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest
• Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world
• Formulate multiple hypotheses and predict multiple outcomes

Planning and conducting
• Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
• Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods
• Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data
• Apply the concepts of accuracy and precision to experimental procedures and data:
— significant figures
— uncertainty
— scientific notation

Processing and analyzing data and information

• Experience and interpret the local environment
• Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information
• Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies
• Construct, analyze, and interpret graphs, models, and/or diagrams
• Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
• Analyze cause-and-effect relationships

Evaluating
• Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
• Describe specific ways to improve their investigation methods and the quality of the data
• Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled
• Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources
• Consider the changes in knowledge over time as tools and technologies have developed
• Connect scientific explorations to careers in science
• Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources
• Consider social, ethical, and environmental implications of the findings from their own and others' investigations
• Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems
• Assess risks in the context of personal safety and social responsibility

Applying and innovating
• Contribute to care for self, others, community, and world through individual or collaborative approaches
• Cooperatively design projects with local and/or global connections and applications
• Contribute to finding solutions to problems at a local and/or global level through inquiry
• Implement multiple strategies to solve problems in real-life, applied, and conceptual situations
• Consider the role of scientists in innovation

Communicating

•Formulate physical or mental theoretical models to describe a phenomenon

• Communicate scientific ideas and information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations

• Express and reflect on a variety of experiences, perspectives, and worldviews through place

Student Substantive Activities will cover the following **Learning Outcomes (Curricular Competencies).**

- Apply the concepts of accuracy and precision to experimental procedures and data:
  — significant figures
  — uncertainty
  — scientific notation
- Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies
- Construct, analyze, and interpret graphs, models, and/or diagrams
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence

These are 5 of the 30 learning outcomes in the course curriculum, which comprises ~15% of the course Learning Outcomes/Activities. (5/30 =17%)

LEARNING STANDARDS: Course Content

Students are expected to know the following:

Students are expected to know the following:
• vector and scalar quantities
• horizontal uniform and accelerated motion
•projectile motion
• contact forces and the factors that affect magnitude and direction
• mass, force of gravity, and apparent weight
• Newton's laws of motion and free-body diagrams
• balanced and unbalanced forces in systems

• conservation of energy; principle of work and energy
• power and efficiency
• simple machines and mechanical advantage
• applications of simple machines by First Peoples
• electric circuits (DC), Ohm's law, and Kirchhoff's laws
• thermal equilibrium and specific heat capacity
• generation and propagation of waves
• properties and behaviours of waves
• characteristics of sound
• resonance and frequency of sound
• graphical methods in physics

UNIT OVERVIEWS AND LEARNING ACTIVITIES:

The course is broken down as follows:

U1: MathTools

Big Idea:

- An object's motion can be predicted, analyzed, and described.

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves patience and time

Unit Overview:

The **Math Tools** unit will focus on scientific method, measurements, math methods related to the analysis of scientific data. The skills practiced in this unit will a broad review of concepts covered in earlier math and science courses with specific focus on the graphing. Representing data graphically and applying the concepts of significant figures, precision, and accuracy will be practiced in the assignment section. Graphs will be explored further to show how the same data can be manipulated to support or dis credit and the reader's task is to reach scientifically sound conclusions.

U2: Motion: 1D Kinematics

Big Idea:

- An object's motion can be predicted, analyzed, and described.

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves patience and time

Unit Overview:

In the **1D motion** unit, students will demonstrate an understanding of uniform and non-uniform linear motion, in one dimension. They will apply knowledge of the

relationships between time, displacement, distance, velocity, and acceleration to situations. They will investigate, in qualitative and quantitative terms, uniform and non-uniform motion, and solve related problems. The lab section will allow students to become familiar with technology that will be used to analyze video files which will be used throughout the course.

U3: Projectiles: 2D Kinematics

Big Idea:

- An object's motion can be predicted, analyzed, and described.
- Forces influence the motion of an object

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves patience and time

Unit Overview:

In the **Projectiles** unit, students will demonstrate an understanding that a projectile experiences a constant downward acceleration due to gravity if friction is ignored.

Students will solve projectile motion problems involving displacement, initial velocity, final velocity and acceleration due to gravity. Three different projectile types will be studied in detail using vector analysis.

U4-5: Forces (1D and 2D)

Big Idea:

- An object's motion can be predicted, analyzed, and described.
- Forces influence the motion of an object

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves patience and time

Unit Overview:

In the **Forces** unit, students will demonstrate an understanding of the relationship between changes in velocity and unbalanced forces in one dimension. They will investigate qualitatively and quantitatively net force, acceleration, and mass; and solve related problems. They will analyse and propose improvements to technologies that apply concepts related to dynamics and Newton's laws.

U6: Energy

Big Idea:

- Forces influence the motion of an object
- Energy is found in different forms, is conserved, and has the ability to do work.

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves patience and time

Unit Overview:

Students will demonstrate an understanding of work, efficiency, power, gravitational potential energy, kinetic energy, nuclear energy, and thermal energy and its transfer as heat. They will investigate energy transformations and the law of conservation of energy, and solve related problems. They will analyse technologies that apply principles of, and concepts related to energy transformations.

U7: Electricity

Big Idea:

- Forces influence the motion of an object
- Energy is found in different forms, is conserved, and has the ability to do work.

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves patience and time

Unit Overview:

Students will demonstrate an understanding of the properties of electric fields, the principles of current and electron flow, and the operation of selected technologies that use the properties and principles to produce and transmit electrical energy. They will investigate electric circuits and solve related problems. They will analyse the social, economic and environmental impact of electrical energy production and technologies related to power transmission.

U8: Waves

Big Idea:

- Forces influence the motion of an object
- Energy is found in different forms, is conserved, and has the ability to do work.

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves patience and time

Unit Overview:

Students will demonstrate an understanding of the properties of mechanical waves and sound and of the principles underlying their production, transmission, interaction, and reception. They will investigate the properties of mechanical waves and sound, and solve related problems. They will analyse how mechanical waves and sound affect technology, structures, society, and the environment, and assess ways of reducing their negative side effects.

Student Learning Activities and Strategies:

Students may engage in the following learning activities and strategies:

- conduct appropriate experiments (*virtual or real*)
- systematically gather and organize data from experiments
- make use of award winning Phet simulation browser based software to conduct virtual simulations
- watch video explanations and interactive tutorials
- attend virtual classroom tutorial support
- design and build a simple machine (mouse trap car)
- participate in forum discussions related to course content and current trends in physics

Keys to Success:

1. Study the Lesson and take good notes for reference when working on homework. Make sure you can do and understand the problems you are shown in the many examples given in each lesson.
2. Once you have completed a Learning Guide and Lab to the best of your ability submit it to your teacher and write the end of unit assessment shortly after.
3. Make sure you understand any quiz question you get wrong. If you can't figure it out - ASK!
4. Physics 11 is an academic course. Work out a schedule for yourself of how many lessons you will complete each week. You need to consider either a 2, 4, 6+ month schedule for completion and with the assistance of your teacher design a pacing schedule that will see you reach your goal.

5. **IMPORTANT SCHEDULING / DEADLINE INFORMATION: This online course is a *partially self paced course.* You have the ability to control the pace of the course but must communicate clearly your intentions.** You will have to choose a pace that the course will move forward at. Once you have chosen a pace, you will have to try and meet the unit completion deadlines based on the pace you have chosen. *If you feel that you will miss an upcoming deadline, you can consult with the teacher and adjust it BUT this MUST happen before the deadline date. A percentage of marks will be assigned to this self directed goal setting and by simply communicating and maintaining a consistent pace you will be able to improve your overall mark.*

Assessment:

***NOTE: NVDL TEST POLICY: You must show picture id whenever writing a test**

Assessment of student performance will include some or all of the following strategies:

o online quizzes , unit exams and a final exam (written and OPTIONAL* M/C)

o worksheets, assignments and virtual labs (variety of self marked and submitted work)

o researching, designing and building a "MouseTrap" car. The car will be tested and data collected so that a final report can be submitted to summarize the results of the project

Evaluation:

Item	Weight
Unit Quizzes	**~ 3- 5%**
Meeting Deadlines / Course Pacing*	**~ ? %**
Learning Guides	**~8%**
Lab Guides / Assignments	**~15 %**
Unit Exams	**~45%**
Project	**~ 12%**
Optional Part A: Final Exam (covers Units 1-8) (M/C) **make-up marks"*	**?%**
Part B: Final Exam (covers Units 1-8) Written **mandatory**	**~ 20%**
*** This weighting may change without notice**	