BIG IDEAS

2D Kinematics
Kinematics allows us to predict, describe, and analyze an object's motion.

2D Dynamics
Forces influence the motion of an object.

2D Momentum and Energy
Momentum and energy are conserved within a closed system.

CHOOSE TWO MODULES (one electric and one force)

Electrostatics
Electric fields and forces describe how charges interact.

Electromagnetic Forces and Induction
The electromagnetic force produces both electricity and magnetism.

Equilibrium
An object in equilibrium is subject to zero net force and zero net torque.

Circular Motion and Gravitation
- Circular motion occurs as a result of a centre seeking force and can be used to describe and predict the motion of objects on Earth and in the universe.
- Gravitational forces and fields describe how masses interact.

Learning Standards

Curricular Competencies	Content
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	**This course comprises five modules — all students take three modules which are core to the course and teachers choose an additional two modules (one force and one electric) to complete the course.** *Students are expected to know the following:* **The following three modules are core to the course:** **2D Kinematics** • **vector analysis** • **relative motion** • accelerated motion • **projectile motion** • **the relationship between variables**

Learning Standards (continued)

Curricular Competencies	Content
• 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	**2D Dynamics** • applications of Newton's laws: – inertial mass versus gravitational mass – **apparent weight** • **applications of dynamics:** – **net force** – acceleration of a **system** • **the relationship between variables** **2D Momentum and Energy** • momentum and impulse • **the law of conservation of momentum** • the law of conservation of energy • collisions: – elastic – inelastic • **applications of conservation laws** • **the relationship between variables**

Learning Standards (continued)

Curricular Competencies	Content
Applying and innovating • Contribute to care for self, others, community, and world through individual or collaborative approaches • Co-operatively 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, 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	**Choose one of the two electric modules below to complete the course:** **Electrostatics** • **electric charge** • **electric force** • **electric field** • electric potential energy • **electric potential** • **applications of electrostatics** • **the relationship between variables** **Electromagnetic Forces and Induction** • **properties of magnetism** • **electromagnetism:** – **electromagnetic force** – **electromagnetic field** • electromagnetic induction: – Faraday's law – Lenz's law • **applications of electromagnetic induction** • **the relationship between variables**

Learning Standards (continued)

Curricular Competencies	Content
	Choose one of the two force modules below to complete the course: **Equilibrium** • **translational equilibrium** • **rotational equilibrium:** – torque – **lever, the fulcrum, and lever arm** – centre of gravity • **static equilibrium** • **the relationship between variables** **Circular Motion and Gravitation** • **uniform circular motion:** – **kinematics** – **dynamics** • Newton's law of universal gravitation • gravitational field strength • **law of conservation of energy applications:** – gravitational potential energy – work • **the relationship between variables**