

SCIENCE COURSE DESCRIPTIONS

The Science curriculum is designed so that students have the opportunity to develop a background in more than one science stream. All science courses are intended to allow individuals to understand the relationships that science, technology, and society share in our everyday world. Each subject uses laboratory, classroom, and technology activities to illustrate the nature of science and how scientific knowledge evolves.

Choosing the Right Course

- All incoming grade 10 students take a 5-credit Science 10, Science 10AP prep, Science 14, or Science 10-4 course.
- From Science 10, students may choose courses in Biology 20, Chemistry 20, Physics 20 and/or Science 20.
- From the appropriate 20-level courses, students choose the courses in Biology 30, Chemistry 30, Physics 30 and /or Science 30. The recommended mark is 60%.
- Upon successful completion of any 20 level science course students may register in Science 30.

SCIENCE 10 (5 credits)

Recommendation for Success: 60% in Grade 9 Science and Math 9

Science 10 is an introductory course designed to provide a means of showing the connections among science, technology, and society (STS). The four major units are:

- Unit 1: Energy and Matter in Chemical Change
- Unit 2: Energy Flow in Technological Systems
- Unit 3: Cycling of Matter in Living Systems
- Unit 4: Energy Flow in Global Systems

SCIENCE 14 (5 credits)

Prerequisite: Completion of Grade 9 Science

Science 14 is a general introductory course to biology, chemistry and physics. This course introduces students to relevant and practical applications of science to everyday life. It is designed to meet the needs and interests of students who want the basic requirements for a high school diploma.

- Unit 1: Investigating Properties of Matter
- Unit 2: Energy Transfers and Technologies
- Unit 3: Matter and Energy in Living Systems
- Unit 4: Matter and Energy in the Biosphere

Students who achieve a minimum standing of 80% may choose to register in Science 10

SCIENCE 24 (5 credits)

Prerequisite: Science 14 or Science 10

Science 24 continues the study of biology, chemistry, and physics. This course assists students in their understanding of principles behind the natural events that they experience and the technology they use in their lives.

Students who did not attain a 60% average in Science 10 may seek credit for Science 14 and 24 by taking and passing Science 24.

- Unit 1: Applications of Matter and Chemical Change
- Unit 2: Common Energy Conversion Systems
- Unit 3: Disease Defense and Human Health
- Unit 4: Motion, Change and Transportation Safety

Note: Science 24 is an “end of the line” course, in that there is not a Science 34 course. Please refer to the chart on page 27 if you are interested in re-entering the academic Science route.

Science 10-4 (5 credits)

Prerequisite: Recommendation of Junior High Science teacher

Science 10-4 is a general introductory course to biology, chemistry and physics. This course focuses on developing and applying essential science skills, knowledge and attitudes needed for everyday living.

- Unit 1: Investigating Properties of Matter
- Unit 2: Energy Transfers and Technologies
- Unit 3: Matter and Energy in Living Systems
- Unit 4: Matter and Energy in the Biosphere

Students who achieve a minimum standing of 75% may choose to register in Science 14.

Science 20-4 (5 credits)

Prerequisite: Science 10-4

Science 20-4 continues the study of biology, chemistry, and physics. This course emphasizes career and life skills, teamwork, communication skills and thinking processes based on students’ abilities and everyday applications.

- Unit 1: Applications of Matter and Chemical Change
- Unit 2: Common Energy Conversion Systems
- Unit 3: Disease Defense and Human Health
- Unit 4: Motion, Change and Transportation Safety

Science 20, 30 Program Vision

The Science 20/30 program is guided by the vision that all students, regardless of gender or cultural background, are given the opportunity to develop scientific literacy. Diverse learning experiences within the science program provide students with opportunities to explore, analyze and appreciate the interrelationships among science, technology, society and the environment and to develop understandings that will affect their personal lives, their careers and their futures. Science 20/30 equips students with attitudes that they need to solve problems and make decisions and encourages students to become lifelong learners who maintain their sense of wonder about the world around them.

Science 20 (5 credits)

Recommendation for Success: 60% in Science 10

This is an academically based course

- Unit 1: Chemical Changes
- Unit 2: Changes in Motion

- Unit 3: The Changing Earth
- Unit 4: The Changes In Living Systems

Science 30 (5 credits)

Prerequisite: Any 20 level Science course

It is strongly recommended that you have at least a 60% final in your Grade 11 course(s)

This is a diploma exam course.

- Unit 1: Living Systems Respond to their Environment
- Unit 2: Chemistry in the Environment
- Unit 3: Electromagnetic Energy
- Unit 4: Energy and the Environment

Biology 20 (5 credits)

Recommendation for Success: 60% in Science 10

Biology 20 students examine the interactions of living systems to better understand the constant flow of energy and the cycling of matter. Specifically, students explore the functioning of the human body and the mechanisms that work to maintain balance in organisms, in ecosystems and in the biosphere:

- Unit 1: Energy and Matter in the Biosphere
- Unit 2: Photosynthesis and Cellular Respiration
- Unit 3: Ecosystems, Taxonomy and Population Change
- Unit 4: Digestion and Human Health
- Unit 5: Circulation and Immunity
- Unit 6: Respiration and Muscles
- Unit 7: Excretory System

Biology 30 (5 credits)

Recommendation for Success: 60% in Biology 20

Biology 30 students conduct lab work and investigate how human systems sense and respond to the environment. They explore human reproduction and development at the cellular level and at the organism level. Students investigate the basic structure and role of DNA and investigate the inheritance of traits in individuals and populations. They analyze the changes in populations resulting from natural and human-induced changes in the environment and discover that living systems are dynamic:

- Unit 1: The Endocrine system
- Unit 2: The Nervous System and Senses
- Unit 3: Reproduction and Development
- Unit 4: Cellular reproduction
- Unit 5: Inheritance
- Unit 6: Molecular Genetics
- Unit 7: Populations and Community Dynamics

Chemistry 20 (5 credits)

Recommendation for Success: 60% in Science 10 and 60% in Math 10C

How do atoms combine to create matter? Students explore matter and how it changes in order to understand the natural world. They investigate the chemical properties of gases and solutions and apply their understanding of chemical bonds to explain the characteristics of ionic and molecular compounds. Students use mathematical processes to study the quantitative relationships in chemical reactions and develop laboratory skills required for scientific inquiry:

- Unit 1: Matter as Solutions, Acids, Bases and Gases
- Unit 2: Quantitative Relationships in Chemical Changes
- Unit 3: Chemical Bonding in Matter
- Unit 4: The Diversity of Matter

Chemistry 30 (5 credits)

Recommendation for Success: 60% in Chemistry 20 and 60% in Math 20-1

Chemistry 30 students will enhance their scientific literacy by developing an understanding of the nature of science and technology and the practical application of science in the real world.

The units of study include:

- Unit 1: Organic Chemistry
- Unit 2: Thermochemical Changes
- Unit 3: Equilibrium, Acids and Bases
- Unit 4: Electrochemical Changes

Physics 20 (5 credits)

Recommendation for Success: 60% in Science 10 and 60% in Math 10C

Physics 20 students investigate the motion of objects. They apply Newton's law of universal gravitation to astronomical observations. They also describe how energy is transmitted by mechanical waves and how waves relate to medical technologies, industry and musical instruments.

- Unit 1: Kinematics – In this unit, students investigate changes in the position and velocity of objects and systems in a study of kinematics.
- Unit 2: Dynamics – Students investigate causes of change in the position and velocity of objects and systems in a study of dynamic and gravitation. The concept of fields is introduced in the explanation of gravitational effects.
- Unit 3: Circular Motion, Work and Energy - Students extend their study of kinematics and dynamics to uniform circular motion and to mechanical energy, work and power.
- Unit 4: Oscillatory Motion and Mechanical Waves – An introduction to simple harmonic motion and mechanical waves.

Physics 30 (5 credits)

Recommendation for Success: 60% in Physics 20 and Math 20-1

Physics 30 students consider historical experiments and explore why the model of the atom has changed as a result of experiments and observations of natural phenomena. Students apply a quantitative approach to describe conservation of momentum in an isolated system, and they investigate applications and implications of electric and magnetic forces and fields. They also use the concept of wave-particle duality to understand both wave and photon behaviour of electromagnetic radiations.

- Unit 1: Momentum and Impulse – Elastic, inelastic, and two-dimensional collisions plus the Laws of Conservation of Momentum and Energy.
- Unit 2: Forces and Fields – The study of basic electric and magnetic fields, how they relate to each other, and their interaction with charged particles.

- Unit 3: Electromagnetic Radiation – An in-depth look at the properties of light, including reflection, refraction, and diffraction.
- Unit 4: Atomic Physics – This unit includes the study of radioactivity, quantum physics, and particle physics.

Advanced Placement

Science 10AP prep (5 credits)

Recommendation for success: 80% in Grade 9 Science and Math

Science 10 AP Prep is an introductory course that covers the same content as Science 10. The pace of the course is faster, however, and topics will be covered in more depth.

Biology 20AP/30AP

The Biology AP program is designed to prepare students for first year university level Biology. The culmination of this course will result in an Advanced Placement Exam which will be held in May. AP Biology classes will cover the same content as all Biology classes with extra emphasis on the following four big ideas:

- Evolution and Diversity
- Energy in Living Systems
- Interactions in Living Systems
- Communication in Living Systems

The supplemental topics covered are:

Biology 20AP (5 credits)

- survey of the major domains of life
- evolutionary patterns

Biology 30AP (5 credits)

- plant physiology and plant hormones
- prokaryotic and viral chromosome structure and activity

If you have a desire to pursue Biology at the post secondary level, you are strongly encouraged to register for this course.

Chemistry 20AP/30AP

The AP chemistry course is a comprehensive science course that deals with physical Chemistry. It is a demanding and rewarding course that provides the student with the skills and mindset to be successful in first (and second) year study at the college or University level. The successful Chemistry AP student will also be prepared for detailed laboratory investigation and will develop attitudes appropriate for higher level studies.

It is expected that students who choose to register in this course will write the AP exam.

The supplemental topics covered are:

Chemistry 20AP (5 credits)

- Atomic Theory and atomic structure
- Chemical bonding
- Gases
- Liquids and solids
- Solutions

Chemistry 30AP (5 credits)

- Reaction Types
- Stoichiometry
- Equilibrium
- Kinetics
- Thermodynamics

Students interested in the Chemistry AP course should also be registered in Physics 20/30 as the material covered in this course relies heavily on an understanding of the Nature of Matter and Nuclear interactions both of which are covered in physics. This course is designed for the serious chemistry student who is looking toward engineering or science at the college or university level.

Physics 20AP (AP-1)/30AP (AP-2)

The Physics AP program is designed to prepare students for the writing of the College Board AP Exam which is held in early May of each year. A successful grade in the College Board exam can result in the student receiving credit for a first year university level physics course at a wide variety of universities and colleges. Besides covering all levels of the Physics 20 and Physics 30 courses, the students will be expected to satisfactorily complete the following AP curriculum.

It is expected that students who choose to register in this course will write the AP exam.

Physics 20AP (AP-1) (5 credits)

Prerequisite: Successful completion of the Science 10AP Prep course (Final mark above 80%, or teacher approval).

Recommended prerequisite: Math 10C

- AP Physics 1 is an algebra-based, introductory college-level physics course that explores topics such as Newtonian mechanics, work, energy, and power; mechanical waves and sound. This includes the study of basic rotational motion and applied forces, torque, rotational kinematics, and banked curves. This course will also cover basic electric circuits.

Students are expected to write the AP-1 exam in May of their Grade 11 year.

Physics 30AP (AP-2) (5 credits)

Prerequisite: The satisfactory completion of the Physics 20AP course (Final mark above 80%, or with teacher approval)

- AP Physics 2 is an algebra-based, introductory college-level physics course that explores topics such as fluid statics and dynamics; thermodynamics with kinetic theory; PV diagrams and probability; electrostatics; electrical circuits with capacitors; magnetic fields; electromagnetism; physical and geometric optics; and quantum, atomic, and nuclear physics.

Students are expected to write the AP-2 exam in May of their Grade 12 year.