THE ERINDALE ACADEMY

Course Outline

Department:	Science
Course Title:	Science
Grade Level:	10
Course Type:	Academic
Course Code:	SNC2D
Credit Value:	1.00
Prerequisite(s):	Grade 9 Science, Academic or Applied
Policy Document:	*The Ontario Curriculum Grades 9 and 10: Science; Revised 2008*
Developed by:	G. Vanderkuur
Development Date:	November 2016
Revised By:	Fauzia Akhter
Revision Date:	Nov, 2020

COURSE DESCRIPTION / RATIONALE

This course enables students to enhance their understanding of concepts in biology, chemistry, earth and space science, and physics, and of the interrelationships between science, technology, society, and the environment. Students are also given opportunities to further develop their scientific investigation skills. Students will plan and conduct investigations and develop their understanding of scientific theories related to the connections between cells and systems in animals and plants; chemical reactions, with a particular focus on acid-base reactions; forces that affect climate and climate change; and the interaction of light and matter.

OUTLINE OF COURSE CONTENT

Units	Titles	Hours
1	Chemistry: chemical reactions	30
2	E. Physics: light and geometric optics	24
3	Biology: tissues, organs, and systems of living things	30
4	Earth and space science: climate change	11
Final Evaluation	Culminating performance task and Final Exam	6
	Total	110

OVERALL 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 a variety of careers related to the fields of science under study, and identify scientists, including Canadians, who have made contributions to those fields.

B. Biology: Tissues, Organs, And Systems Of Living Things

By the end of this course, students will:
B1. evaluate the importance of medical and other technological developments related to systems biology, and analyse their societal and ethical implications;
B2. investigate cell division, cell specialization, organs, and systems in animals and plants, using research and inquiry skills, including various laboratory techniques;
B3. demonstrate an understanding of the hierarchical organization of cells, from tissues, to organs, to systems in animals and plants.

C. Chemistry: Chemical Reactions

By the end of this course, students will:
C1. analyse a variety of safety and environmental issues associated with chemical reactions, including the ways in which chemical reactions can be applied to address environmental challenges;
C2. investigate, through inquiry, the characteristics of chemical reactions;
C3. demonstrate an understanding of the general principles of chemical reactions, and various ways to represent them.

D. Earth And Space Science: Climate Change

D1. analyse some of the effects of climate change around the world, and assess the effectiveness of initiatives that attempt to address the issue of climate change;
D2. investigate various natural and human factors that influence Earth's climate and climate change;
D3. demonstrate an understanding of natural and human factors, including the greenhouse effect, that influence Earth's climate and contribute to climate change.

E. Physics: Light And Geometric Optics

By the end of this course, students will:
E1. evaluate the effectiveness of technological devices and procedures designed to make use of light, and assess their social benefits;
E2. investigate, through inquiry, the properties of light, and predict its behaviour, particularly with respect to reflection in plane and curved mirrors and refraction in converging lenses;
E3. demonstrate an understanding of various characteristics and properties of light, particularly with respect to reflection in mirrors and reflection and refraction in lenses.

TEACHING & LEARNING STRATEGIES

Using a variety of instructional strategies, the teacher will provide numerous opportunities for students to develop skills of inquiry, problem solving, and communication as they investigate and learn fundamental concepts.

Along with some of the strategies noted in the assessment for, as and of learning charts below, strategies will include:

Activity Based Strategies	**Arts Based Strategies**	**Cooperative Strategies**
Game Field Trip Debate Simulation Survey Case Study	Role Playing	Collaborative Community Links Discussion Interview Jigsaw Peer Practice Peer Teaching Round Table Think/Pair/Share

Direct Instruction Strategies	**Independent Learning Strategies**	**Technology and Media Based Applications**
Demonstration Activities Guest speaker Lecture Reciprocal teaching Review Seminar/Tutorial Task Cards Visual Stimuli Visualization Workbook/Work Sheets	Homework Independent Study Memorization Note Making Response Journal	Internet Technologies Media Presentation Multimedia Applications On-line Public Access Catalogues

STRATEGIES FOR ASSESSMENT & EVALUATION OF STUDENT PERFORMANCE

There are three forms of assessment that will be used throughout this course:

Assessment for Learning: Assessment for Learning will directly influence student learning by reinforcing the connections between assessment and instruction, and provide ongoing feedback to the student. Assessment for Learning occurs as part of the daily teaching process and helps teachers form a clear picture of the needs of the students because students are encouraged to be more active in their learning and associated assessment. Teachers gather this information to shape their classroom teaching.

Assessment for Learning is:

- Ongoing
- Is tied to learning outcomes
- Provides information that structures the teachers planning and instruction
- Allows teachers to provide immediate and descriptive feedback that will guide student learning

The purpose of Assessment for Learning is to create self-regulated and lifelong learners.

Assessment as Learning*:* Assessment as Learning is the use of a task or an activity to allow students the opportunity to use assessment to further their own learning. Self and peer assessments allow students to reflect on their own learning and identify areas of strength and need. These tasks offer students the chance to set their own personal goals and advocate for their own learning.

The purpose of Assessment as Learning is to enable students to monitor their own progress towards achieving their learning goals.

Assessment of Learning: Assessment of Learning will occur at or near the end of a period of learning; this summary is used to make judgments about the quality of student learning using established criteria, to assign a value to represent that quality and to communicate information about achievement to students and parents.

Evidence of student achievement for evaluation is collected over time from three different sources – *observation, conversations,* and *student products.* Using multiple sources of evidence will increase the reliability and validity of the evaluation of student learning.

<table>
<tr><th>Assessment for Learning</th><th>Assessment as Learning</th><th>Assessment of Learning</th></tr>
<tr>
<td>Student Product
Journals
Pre-tests
Exit tickets
Whiteboard Quizzes
Graphic Organizers
Observation
Class discussions
PowerPoint presentations
Performance tasks
Conversation
Student teacher conferences
Small Group Discussions
Pair work</td>
<td>Student Product
Pre-tests
Whiteboard Quizzes
Graphic Organizers
Peer feedback
Exit tickets
Journals
Observation
Class discussions
PowerPoint presentations
Performance tasks
Conversation
Student teacher conferences
Small Group Discussions</td>
<td>Student Product
Assignment
Quests
Tests
Exam
Reports
Portfolio
Observation
PowerPoint presentations
Performance tasks
Conversation
Student teacher conferences
Question and Answer Sessions</td>
</tr>
</table>

EVALUATION

Evaluation will be based on the provincial curriculum expectations and the achievement levels outlined in the curriculum document. Student achievement of the learning expectations will be evaluated according to the following breakdown.

Categories of the Achievement Chart	Description	Wt.
Knowledge & Understanding	Subject-specific content acquired (knowledge), and the comprehension of its meaning and significance (understanding)	25%
Thinking	The use of critical and creative thinking skills and/or processes.	25%
Communication	The conveying of meaning and expression through various art form	25%
Application	The use of knowledge and skills to make connections within and between various contexts.	25%
Total		100%

FINAL MARK

The percentage grade represents the quality of the student's overall achievement of the expectations for the course and reflects the corresponding level of achievement as described in the achievement chart for the arts.

70% of the grade will be based upon evaluations conducted throughout the course. This portion of the grade will reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.

30% of the grade will be based on a final evaluation. At least 20% of this evaluation will be a formal examination. The other 10% may be any one of a variety of assessment tools that suit the students learning style.

CONSIDERATIONS FOR PROGRAM PLANNING

Instructional Approaches

Students come to secondary school with a natural curiosity developed throughout the elementary grades. They also bring with them individual interests and abilities as well as diverse personal and cultural experiences, all of which have an impact on their prior knowledge about science, technology, the environment, and the world they live in. Effective instructional approaches and learning activities draw on students' prior knowledge, capture their interest, and encourage meaningful practice both inside and outside the classroom. Students will be engaged when they are able to see the connection between the scientific concepts they are learning and their application in the world around them and in real-life situations.

Students in a science class typically demonstrate diversity in the ways they learn best. It is important, therefore, that students have opportunities to learn in a variety of ways – individually, cooperatively, independently, with teacher direction, through hands-on experiences, and through examples followed by practice. In science, students are required to learn concepts and procedures, acquire skills, and learn and apply scientific processes, and they become competent in these various areas with the aid of instructional and learning strategies that are suited to the particular type of learning. The approaches and strategies teachers use will vary according to both the object of the learning and the needs of the students.

In order to learn science and to apply their knowledge and skills effectively, students must develop a solid understanding of scientific concepts. Research and successful classroom practice have shown that an inquiry approach, with emphasis on learning through concrete, hands-on experiences, best enables students to develop the conceptual foundation they need. When planning science programs, teachers will provide activities and challenges that actively engage students in inquiries that honour the ideas and skills students bring to them, while further deepening their conceptual understandings and essential skills.

Students will investigate scientific concepts using a variety of equipment, materials, and strategies. Activities are necessary for supporting the effective learning of science by all students. These active learning opportunities invite students to explore and investigate abstract scientific ideas in rich, varied, and hands-on ways. Moreover, the use of a variety of equipment and materials helps deepen and extend students' understanding of scientific concepts and further extends their development of scientific investigation skills.

All learning, especially new learning, should be embedded in well-chosen contexts for learning – that is, contexts that are broad enough to allow students to investigate initial understandings, identify and develop relevant supporting skills, and gain experience with varied and interesting applications of the new knowledge. In the secondary science curriculum, many of these contexts come from the Relating Science to Technology, Society, and the Environment (STSE) expectations. Such rich contexts for learning enable students to see the "big ideas" of science. This understanding of "big ideas" will enable and encourage students to use scientific thinking throughout their lives. As well, contextualized teaching and learning provides teachers with useful insights into their students' thinking, their understanding of concepts, and their ability to reflect on what they have done. This insight allows teachers to provide supports to help enhance students' learning.

Health and Safety in Science

Teachers must model safe practices at all times and communicate safety expectations to students in accordance with school board and Ministry of Education policies and Ministry of Labour regulations. Teachers are responsible for ensuring the safety of students during classroom activities and also for encouraging and motivating students to assume responsibility for their own safety and the safety of others. Teachers must also ensure that students have the knowledge and skills needed for safe participation in science activities.

To carry out their responsibilities with regard to safety, it is important for teachers to have:

• concern for their own safety and that of their students;

• the knowledge necessary to use the materials, equipment, and procedures involved in science safely;

• knowledge concerning the care of living things – plants and animals – that are brought into the classroom;

• the skills needed to perform tasks efficiently and safely.

Students demonstrate that they have the knowledge, skills, and habits of mind required for safe participation in science activities when they:

- maintain a well-organized and uncluttered work space;
- follow established safety procedures;
- identify possible safety concerns;
- suggest and implement appropriate safety procedures;
- carefully follow the instructions and example of the teacher;
- consistently show care and concern for their own safety and that of others.

Various kinds of health and safety issues can arise when learning involves field trips. Out-of-school field trips can provide an exciting and authentic dimension to students' learning experiences. They also take the teacher and students out of the predictable classroom environment and into unfamiliar settings. Teachers must preview and plan these activities carefully to protect students' health and safety.

Planning Science Programs for Students with Special Needs

This is not applicable since The Erindale Academy does not have students with special needs.

Program Considerations for English Language Learners

In planning programs for students with linguistic backgrounds other than English, teachers need to recognize the importance of the orientation process, understanding that every learner needs to adjust to the new social environment and language in a unique way and at an individual pace. For example, students who are in an early stage of English-language acquisition may go through a "silent period" during which they closely observe the interactions and physical surroundings of their new learning environment. They may use body language rather than speech or they may use their first language until they have gained enough proficiency in English to feel confident of their interpretations and responses. Students thrive in a safe, supportive, and welcoming environment that nurtures their self-confidence while they are receiving focused literacy instruction. When they are ready to participate in paired, small-group, or whole-class activities, some students will begin by using a single word or phrase to communicate a thought, while others will speak quite fluently.

With exposure to the English language in a supportive learning environment, most young children will develop oral fluency quite quickly, making connections between concepts and skills acquired in their first language and similar concepts and skills presented in English. However, oral fluency is not a good indicator of a student's knowledge of vocabulary or sentence structure, reading comprehension, or other aspects of language proficiency that play an important role in literacy development and academic success. Research has shown that it takes five to seven years for most English language learners to catch up to their English-speaking peers in their ability to use English for academic purposes. Moreover, the older the children are when they arrive, the more language knowledge and skills they have to catch up on, and the more direct support they require from their teachers.

Responsibility for students' English-language development is shared by the classroom teacher, the ESL/ELD teacher (where available), and other school staff. Volunteers and peers may also be helpful in supporting English language learners in the language classroom. Teachers must adapt the instructional program in order to facilitate the success of these students in their classrooms. Appropriate adaptations include:

• modification of some or all of the subject expectations so that they are challenging but attainable for the learner at his or her present level of English proficiency, given the necessary support from the teacher;

• use of a variety of instructional strategies (e.g., extensive use of visual cues, graphic organizers, and scaffolding; previewing of textbooks; pre-teaching of key vocabulary; peer tutoring; strategic use of students' first languages);

• use of a variety of learning resources (e.g., visual material, simplified text, bilingual dictionaries, and materials that reflect cultural diversity);

• use of assessment accommodations (e.g., granting of extra time; use of oral interviews, demonstrations or visual representations, or tasks requiring completion of graphic organizers or cloze sentences instead of essay questions and other assessment tasks that depend heavily on proficiency in English).

When learning expectations in any course are modified for an English language learner (whether the student is enrolled in an ESL or ELD course or not), this information must be clearly indicated on the student's report card.

Environmental Education

As noted in *Shaping Our Schools, Shaping Our Future: Environmental Education in Ontario Schools*, environmental education "is the responsibility of the entire education community. It is a content area and can be taught. It is an approach to critical thinking, citizenship, and personal responsibility, and can be modelled. It is a context that can enrich and enliven education in all subject areas, and offer students the opportunity to develop a deeper connection with themselves, their role in society, and their interdependence on one another and the earth's natural systems" (p. 10).

The increased emphasis on relating science to technology, society, and the environment (STSE) within this curriculum document provides numerous opportunities for teachers to integrate environmental education effectively into the curriculum. The STSE expectations provide meaningful contexts for applying what has been learned about the environment, for thinking critically about issues related to the environment, and for considering personal action that can be taken to protect the environment. Throughout the courses and strands, teachers have opportunities to take students out of the classroom and into the world beyond the school, to observe, explore, and investigate. One effective way to approach environmental literacy is through examining critical inquiry questions related to students' sense of place, to the impact of human activity on the environment, and/or to systems thinking. This can be done at numerous points within the science curriculum.

The following are some examples:

- A sense of place can be developed as students investigate natural and human factors that influence Earth's climate.

- An understanding of the effects of human activity on the environment can develop as students consider the impact of their actions (e.g., taking part in tree planting at a local park, walking or biking to school instead of riding in the car, packing a litterless lunch) on their local environment.

- Systems thinking can be developed as students understand what a system is and how changing one part of it (e.g., introducing zebra mussels into a local lake or non-native invasive plants into a wetland) can affect the whole system.

Antidiscrimination Education

Overview

The implementation of antidiscrimination principles in education influences all aspects of school life. It promotes a school climate that encourages all students to work to attain high standards, affirms the worth of all students, and helps students strengthen their sense of identity and develop a positive self-image. It encourages staff and students alike to value and show respect for diversity in the school and the wider society. It requires schools to adopt measures to provide a safe environment for learning, free from harassment, violence, and expressions of hate.

Antidiscrimination education encourages students to think critically about themselves and others in the world around them in order to promote fairness, healthy relationships, and active, responsible citizenship.

Schools have the responsibility to ensure that school–community interaction reflects the diversity in the local community and wider society. Consideration should be given to a variety of strategies for communicating and working with parents and community members from diverse groups, in order to ensure their participation in such school activities as plays, concerts, and teacher interviews. Families new to Canada, who may be unfamiliar with the Ontario school system, or parents of Aboriginal students may need special outreach and encouragement in order to feel comfortable in their interactions with the school.

Antidiscrimination Education and Science

The science program provides students with access to materials that reflect diversity with respect to gender, race, culture, and ability. Diverse groups of people involved in scientific activities and careers should be prominently featured. In planning the science program, teachers should consider issues such as access to laboratory experiences and equipment. Laboratory benches and lighting should be adjustable and appropriate for students with physical disabilities. Equipment and materials can also be adapted in ways that make them accessible to all students.

The examples used to illustrate knowledge and skills, and the practical applications and topics that students explore as part of the learning process, should vary so that they appeal to both boys and girls and relate to students' diverse backgrounds, interests, and experiences.

In many instances, variations in culture and location (whether rural, urban, or suburban) can be found in a single classroom. Students living in apartment buildings will have different access to plants and animals than students living in a rural setting or on a First Nation reserve. There may be cultural sensitivities for some students in areas such as the use of biological specimens. For example, a number of religions have prohibitions regarding pigs. Although it is impossible to anticipate every contingency, teachers should be open to adjusting their instruction, if feasible, when concerns are brought to their attention.

It is important that learning activities include opportunities for students to describe, study, or research how women and men from a variety of backgrounds, including Aboriginal peoples, have contributed to science, used science to solve problems in their daily life and work, or been affected by scientific processes or phenomena. The calendar systems of various cultures or the use that Aboriginal peoples have made of medicinal plants might be considered. Students might examine the impact of climate change on different regions and cultures around the world, as well as the impact of technologies or technological processes in use in different countries in relation to the food chain, the environment, or the ozone layer. Expectations in the curriculum encourage students to look at the perspectives and world views of various cultures, including Aboriginal cultures, as they relate to scientific issues.

Access to computers should be monitored and a range of software applications provided. A problem-solving approach can benefit students who are having difficulties with materials or equipment. Because access to equipment at home will vary, it is important to offer challenges for or support to students whose levels of prior knowledge differ.

Critical Thinking and Critical Literacy in Science

Critical thinking is the process of thinking about ideas or situations in order to understand them fully, identify their implications, and/or make a judgement about what is sensible or reasonable to believe or do. Critical thinking includes skills such as questioning, predicting, hypothesizing, analysing, synthesizing, examining opinions, identifying values and issues, detecting bias, and distinguishing between alternatives.

Students use critical thinking skills in science when they assess, analyse, and/or evaluate the impact of something on society and the environment; when they form an opinion about something and support that opinion with logical reasons; or when they create personal plans of action with regard to making a difference. In order to do these things, students need to examine the opinions and values of others, detect bias, look for implied meaning in their readings, and use the information gathered to form a personal opinion or stance.

As they work to achieve the STSE expectations, students are frequently asked to identify the implications of an action, activity, or process. As they gather information from a variety of sources, they need to be able to interpret what they are reading, to look for instances of bias, and to determine why that source might express that particular bias. In developing the skills of scientific investigation (inquiry/research skills), students must ask appropriate questions to frame their research, interpret information, and detect bias.

Depending on the topic, they may be required to consider the values and perspectives of a variety of groups and individuals. Critical literacy is the capacity for a particular type of critical thinking that involves looking beyond the literal meaning of a text to determine what is present and what is missing, in order to analyse and evaluate the text's complete meaning and the author's intent. Critical literacy goes beyond conventional critical thinking by focusing on issues related to fairness, equity, and social justice. Critically literate students adopt a critical stance, asking what view of the world the text advances and whether they find this view acceptable.

In science, students who are critically literate are able, for example, to read or view reports from a variety of sources on a common issue. They are able to assess how fairly the facts have been reported, what biases might be contained in each report and why that might be, how the content of the report was determined and by whom, and what might have been left out of the report and why. These students would then be equipped to produce their own interpretation of the issue.

Literacy, Mathematical Literacy, and Investigation (Inquiry/Research) Skills

Literacy, mathematical literacy, and investigation skills are critical to students' success in all subjects of the curriculum and in all areas of their lives. Many of the activities and tasks that students undertake in the science curriculum involve the literacy skills related to oral, written, and visual communication. Communication skills are fundamental to the development of scientific literacy, and fostering students' communication skills is an important part of the teacher's role in the science curriculum.

When reading in science, students use a different set of skills than they do when reading fiction or general non-fiction. They need to understand vocabulary and terminology that are unique to science, and must be able to interpret symbols, charts, diagrams, and graphs. In addition, as they progress through secondary school, it becomes critically important for them to have the ability to make sense of the organization of science textbooks, scientific journals, and research papers. To help students construct meaning from scientific texts, it is essential that teachers of science model and teach the strategies that support learning to read while students are reading to learn in science.

Writing in science employs special forms and therefore also requires specific and focused learning opportunities. Students use writing skills to describe and explain their observations, to support the process of critically analysing information in both informal and formal contexts, and to present their findings in written, graphic, and multimedia forms.

Oral communication skills are fundamental to the development of scientific literacy and are essential for thinking and learning. Through purposeful talk, students not only learn to communicate information but also explore and come to understand ideas and concepts; identify and solve problems; organize their experience and knowledge; and express and clarify their thoughts, feelings, and opinions.

To develop their oral communication skills, students need numerous opportunities to listen to information and talk about a range of subjects in science. The science program provides opportunities for students to engage in various oral activities in connection with expectations in all the strands, such as brainstorming to identify what they know about the new topic they are studying, discussing strategies for solving a problem, presenting and defending ideas or debating issues, and offering critiques of models and results produced by their peers.

Students' understanding is revealed through both oral and written communication. It is not always necessary for science learning to involve a written communication component. Whether students are talking or writing about their scientific learning, teachers can ask questions that prompt students to explain their thinking and reasoning behind a particular solution, design, or strategy, or to reflect on what they have done.

Understanding science also requires the use and understanding of specialized terminology. In all science courses, students are expected to use appropriate and correct terminology, and are encouraged to use language with care and precision in order to communicate effectively.

The Ministry of Education has facilitated the development of materials to support literacy instruction across the curriculum. Helpful advice for integrating literacy instruction in science courses may be found in the following resource documents:

• *Think Literacy: Cross-Curricular Approaches, Grades 7–12, 2003*

• *Think Literacy: Cross-Curricular Approaches – Subject-Specific Examples: Science, Grade 9 Applied, 2004*

• *Think Literacy: Cross-Curricular Approaches – Subject-Specific Examples: Science, Grades 9–10 – Oral Communication, 2005*

• *Think Literacy: Cross-Curricular Approaches – Subject-Specific Examples: Science, Grades 9–10 – Writing Strategies, 2005*

• *Think Literacy: Cross-Curricular Approaches – Subject-Specific Examples: Science, Grade 10 – Reading Strategies, 2005*

• *Think Literacy: Cross-Curricular Approaches – Subject-Specific Examples: Locally Developed Compulsory Credit Course – Grade 9 Science, 2005*

The science program also builds on, reinforces, and enhances mathematical literacy. For example, clear, concise communication in science often involves using diagrams, tables, graphs, calculations, and equations to represent quantitative data. Many components of the science curriculum emphasize students' ability to interpret data and information presented in a variety of forms (e.g., symbols, graphs, tables). In addition, physics, chemistry, earth and space science, and biology provide rich problem-solving situations that require students to apply, and help them develop and extend, mathematical knowledge and thinking.

Investigations are at the heart of learning in science. In science courses, students will have multiple opportunities to develop their ability to ask questions and conduct inquiries and research as they plan and carry out investigations. They will practise using a variety of inquiry and research skills that they need to carry out their investigations, and will learn how to determine the most appropriate methods to use in a particular inquiry or research activity. Students will also learn how to locate relevant information in a variety of print and electronic sources, including books and articles, scientific periodicals, manuals, newspapers, websites, databases, tables, diagrams, and charts. As they advance through the courses, students will be expected to distinguish between primary and secondary sources, to use these sources in appropriate ways and with increasing sophistication, and to assess their validity and relevance.

The Role of Information and Communication Technology in Science

Information and communications technology (ICT) provides a range of tools that can significantly extend and enrich teachers' instructional strategies and support students' learning in science. Computer programs can help students collect, organize, and sort the data they gather and to write, edit, and present multimedia reports on their findings. ICT can also be used to connect students to other schools, at home and abroad, and to bring the global community into the local classroom. Technology also makes it possible to use simulations – for instance, when field studies on a particular topic are not feasible or dissections are not acceptable.

Whenever appropriate, therefore, students should be encouraged to use ICT to support and communicate their learning. For example, students working individually or in groups can use computers and portable storage devices, CD-ROM and DVD technologies, and/or Internet websites to gain access to science institutions in Canada and around the world. Students can also use digital or video cameras to record laboratory inquiries or findings on field trips, or for multimedia presentations on scientific issues.

Although the Internet is a powerful learning tool, all students must be made aware of issues of privacy, safety, and responsible use, as well as of the potential for abuse of this technology, particularly when it is used to promote hatred. ICT tools are also useful for teachers in their teaching practice, both for whole class instruction and for the design of curriculum units that contain varied approaches to learning to meet diverse student needs. A number of educational software programs to support science are licensed through the ministry and are listed at www.osapac.org/software.asp.

The Ontario Skills Passport and Essential Skills

Teachers planning programs in science need to be aware of the purpose and benefits of the Ontario Skills Passport (OSP). The OSP is a bilingual, web-based resource that enhances the relevance of classroom learning for students and strengthens school–work connections. The OSP provides clear descriptions of Essential Skills such as Reading Text, Writing, Computer Use, Measurement and Calculation, and Problem Solving and includes an extensive database of occupation-specific workplace tasks that illustrate how workers use these skills on the job. The Essential Skills are transferable, in that they are used in virtually all occupations. The OSP also includes descriptions of important work habits, such as working safely, being reliable, and providing excellent customer service. The OSP is designed to help employers assess and record students' demonstration of these skills and work habits during their cooperative education placements. Students can use the OSP to assess, practise, and build their Essential Skills and work habits and transfer them to a job or further education or training.

The skills described in the OSP are the Essential Skills that the Government of Canada and other national and international agencies have identified and validated, through extensive research, as the skills needed for work, learning, and life. These Essential Skills provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change. For further information on the OSP and the Essential Skills, visit http://skills.edu.gov.on.ca.

Career Education

Ongoing scientific discoveries and innovations coupled with rapidly evolving technologies have resulted in an exciting environment in which creativity and innovation thrive, bringing about new career opportunities. Today's employers seek candidates with strong critical-thinking and problem-solving skills and the ability to work cooperatively in a team – traits that are developed through participation in the science program. Through science courses, students will develop a variety of important capabilities, including the ability to identify issues, conduct research, carry out experiments, solve problems, present results, and work on projects both independently and as a team. Students are also given opportunities to explore various careers related to the areas of science under study and to research the education and training required for these careers (see the expectations in the first strand of every course in the program, "Scientific Investigation Skills and Career Exploration").

Cooperative Education and Other Forms of Experiential Learning

This is not applicable since The Erindale Academy does not offer cooperative education and other forms of experiential learning.

Planning Program Pathways and Programs Leading to a Specialist High Skills Major

This is not applicable since The Erindale Academy does not offer programs leading to a specialist high-skills major.

RESOURCES

- TEXTBOOK-SNC2D-Peason (Main Textbook) https://sciencesource.pearsoncanada.ca/
- *Science 10 , McGraw-Hill (Additional Textbook)*
- Computer Simulation and Modeling Software
- Internet information retrieval, research, simulations

Achievement Chart – Grades 9–12, Science

Category	50-59% (Level 1)	60-69% (Level 2)	70-79% (Level 3)	80-100% (Level 4)
Knowledge and Understanding	*The student:*			
Knowledge of content (e.g., facts, terminology, definitions, safe use of equipment and materials)	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates thorough knowledge of content
Understanding of content (e.g., concepts, ideas, theories, principles, procedures, processes)	demonstrates limited understanding of content	demonstrates some understanding of content	demonstrates considerable understanding of content	demonstrates thorough understanding of content
Thinking and Investigation	*The student:*			
Use of initiating and planning skills and strategies (e.g., formulating questions, identifying the problem, developing hypotheses, selecting strategies and resources, developing plans)	uses initiating and planning skills and strategies with limited effectiveness	uses initiating and planning skills and strategies with some effectiveness	uses initiating and planning skills and strategies with considerable effectiveness	uses initiating and planning skills and strategies with a high degree of effectiveness
Use of processing skills and strategies (e.g., performing and recording, gathering evidence and data, observing, manipulating materials and using equipment safely, solving equations, proving)	uses processing skills and strategies with limited effectiveness	uses processing skills and strategies with some effectiveness	uses processing skills and strategies with considerable effectiveness	uses processing skills and strategies with a high degree effectiveness
Use of critical/creative thinking processes, skills, and strategies (e.g., analyzing, interpreting, problem solving, evaluating, forming and justifying conclusions on the basis of evidence)	uses critical/creative thinking processes, skills, and strategies with limited effectiveness	uses critical/creative thinking processes, skills, and strategies with some effectiveness	uses critical/creative thinking processes, skills, and strategies with considerable effectiveness	uses critical/creative thinking processes, skills, and strategies with a high degree of effectiveness
Communication	*The student:*			
Expression and organization of ideas and information (e.g., clear expression, logical organization) in oral, visual, and/or written forms (e.g., diagrams, models)	expresses and organizes ideas and information with limited effectiveness	expresses and organizes ideas and information with some effectiveness	expresses and organizes ideas and information with considerable effectiveness	expresses and organizes ideas and information with a high degree of effectiveness
Use of conventions, vocabulary, and terminology of the discipline in oral, visual, and/or written forms (e.g., symbols, formulae, scientific notation, SI units)	uses conventions, vocabulary, and terminology of the discipline with limited effectiveness	uses conventions, vocabulary, and terminology of the discipline with some effectiveness	uses conventions, vocabulary, and terminology of the discipline with considerable effectiveness	uses conventions, vocabulary, and terminology of the discipline with a high degree of effectiveness
Application	*The student:*			
Application of knowledge and skills (e.g., concepts and processes, safe use of equipment, scientific investigation skills) in familiar contexts	applies knowledge and skills in familiar contexts with limited effectiveness	applies knowledge and skills in familiar contexts with some effectiveness	applies knowledge and skills in familiar contexts with considerable effectiveness	applies knowledge and skills in familiar contexts with a high degree of effectiveness
Transfer of knowledge and skills (e.g., concepts and processes, safe use of equipment, scientific investigation skills) to unfamiliar contexts	transfers knowledge and skills to unfamiliar contexts with limited effectiveness	transfers knowledge and skills to unfamiliar contexts with some effectiveness	transfers knowledge and skills to unfamiliar contexts with considerable effectiveness	transfers knowledge and skills to unfamiliar contexts with a high degree of effectiveness
Making connections between science, technology, society, and the environment (e.g., assessing the impact of science on technology, people and other living things, and the environment)	makes connections between science, technology, society, and the environment with limited effectiveness	makes connections between science, technology, society, and the environment with limited effectiveness	makes connections between science, technology, society, and the environment with limited effectiveness	makes connections between science, technology, society, and the environment with limited effectiveness
Proposing courses of practical action to deal with problems relating to science, technology, society, and the environment	Proposes courses of practical action of limited effectiveness	Proposes courses of practical action of some effectiveness	Proposes courses of practical action of considerable effectiveness	Proposes highly effective courses of practical action