Ontario eSecondary School
Course Outline
2023-2024

Ministry of Education Course Title: Science - Academic	
Ministry Course Code: SNC2D	
Course Type: Academic	
Grade: 10	
Credit Value: 1.0	
Prerequisite(s): Science, Grade 9, Academic (SNC1D) **Science, Grade 9, Academic (SNC1P)**	
Department: Science	
Course developed by: **Ting Li**	**Created: June 31st, 2019**
Length: **One Semester**	**Hours:** **110**
This course has been developed based on the following Ministry documents: 1. *Science, The Ontario Curriculum, Grades 9 and 10*, 2008, (revised) 2. *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)* 3. *Learning for All (2013)*	

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.

Overall Curriculum Expectations

By the end of this course, students will:

A: Scientific Investigation Skills and Career Exploration
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
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
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
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.

COURSE CONTENT

Unit	*Length*
Unit 1: Biology	31 hours
Unit 2: Physics	24 hours
Unit 3: Earth and Space Science	14 hours
Unit 4: Chemistry	29 hours
Exam	2 hours
Culminating Task	10 hours
Total	**110 hours**

Unit Descriptions

Unit 1: Biology
Students will demonstrate an understanding of the ways in which plants and animals, including humans, are made of specialized cells, tissues, and organs that are organized into systems. They will also evaluate the social and ethical implications of developments in medicine and medical technology.

Unit 2: Physics
Students will demonstrate an understanding of the characteristics and properties of light that can be manipulated with mirrors and lenses for a range of uses. They will also explore the ways in which society has benefited from the development of a range of optical devices and technologies.

Unit 3: Earth and Space Science
Students will demonstrate an understanding that Earth's climate is dynamic and is the result of interacting systems and processes. They will explore how global climate change is influenced by both natural and human factors. Students will also investigate the variety of ways climate change affects living things and natural systems. Finally, they will assess the impact of human activity on climate change and to identify effective courses of action to reduce this impact.

Unit 4: Chemistry
Students will demonstrate an understanding of the predictable ways in which chemicals react. They will also explore how chemical reactions may have a negative impact on the environment, but they can also be used to address environmental challenges.

TEACHING AND LEARNING STRATEGIES

In this course, students will experience the following activities.

Presentations with embedded videos are utilized to outline concepts, explain theory with the use of examples and practice questions, and incorporate multi-media opportunities for students to learn more (e.g. online simulations, quizzes, etc.).

End of unit conversations and Poodlls are opportunities for students to express their ideas, problem solving, and thought processes with a teacher who provides timely feedback.

Reflection is an opportunity for students to look back at concepts and theories with new eyes, to relate theory to practice, and to align learning with their own values and beliefs.

Discussions with the instructor are facilitated through video conferencing, discussing the concepts and skills being studied. This enables two-way communication between the student and the instructor, to share ideas and ask questions in dialogue. This also helps to build a relationship between the student and instructor.

Instructor demonstrations (research skills, etc.) are opportunities for the instructor to lead a student through a concept or skill through video conferencing, videos, or emailing with the student.

Discussion forums are an opportunity for students to summarize and share their ideas and perspectives with their peers, which deepens understanding through expression. It also provides an opportunity for peer-to-peer feedback.

Practical extension and application of knowledge are integrated throughout the course. The goal is to help students make connections between what they learn in the classroom and how they understand and relate to the world around them and their own lives. Learning becomes a dynamic opportunity for students to be more aware that their learning is all around them and enable them to create more meaning in their lives.

Individual activities/assignments assessments are completed individually at a student's own pace and are intended to expand and consolidate the learning in each lesson. Individual activities allow the teacher to accommodate interests and needs and to assess the progress of individual students. For this reason, students are encouraged to discuss IEPs (Individual Education Plans) with their teacher and to ask to modify assessments if they have a unique interest that they feel could be pursued in the assessment. The teacher plays an important role in supporting these activities by providing ongoing feedback to students, both orally and in writing.

Research is an opportunity to apply inquiry skills to a practical problem or question. Students perform research to gather information, evaluate quality sources, analyze findings, evaluate their analysis, and synthesize their findings into conclusions. Throughout, students apply both creative thinking and critical thinking. New questions are also developed to further learning.

Writing as a learning tool helps students to think critically about course material while grasping, organizing, and integrating prior knowledge with new concepts. Good communication skills are important both in and out of the classroom.

Virtual simulations are interactive websites that provide students with an opportunity to ask questions, explore hypotheses, relate variables, examine relationships, and make connections between theory and application in a safe environment that promotes intellectual risk taking and curiosity.

Virtual labs are interactive websites that provide students with an opportunity to follow a procedure to test hypotheses using scientific apparatus, gather and record observations, analyze observations using formula and relevant theory/concepts, and then formulate conclusions that relate hypotheses to analysis.

Diagrams are visual representations of scientific ideas and concepts. They provide another perspective to organize ideas. Visuals are thought to promote cognitive plasticity - meaning, they can help us change our minds or help us to remember an idea.

Graphics/images are visual representations of ideas/concepts. Visuals are thought to promote cognitive plasticity - meaning, they can help us change our minds or help us to remember an idea.

Charts are visual representations of scientific ideas and concepts using math that support analysis. For example, you can have a pie chart that shows Canada's energy sources.

Tables involve organizing information in terms of categories (rows and columns). This helps us to understand the relationships between ideas and data, as well as highlight trends.

Drawings and schematics are scientific and engineering ideas explained visually. For example, an electric circuit can be explained using symbols, which makes it possible to communicate ideas universally, clearly, and succinctly.

Practice problems provide students with a scenario/problem to solve by applying concepts and skills learned in a context. This helps students to understand the relevance of their learning.

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.

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.

ASSESSMENT ACTIVITIES

- ❑ Virtual lab assignments
- ❑ Individual conference meetings
- ❑ Practice (formative) worksheet
- ❑ Oral presentations
- ❑ Research projects (STSE focused)
- ❑ Inquiry Assignments
- ❑ Tests & Exam

EVALUATION

The final grade will be determined as follows:

- ❑ Seventy percent 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 percent 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 a combination of the following: an examination and a performance task, 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)

Weightings	
Course Work	**70**
Knowledge/Understanding (K)	21
Thinking/Inquiry (T)	21
Communication (C)	14
Application (A)	14
Final	**30**
Performance Task (3K, 3T, 2C, 2A)	10
Final Exam (6K, 6T, 4C, 4A)	20

TERM WORK EVALUATIONS (70%)

The overview below outlines all Assessment and Evaluation activities for each unit of the course. The following weighting system should be applied when generating a student's mark:

AFL/AAL/AOL Tracking Sheet

Unit 1: Biology

AAL	AFL	AOL
Discussion Forum Gizmos: growing plants Worksheet (self-check answers) Lesson notes KWL chart	Worksheet Gizmos Investigation: ● Cell division ● Digestive system ● Circulatory system	Assignment: cell structure worksheet (1.2) Unit Test

Unit 2: Physics

AAL	AFL	AOL
Worksheet (self-check answers) Lesson notes KWL chart	Gizmos Investigation: ● Reflection ● Ray tracing (mirrors) ● Refraction ● Ray tracing (Lenses)	Unit Project Unit Test End of the unit response

Unit 3: Earth and Space Science

AAL	AFL	AOL
Worksheet (self-check answers) Lesson notes KWL chart	Gizmos Investigation: ● Greenhouse effect	Unit Project Unit Test

Unit 4: Chemistry

AAL	AFL	AOL
Worksheet (self-check answers) Lesson notes KWL chart	Gizmos Investigation: ● Periodic trends ● Balancing chemical equations	Unit Project Unit Test End of the unit response

Finals

AOL
Culminating Activity
Final Exam

CONSIDERATION FOR PROGRAM PLANNING

PLANNING SCIENCE PROGRAMS FOR STUDENTS WITH SPECIAL EDUCATION NEEDS

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 SCIENCE 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 tasks.
- Allow students to report verbally using a voice or video recording.
- Permit students a range of options for reporting tasks.
- Provide opportunities for enrichment.