NIAGARA ACADEMY
SCIENCE, GRADE 9, ACADEMIC
COURSE OUTLINE

COURSE CODE:	SNC1D
DEVELOPED BY:	V. Rows, 2004
REVISED BY:	J. Mocha, 2009, V. Rows, 2010, L Cousineau, 2011, M. Wilson, 2013, M. Richter, 2015, 2016, 2017, J. Pauls, 2018, 2019
DEVELOPED FROM:	The Ontario Curriculum Grades 9 and 10, Science, 2008, Website: http:// www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf
PREREQUISITE:	None
COURSE DURATION:	110 hours
COURSE VALUE:	1.0 credits

COURSE DESCRIPTION AND RATIONALE

This course enables students to develop their understanding of basic concepts in biology, chemistry, earth and space science, and physics, and to relate science to technology, society, and the environment. Throughout the course, students will develop their skills in the processes of scientific investigation. Students will acquire an understanding of scientific theories and conduct investigations related to sustainable ecosystems; atomic and molecular structures and the properties of elements and compounds; the study of the universe and its properties and components; and the principles of electricity.

OVERALL CURRICULUM EXPECTATIONS

A. Scientific Investigation Skills and Career Exploration By the end of 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: Sustainable Ecosystems By the end of this course, students will:	
B1.	assess the impact of human activities on the sustainability of terrestrial and/or aquatic ecosystems, and evaluate the effectiveness of courses of action intended to remedy or mitigate negative impacts;
B2.	investigate factors related to human activity that affect terrestrial and aquatic ecosystems, and explain how they affect the sustainability of these ecosystems;
B3.	demonstrate an understanding of the dynamic nature of ecosystems, particularly in terms of ecological balance and the impact of human activity on the sustainability of terrestrial and aquatic ecosystems.

C. Chemistry: Atoms, Elements, and Compounds By the end of this course, students will:	
C1.	assess social, environmental, and economic impacts of the use of common elements and compounds, with reference to their physical and chemical properties;
C2.	investigate, through inquiry, the physical and chemical properties of common elements and compounds;
C3.	demonstrate an understanding of the properties of common elements and compounds, and of the organization of elements in the periodic table.

D. Earth and Space Science: The Study of the Universe By the end of this course, students will:	
D1.	assess some of the costs, hazards, and benefits of space exploration and the contributions of Canadians to space research and technology;
D2.	investigate the characteristics and properties of a variety of celestial objects visible from Earth in the night sky;
D3.	demonstrate an understanding of the major scientific theories about the structure, formation, and evolution of the universe and its components and of the evidence that supports these theories.

E. Physics: The Characteristics of Electricity	
E1.	assess some of the costs and benefits associated with the production of electrical energy from renewable and non-renewable sources, and analyse how electrical efficiencies and savings can be achieved, through both the design of technological devices and practices in the home;
E2.	investigate, through inquiry, various aspects of electricity, including the properties of static and current electricity, and the quantitative relationships between potential difference, current, and resistance in electrical circuits;
E3.	demonstrate an understanding of the principles of static and current electricity.

COURSE CONTENT AND EVALUATION

Unit	Description	Evaluation	Percentage Hours
Unit One	**Sustainable Ecosystems:** *1. Nutrient Cycles and Energy Flow* 1.1 Sustainability 1.2 The Biosphere and Energy 1.3 Extracting Energy from Biomass *2. Populations and Sustainable Ecosystems* 2.1 Populations and Resources 2.2 Interactions Among Species 2.3 Human Niches and Population 2.4 Ecosystem services *3. Biodiversity* 3.1 Measuring biodiversity 3.2 Communities 3.3 Threats to Biodiversity 3.4 Restoration Ecology	17.5%	27.5 hrs
Unit Two	**Atoms, Elements, and Compounds** *4. Properties of Elements and Compounds* 4.1 Studying Matter 4.2 Physical Properties 4.3 Chemical Properties *5. Understanding the Properties of Elements* 5.1 Evolution of the Atomic Model 5.2 The Structure of the Atom 5.3 The Periodic Table 5.4 Trends in the Periodic Table *6. Understanding the Properties of Compounds* 6.1 Ionic Compounds 6.2 Molecular Compounds 6.3 Modelling Compound	17.5%	27.5 hrs
Unit Three	**The Study of the Universe** *7. The Night Sky* 7.1 Ancient Astronomy 7.2 The Constellations 7.3 Movements of Earth and the Moon 7.4 Meet Your Solar System 7.5 Other Objects in the Solar System *8. Exploring Our Stellar Neighbourhood* 8.1 Exploring Space 8.2 Exploring the Sun 8.3 Exploring Other Stars *9. The Mysterious Universe* 9.1 Galaxies 9.2 The Universe 9.3 Unsolved Mysteries	17.5%	27.5 hrs
Unit Four	**The Characteristics of Electricity***:* *10. Static Charges and Energy*	17.5%	27.5 hrs

	10.1 Exploring Static Charges 10.2 Charging by Contact and by Induction 10.3 Charges at Work *11. Electric Circuits* 11.1 Cells and Batteries 11.2 Electric Circuits: Analogies and Characteristics 11.3 Measuring the Properties of Simple Circuits 11.4 Measuring Electrical Resistance 11.5 Series and Parallel Circuits *12. Generating and Using Electricity* 12.1 Electricity at Home 12.2 Using Electrical Energy Wisely 12.3 Meeting the Demand for Electricity 12.4 Sustainable Sources of Electricity		
	Total Term Work	**70%**	**110 hrs**
Final Evaluation	**Culminating Activity** **Final Exam**	**10%** **20%**	
	Final Mark	**100%**	

ASSESSMENT AND EVALUATION

Knowledge /Understanding (15%)	Thinking (25%)	Communication (25%)	Making Connections (35%)
- Class work - Discussions - Research Report - Textbook readings - Final Exam	- Gizmos - Research report - Tests - Quizzes	- Report writing - Science journal - Short essay questions	- Investigating careers - Home electricity practices - Tests - Quizzes

Evaluation and Reporting of Student Achievement: Student achievement is communicated formally to students and parents by means of the Provincial Report Card, Grades 9–12. The report card provides a record of the student's achievement of the curriculum expectations in every course, at particular points in the school year or semester, in the form of a percentage grade. The percentage grade represents the quality of the student's over- all achievement of the expectations for the course which are described in the achievement chart on pages 26-27 of The Ontario Curriculum Grades 9 and 10, Science, 2008, Website: http://www. edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf.

Learning Skills will also be assessed and reported on the Provincial Report Card, Grades 9-12. The quality of the learning skills demonstrated by a student are recorded in six categories – Responsibility, Organization, Independent Work, Collaboration, Initiative, Self-Regulation – are assessed throughout the semester using a four-point scale (E - Excellent, G - Good, S - Satisfactory, N - Needs Improvement),

and the document page 11, Growing Success: Assessment, Evaluation and Reporting in Ontario Schools, 2010, as a guide (http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf).

Assessment for Learning will be used as a process for seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go, and how best to get there. Teachers will use diagnostic assessment before instruction and formative assessment will occur frequently and in an ongoing manner to monitor students' progress. Observation and conversation will be used to determine the needs of individual student learning.

Assessment as Learning will focus on the explicit fostering of student's capacity over time to be their own best assessors, but teachers need to start by presenting and modelling external, structured opportunities for students to assess themselves. Formative assessment be used by students to monitor their own and their peers' progress.

Assessment of Learning will be used as the assessment that becomes public and results in statements or symbols about how well students are learning. Summative assessment will be used by the teacher to summarize learning at a given point in time. (Ref: page 31 of Growing Success)

A student's achievement of the overall curriculum expectations will be evaluated in accordance with the achievement charts in the provincial curriculum and will be reported using percentage marks. It is expected that both mathematical calculations and professional judgement will inform the determination of percentage marks

The teacher will use assessment strategies that:

- are fair, transparent and equitable for all students;
- are clearly communicated to students at the beginning of the course and at other points throughout the semester
- are varied in nature, administered over a period of time and designed to provide opportunities for students to demonstrate the full range of their learning
- are appropriate for the learning activities used, the purposes of instruction and the needs and experiences of the students
- relate to the curriculum expectations and learning goals and, as much as possible, to the interests, learning styles and preferences, needs and experiences of all students
- accommodate students with special education needs, consistent with the strategies outlined in their Individual Education Plan
- accommodate the needs of students who are learning the language of instruction
- ensure that each student is given clear directions for improvement
- promote students' ability to assess their own learning and to set specific goals
- ensure that each student is given clear directions for improvement

A final grade is recorded for every course, and a credit is granted and recorded for every course in which the student's grade is 50% or higher. The final grade for each course in Grades 9–12 will be determined as follows:

- Seventy per cent of the grade will be based on evaluations 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 should be given to more recent evidence of achievement. Please see the chart below for an explanation of how course work marks will be obtained.
- Thirty per cent of the grade will be based on a final evaluation in the form of an examination, performance, essay, and/or other method of evaluation suitable to the course content and administered towards the end of the course. This final evaluation consists of the following: Culminating Activity 10% and Final Exam 20%.

TEACHING AND LEARNING STRATEGIES

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. The following are specific strategies for teaching and learning.

- Assessment of prior knowledge and provision of differentiated instruction for individual students
- Teaching and modelling of learning strategies
- Problem posing and problem solving
- Individual and cooperative small group learning, teamwork
- Hands-on experiments
- Brainstorming
- Creation of scenarios for decision making
- Independent research
- Issue-based analysis
- Personal reflection
- Seminar presentations
- Use of technology
- Hands-on applications
- Constructive or creative dialogue

CONSIDERATIONS FOR PROGRAM PLANNING

The planning and administering of this course is based on the premise that all students can be successful language learners. The teacher will provide quality instruction that respects students' strengths and address their learning needs, using assessment information to plan instruction.

Teachers of science will incorporate appropriate strategies for instruction and assessment to facilitate the success of the ELL students in their classrooms. These strategies include:

- modification of some or all of the course expectations, based on the student's level of English proficiency;
- use of a variety of instructional strategies (e.g. extensive use of visual cues, manipulatives, pictures, diagrams, graphic organizers; attention to clarity of instructions; modelling of preferred ways of working in mathematics; previewing of textbooks; pre-teaching of key specialized vocabulary; encouragement of peer tutoring and class discussion; strategic use of students' first languages);
- use of a variety of learning resources (e.g., visual material, simplified text, bilingual dictionaries, culturally diverse materials);
- use of assessment accommodations (e.g., granting of extra time; use of alternative forms of assessment, such as oral interviews, learning logs, or portfolios; simplification of language used in problems and instructions).

Information and communications technology will be used throughout the course where it is appropriate. The program will also include opportunities for students to apply their skills to work-related situations, to explore educational and career options, and to become self-directed learners.

Teachers will model safe practices at all time and communicate safety requirements to students in accordance with the school, the Ministry of Education policies and Ministry of Labour regulations. This is particularly important in the case of off-site excursions. Teachers will also adhere to the policies of the First Nation, Métis and Inuit Education policy framework should the class include students from these communities.

RESOURCES

- ON Science 9, McGraw-Hill Ryerson
- Science 9, Nelson Thomson Learning, 1999
- Science 10, Nelson Thomson Learning, 2001
- https://www.youtube.com/watch?v=Az9V3u3S0nE (The Agenda with Steve Paikin on Climate Change)
- Variety of websites and YouTube videos related to topics being studied
- TED Talks, www.TED.com
- Crash Course Science, https://www.youtube.com/user/crashcourse/
- Teachers Try Science, http://www.teacherstryscience.org/
- How Stuff Works, https://science.howstuffworks.com/
- Science News for Students, https://www.sciencenewsforstudents.org/