



# CanSTEM Education Private School Inc.

350 Rutherford Road South, Unit-10, Brampton, Ontario, L6W 3M2 Ph: 647-568-0258, 647-709-0258, 647-847-1231 Email: [CanSTEM.Education@gmail.com](mailto:CanSTEM.Education@gmail.com) [www.canstemeducation.com](http://www.canstemeducation.com)

## CHEMISTRY 11 Course Outline

**Name of School:** CanSTEM Education Private School Inc.

**Department:** Science

**Course Developer:** Sajjala P Sankhe

**Course Development Date:** September 2017

**Revision Date:** 1<sup>st</sup> Sept, 2022

**Course Title:** Chemistry

**Grade:** 11

**Type:** University preparation

**Ministry Course Code:** SCH3U

**Credit Value:** 1.00

**Developed from:** *Science, The Ontario Curriculum, Grades 11 and 12, 2008 (Revised)*

**Prerequisite:** Science 10, Academic

### Course Description:

This course enables students to deepen their understanding of chemistry through the study of the properties of chemicals and chemical bonds; chemical reactions and quantitative relationships in those reactions; solutions and solubility; and atmospheric chemistry and the behaviour of gases. Students will further develop their analytical skills and investigate the qualitative and quantitative properties of matter, as well as the impact of some common chemical reactions on society and the environment.

### Overall Expectations:

By the end of the course, students will:

#### 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 careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

#### Matter, Chemical Trends and Chemical Bonding

B1. Analyse the properties of commonly used chemical substances and their effects on human health and the environment, and propose ways to lessen their impact;

B2. Investigate physical and chemical properties of elements and compounds, and use various methods to visually represent them;

B3. Demonstrate an understanding of periodic trends in the periodic table and how elements combine to form chemical bonds.

#### Chemical Reactions

C1. Analyse chemical reactions used in a variety of applications, and assess their impact on society and the environment;



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C2. Investigate different types of chemical reactions;

C3. Demonstrate an understanding of the different types of chemical reactions.

## Quantities in Chemical Reactions

D1. Analyse processes in the home, the workplace, and the environmental sector that use chemical quantities and calculations, and assess the importance of quantitative accuracy in industrial chemical processes;

D2. Investigate quantitative relationships in chemical reactions, and solve related problems;

D3. Demonstrate an understanding of the mole concept and its significance to the quantitative analysis of chemical reactions.

## Solutions and Solubility

E1. Analyse the origins and effects of water pollution, and a variety of economic, social, and environmental issues related to drinking water;

E2. Investigate qualitative and quantitative properties of solutions, and solve related problems;

E3. Demonstrate an understanding of qualitative and quantitative properties of solutions.

## Gases and Atmospheric Chemistry

F1. Analyse the cumulative effects of human activities and technologies on air quality, and describe some Canadian initiatives to reduce air pollution, including ways to reduce their own carbon footprint;

F2. Investigate gas laws that explain the behavior of gases, and solve related problems;

F3. Demonstrate an understanding of the laws that explain the behavior of gases.

<b><u>COURSE CONTENT</u></b>		
<b>Unit</b>	<b>Titles and Descriptions</b>	<b>Hours</b>
Unit 1	<b><i>Matter, Chemical Trends, and Chemical Bonding</i></b> Every element has predictable chemical and physical properties determined by its structure. The type of chemical bond in a compound determines the physical and chemical properties of that compound. It is important to use chemicals properly to minimize the risks to human health and the environment.	24 hours
Unit 2	<b><i>Chemical Reactions</i></b> Chemicals react in predictable ways. Chemical reactions and their applications have significant implications for society and the environment.	22 hours
Unit 3	<b><i>Quantities in Chemical Reactions</i></b> Relationships in chemical reactions can be described quantitatively. The efficiency of chemical reactions can be determined and optimized by applying an understanding of quantitative relationships in such reactions.	22 hours
Unit 4	<b><i>Solutions and Solubility</i></b> Properties of solutions can be described qualitatively and quantitatively, and can be predicted. Living things depend for their survival on the unique physical and chemical properties of water. People have a responsibility to protect the integrity of Earth's water resources.	22 hours



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Unit 5	<b>Gases and Atmospheric Chemistry</b> Properties of gases can be described qualitatively and quantitatively, and can be predicted. Air quality can be affected by human activities and technology. People have a responsibility to protect the integrity of Earth's atmosphere.	20 hours
	<b>Final Evaluation</b> A two hour final exam, culminating activity, worth 30% of the final grade, meant as a summative evaluation of all strands, will be administered at the end of the course.	2
<b>Total Hours</b>		<b>110</b>

## TEACHING & LEARNING STRATEGIES

Strategies marked with “x” are used in the course.

Direct Instruction (teacher-led)	X	Class Activity (teacher facilitation)	
Direct Instruction (discussion possible)	X	Experiential learning (learn by doing)	
Class Discussion (teacher facilitated)	X	Worksheets/Surveys	X
Small Group Discussion	X	Individual or Group Research	
Partner Discussion/Conferencing		Teacher modeling	
1:1 Conferencing Teacher & Student		Text-based modeling	
Teacher reading to class		Use of Computers / Internet	
Silent individual reading	X	Use of video tape or audio materials	
Group based reading		Role Playing	
Independent Work (teacher facilitation)	X	Presentations	
Group Work (teacher facilitation)	X	Guest Speaker / Interviews / Questions	
Brainstorming	X	Field Trip	

## ASSESSMENT & EVALUATION

### **Purpose**

The primary purpose of assessment is to improve student learning. Assessment relates directly to the expectations for the course.

A variety of assessments for and as learning are conducted on a regular basis to allow ample opportunities for students to improve and ultimately demonstrate their full range of learning and in order for the teacher to gather information to provide feedback. Assessment tasks relate to the success criteria set out in lesson plans. Success criteria allow students to see what quality looks like.

Evaluation is the process of judging the quality of student work in relation to the achievement chart categories and criteria, and assigning a percentage grade to represent that quality. Evaluation is based on gathering evidence of student achievement through:

- Products



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- Observations
- Conversations

## **Assessment for Learning** - we provide feedback and coaching

Assessment FOR Learning is the process of seeking and interpreting evidence for the use of learners and their teachers to decide where the learners are in their learning, where they need to go, and how best to go there.

## **Assessment as Learning** - we help students monitor progress, set goals, reflect on their learning

Assessment AS Learning is the process of the explicit fostering of students' 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.

## **Assessment of Learning** – we use assessments as ways of providing evaluative statements about the level of achievement of students

Assessment OF Learning is the assessment that becomes public and results in statements of symbols (marks/grades/levels of achievement) about how well students are learning. It often contributes to pivotal decisions that will affect students' future.

## **Grading**

The final grade is based on performance in 3 areas: products, observations, conversations.  
70% of the grade is based on evaluations conducted throughout the course.  
30% is based on a final evaluation.

## **Weighting of categories**

<b>Knowledge &amp; Understanding</b>	<b>Thinking</b>	<b>Communication</b>	<b>Application</b>
<b>20%</b>	<b>30%</b>	<b>20%</b>	<b>30%</b>

## **Assessment Tools**

**Assessment tools marked with “x” are used in the course**

Marking schemes	X	Rubrics	X
Anecdotal comments		Checklists	
Rating Scales			

## **Assessment Strategies**

<b>Assessment for Learning</b>	<b>Assessment as Learning</b>	<b>Assessment of Learning</b>
Quizzes	X	Journal
		Tests
		X



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Tests	X	Exit and Entrance Cards		Presentations	
Presentations		KWL Chart		Journals	
Journals		Self/Peer assessment		Essays	
Essays		Logs		Models	
Models				Projects	
Projects				Demonstrations	
Demonstrations				Conferencing	
Conferencing				Questioning	X
Questioning	x			Independent Study Assignment	
Independent Study Assignment				Art Exhibits	
Art Exhibits				Researching	
Researching				Reading Aloud	
Reading Aloud				Problem Solving (process focused)	
Problem Solving (process focused)				Debates	
Debates				Work Sheets	X
Work Sheets	X			Role Playing	
Role Playing				Direct Instruction	x
Direct Instruction					

## CONSIDERATIONS FOR PROGRAM PLANNING

**Instructional Approaches.** Students CanSTEM Education Private Inc. bring to the classroom a natural curiosity as well as individual interests and abilities within their diverse personal and cultural experiences. Effective instructional approaches in Science draws upon their prior knowledge, captures their interest and encourages meaningful practice especially when the student sees a connection between what they are learning and their real-world application. Students are provided with opportunities to learn in a variety of ways. From a solid understanding of scientific concepts, the scientific method is employed to enable the student to investigate their world. The context for all learning in Science comes from the Relating Science to Technology, Society and the Environment (STSE) expectations.

**Health and Safety in Science.** The Science program at CanSTEM Education Private Inc. provides the reading and analytical skills for the student to be able to explore the variety of concepts relating to health and safety in the workplace. Teachers who provide support for students in workplace learning placements need to assess placements for safety and ensure that students can read and understand the importance of issues relating to health and safety in the workplace. The teacher must also ensure that students have the knowledge and skills for safe participation in science activities.

**Critical Thinking and Critical Literacy in Science.** The teacher at CanSTEM Education Private Inc. plan science programs to promote critical thinking skills such as questioning, predicting, hypothesizing, analysing, synthesizing, examining opinions, identifying values and issues, detecting



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bias, and distinguishing between alternatives. As students work to achieve the STSE expectations, they are frequently asked to identify the implications of an action, activity, or process. In addition as students develop the skills of scientific investigation (inquiry/research skills), students are given the opportunity to ask appropriate questions to frame their research, interpret information, and detect bias. These learning activities would equip students with the skills to assess, analyze, and/or evaluate the impact of something on society and the environment.

**The Role of Information and Communications Technology in Science.** Information technology is considered a learning tool that must be accessed by science students when the situation is appropriate. As a result, students will develop transferable skills through their experience with word processing, internet research, presentation software, and telecommunication tools, as would be expected in any environment.

**Career Education.** Science definitely helps prepare students for employment in a huge number of diverse areas. The skills, knowledge and creativity that students acquire through this course are essential for a wide range of careers. Being able to express oneself in a clear concise manner without ambiguity, solve problems, make connections between this Science course and the larger world, etc., would be an overall intention of this Science course, as it helps students prepare for success in their working lives.

## **Antidiscrimination Education**

Learning resources reflect students' interests, backgrounds, cultures, and experiences.

Learning materials:

involve protagonists of both sexes from a wide variety of backgrounds

- reflect the diversity of Canadian and world cultures, including those of contemporary First Nations, Métis, and Inuit peoples
- include, in English, use of short stories, novels, magazine and newspaper articles, television programs, and films

Provide opportunities for students to explore issues relating to their self-identity make students aware of the historical, cultural, and political contexts for both the traditional and non-traditional gender and social roles represented in the materials they are studying.

## **Literacy and Inquiry/Research Skills**

The school emphasizes the importance of the following:

- Using clear, concise communication in the classroom involving the use of diagrams, charts, tables, and graphs
- Emphasizing students' ability to interpret and use graphic texts.
- Acquiring the skills to locate relevant information from a variety of sources, such as books, newspapers, dictionaries, encyclopedias, interviews, videos, and the Internet.
- Learning that all sources of information have a particular point of view
- Learning that the recipient of the information has a responsibility to



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evaluate it, determine its validity and relevance, and use it in appropriate ways.

## **Role of Technology**

Information and communications technologies (ICT) tools used in many ways:

Students at CanSTEM Education Private Inc. use multimedia resources, databases, Internet websites, digital cameras, and word-processing programs.

They use technology to collect, organize, and sort the data they gather and to write, edit, and present reports on their findings.

- Students at CanSTEM Education Private Inc. are encouraged to use ICT to support and communicate their learning. For example, students working individually or in
- Groups can use computer technology and/or Internet websites to gain access to museums and archives in Canada and around the world.
- Students at CanSTEM Education Private Inc. use digital cameras and projectors to design and present the results of their research to their classmates.
- The school plans to use ICT to connect students to other schools and to bring the global community into the classroom.
- Students at CanSTEM Education Private Inc. are made aware of issues of Internet privacy, safety, and responsible use, as well as of the potential for abuse of this technology, particularly when it is used to promote hatred.

## **Career Education**

Students are given opportunities to develop career-related skills by:

- applying their skills to work-related situations
- exploring educational and career options developing research skills practicing expository writing
- learning strategies for understanding informational reading material
- Making oral presentations working in small groups with classmates to help students express themselves confidently and work cooperatively with others.

**Academic Honesty** Students at CanSTEM Education Private Inc. who present the work of others as their own are guilty of plagiarism and will receive a mark of zero for the work and will have the details of the plagiarism noted in their school records. Students who are guilty of cheating on tests or examinations will receive a mark of zero on the test or examination and have the details of the cheating noted in their school records.

## **Late Assignments**

Students are responsible for providing evidence of their achievement of the overall





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expectations within the time frame specified by the teacher, and in a form approved by the teacher. There are consequences for not completing assignments for evaluation or for submitting those assignments late.

**Resources:** Nelson 11, Chemistry textbook