



TFS High School
5635 Yong St. Suite 206,
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COURSE OUTLINE

Chemistry 11, University Preparation SCH3U

Department	Science
Instructor	Mr. Babak Samani
Course Development Date	September 2012
Ministry Course Code	SCH3U
Credit Value	1.00
Ministry Curriculum Document	Policy Document: <i>Science, the Ontario Curriculum, Grades 11 and 12, 2008 (Revised)</i> http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.txt http://www.edu.gov.on.ca/eng/policyfunding/growsuccess.pdf
Prerequisites	SNC2D Grade 10 Science, Academic
Course Revision Date	2023

COURSE DESCRIPTION

This course focuses on the concepts and theories that form the basis of modern chemistry. Students will study the behaviors of solids, liquids, gases, and solutions; investigate changes and relationships in chemical systems; and explore how chemistry is used in developing new products and processes that affect our lives and our environment. Emphasis will also be placed on the importance of chemistry in other branches of science. This profile offers one set of suggestions for achieving the learning expectations of the SCH3U. Teachers must adapt the profile to suit their circumstances and to match the students' needs while ensuring that all learning expectations of the course are addressed fully.

Unit	Unit Description	Time Frame
1.	Matter and Chemical Bonding This unit serves as the introduction to Grade 11 Chemistry. Essential chemical terminology is reviewed from earlier courses and extended in the context of student investigations, discussions and teacher direction. The Periodic Table as a central organizer from which properties of matter and bonding can be predicted is central to this unit. Qualitative information observed in simple chemical reactions is formalized through writing balanced chemical equations	22 hrs
2.	.Types of Chemical Reactions This unit begins with introducing the reactants and products in a chemical reaction. Then an introduction to the word chemical equation and how to change it to skeleton, ionic and net ionic equation. Experimental work forms the foundation for quantitative work based on the un-soluble products that called precipitate. Then this unit continues with the concept of different types of chemical reaction such as synthesis, decomposition, combustion, single displacement reactions, and double displacement reactions.	22 hrs
3.	Quantities in Chemical Reactions In this unit, students are introduced to the mole concept. The quantitative treatment of chemical equations and reactions moves from mole-mole and mass-mass relationships to percent yield and limiting reagent calculations. Additional quantitative topics include the theory of average atomic mass and its calculations as well as percent composition and the Law of Definite Proportion. Whenever possible, the theory is complemented by experimental work.	22 hrs
4.	Solutions and Solubility This unit begins with a review of the characteristics of solutions and dissolving. Experimental work forms the foundation for qualitative analysis and selective precipitation. Quantitative work from the previous unit is carried forward into solution calculations and the concepts of concentrations and dilution. The discussions of acids and bases from previous courses are extended to pH calculations, titrations and various acid base theories.	22 hrs.
5.	Gases and Atmospheric Chemistry This unit begins with a review of the properties and uses of some common gases. A review of the kinetic molecular theory leads to a discussion of gas properties and their measurement. Experimental work forms the foundation for quantitative work on the gas laws, including the law of partial pressure. Mole calculations from earlier units are extended to the Ideal Gas Law and standard molar volume. The unit culminates with a laboratory investigation, which will utilize the skills and knowledge from Units 2, 3 and 4.1	22 hrs
	Final Evaluation	
		Total 110 hrs

OVERALL EXPECTATIONS

Scientific Investigation Skills and Career Exploration

- Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analyzing and interpreting, and communicating);
- Identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

Matter and Chemical Bonding

- Demonstrate an understanding of the relationship between periodic tendencies, types of chemical bonding, and the properties of ionic and molecular compounds;
- Carry out laboratory studies of chemical reactions, analyse chemical reactions in terms of the type of reaction and the reactivity of starting materials, and use appropriate symbols and formulae to
- Represent the structure and bonding of chemical substances;
- Describe how an understanding of matter and its properties can lead to the production of useful substances and new technologies.

Types of Chemical Reaction

- Demonstrate an understanding of the relationship between the type of chemical reaction (eg, synthesis, decomposition, combustion, single displacement reaction, and double displacement reactions) and the nature of the reactants.
- Explain hardness of water, its consequences(eg. Pipe scaling), and water-softening methods.

Quantities in Chemical Reactions

- Demonstrate an understanding of the mole concept and its significance in the analysis of chemical systems;
- Carry out experiments and complete calculations based on quantitative relationships in
- Balanced chemical reactions
- Demonstrate an awareness of the importance of quantitative chemical relationships in the home or in industry.

Solutions and Solubility

- Demonstrate an understanding of the properties of solutions, the concept of concentration, and the importance of water as a solvent;
- Carry out experiments and other laboratory procedures involving solutions, and solve quantitative problems involving solutions;
- Relate a scientific knowledge of solutions and solubility to everyday applications, and explain how environmental water quality depends on the concentrations of a variety of dissolved substances.

Gases and Atmospheric Chemistry

- Demonstrate an understanding of the laws that govern the behavior of gases;
- Investigate through experimentation the relationships among the pressure, volume, and temperature of a gas, and
- Solve problems involving quantity of substance in moles, molar masses and volumes, and the gas laws;
- Describe how knowledge of gases has helped to advance technology, and how such technological advances have led to a better understanding of environmental phenomena and issues.

ASSESSMENT/EVALUATION STRATEGIES:

Diagnostic assessment is used at the beginning of a unit to assist in determining a starting point for instruction.

Assessment for Learning (AFL) provides information to students as they are learning and refining their skills. Assessment as Learning (AAL) acts as a stepping-stone for students to begin applying their understanding using critical thinking; it bridges the gap between AFL and AOL. Assessment of Learning (AOL), at the end of units and course, provides students with the opportunity to synthesize/apply/demonstrate their learning and the achievement of the expectations. The following is a list of specific assessment/evaluation strategies that the teacher may use but is not limited to:

Evaluation Scheme

	Units	Duration	AFL	AAL	AOL	K 30 %	A 20 %	C 20 %	T 30 %
70 %	Scientific Investigation Skills and Career Exploration	Integrated throughout the course							
	1. Matter and Chemical Bonding	22	Worksheet Class Discussion	Homework Assignment Presentation	Unit Test Quiz	√	√	√	√
	2. Types of Chemical Reactions	22	Assigned Questions Group Discussion	Homework Assignment	Unit Test Quiz	√	√	√	√
	3. Quantities in Chemical Reactions	22	Student - Teacher Conferencing Worksheet	Reflective Discussion Homework Assignment	Unit Test Quiz Virtual Lab	√	√	√	√
	4. Solutions and Solubility	22	Exit Card Worksheet	Peer Pair Assessment Homework	Unit Test Quiz	√	√	√	√
	5. Gases and Atmospheric Chemistry	22	Assigned Questions Group Discussion	Homework Assignment Presentation	Quiz Virtual Lab	√	√	√	√
30 %	1 - 5	Final Exam				√	√	√	√

TEACHING AND LEARNING STRATEGIES

- Lecture
- Discussion
- Problem posing
- Brainstorming
- demonstration
- Mathematical problem solving
- Homework
- Critical thinking
- Assignment
- Investigations
- Lab report
- Note making

ASSESSMENT STRATEGIES

Quiz	Report	Presentation	Extended Investigations
Test	Skills Checklist	Interview	Project

ADDITIONAL RESOURCES

- | | | |
|----------------------|-------------------------|-------------------|
| ◦ Access to computer | ◦ Scientific calculator | ◦ Graphing paper |
| ◦ Writing utensil | ◦ Ruler | ◦ Section Divider |
| ◦ 3 Ring Binder | ◦ | ◦ |

Textbook: McGraw-Hill Ryerson Chemistry
Nelson Chemistry (as reference)

Helpful Links:

- <http://www.chemguide.co.uk/>
<http://www.wwnorton.com/college/chemistry/gilbert2/chemtours.asp>
<http://www.usetute.com.au/>
<http://www.chemistrydaily.com/chemistry/Category:Chemistry>
<http://hyperphysics.phy-astr.gsu.edu/hbase/chemical/chemcon.html#c1>

ACHIEVEMENT CHART: SCIENCE, GRADES 9-12

Category	50-59% (Level 1)	60-69% (Level 2)	70-79% (Level 3)	80-100% (Level 4)
Knowledge and Understanding - Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding)				
	The student:			
understanding of concepts, principles, laws, and theories (e.g., identifying assumptions; eliminating misconceptions; providing explanations)	demonstrates limited understanding of concepts, principles, laws, and theories	demonstrates some understanding of concepts, principles, laws, and theories	demonstrates considerable understanding of concepts, principles, laws, and theories	demonstrates thorough understanding of concepts, principles, laws, and theories
knowledge of facts and terms	demonstrates limited knowledge of facts and terms	demonstrates some knowledge of facts and terms	demonstrates considerable knowledge of facts and terms	demonstrates thorough knowledge of facts and terms
transfer of concepts to new contexts	infrequently transfers simple concepts to new contexts	sometimes transfers simple concepts to new contexts	usually transfers simple concepts to new contexts	routinely transfers simple concepts to new contexts
understanding of relationships between concepts	demonstrates limited understanding of relationships between concepts	demonstrates some understanding of relationships between concepts	demonstrates considerable understanding of relationships between concepts	demonstrates thorough and insightful understanding of relationships between concepts
Thinking and Inquiry - The use of critical and creative thinking and inquiry skills and/or processes				
	The student:			
application of the skills and strategies of scientific inquiry (e.g., initiating and planning, performing and recording, analysing and interpreting, problem	applies few of the skills and strategies of scientific inquiry	applies some of the skills and strategies of scientific inquiry	applies most of the skills and strategies of scientific inquiry	applies all or almost all of the skills and strategies of scientific inquiry

solving)				
application of technical skills and procedures (e.g., microscopes)	applies technical skills and procedures with limited competence	applies technical skills and procedures with moderate competence	applies technical skills and procedures with considerable competence	applies technical skills and procedures with a high degree of competence
use of tools, equipment, and materials	uses tools, equipment, and materials safely and correctly only with supervision	uses tools, equipment, and materials safely and correctly with some supervision	uses tools, equipment, and materials safely and correctly	demonstrates and promotes the safe and correct use of tools, equipment, and materials
Communication - The conveying of meaning through various forms				
	The student:			
communication of information and ideas	communicates information and ideas with limited clarity and precision	communicates information and ideas with some clarity and precision	communicates information and ideas with considerable clarity and precision	communicates information and ideas with a high degree of clarity and precision
use of scientific terminology, symbols, conventions, and standard (SI) units	uses scientific terminology, symbols, conventions, and SI units with limited accuracy and effectiveness	uses scientific terminology, symbols, conventions, and SI units with some accuracy and effectiveness	uses scientific terminology, symbols, conventions, and SI units with considerable accuracy and effectiveness	uses scientific terminology, symbols, conventions, and SI units with a high degree of accuracy and effectiveness
communication for different audiences and purpose	communicates with a limited sense of audience and purpose	communicates with some sense of audience and purpose	communicates with a clear sense of audience and purpose	communicates with a strong sense of audience and purpose
use of various forms of communication (e.g., reports, essays)	demonstrates limited command of the various forms	demonstrates moderate command of the various forms	demonstrates considerable command of the various forms	demonstrates extensive command of the various forms
use of information technology for scientific purposes (e.g., specialized databases)	uses technology with limited appropriateness and effectiveness	uses technology with moderate appropriateness and effectiveness	uses appropriate technology with considerable effectiveness	uses appropriate technology with a high degree of effectiveness
Application - The use of knowledge and skills to make connections within and between various contexts				
	The student:			
understanding of connections among science, technology, society, and the environment	shows limited understanding of connections in familiar contexts	shows some understanding of connections in familiar contexts	shows considerable understanding of connections in familiar and some unfamiliar contexts	shows thorough understanding of connections in familiar and unfamiliar contexts
analysis of social and economic issues involving science and technology	analyses social and economic issues with limited effectiveness	analyses social and economic issues with moderate effectiveness	analyses social and economic issues with considerable effectiveness	analyses complex social and economic issues with a high degree of effectiveness
assessment of impacts of science and technology on the environment	assesses environmental impacts with limited effectiveness	assesses environmental impacts with moderate effectiveness	assesses environmental impacts with considerable effectiveness	assesses environmental impacts with a high degree of effectiveness
proposing of courses of practical action in relation to science and technology-based problems	extends analyses of familiar problems into courses of practical action with limited effectiveness	extends analyses of familiar problems into courses of practical action with moderate effectiveness	extends analyses of familiar problems into courses of practical action with considerable effectiveness	extends analyses of familiar and unfamiliar problems into courses of practical action with a high degree of effectiveness

Learning Skills:

Learning Skills are skills and habits are essential to success in school and in the workplace. Teachers report achievement on the six Learning Skills in the table below using letter codes:

E = Excellent

G = Good

S = Satisfactory

N = Needs Improvement.

Learning Skills	Sample Behaviors
Responsibility	The student fulfils responsibilities and commitments within the learning environment; completes and submits class work, homework, and assignments according to agreed-upon timelines; takes responsibility for and manages own behavior.
Organization	The student devises and follows a plan and process for completing work and tasks; establishes priorities and manages time to complete tasks and achieve goals; identifies, gathers, evaluates, and uses information, technology, and resources to complete tasks.
Independent Work	The student independently monitors, assesses, and revises plans to complete tasks and meet goals; uses class time appropriately to complete tasks; follows instructions with minimal supervision.
Collaboration	The student accepts various roles and an equitable share of work in a group; responds positively to the ideas, opinions, values, and traditions of others; builds healthy peer-to-peer relationships through personal and media-assisted interactions; works with others to resolve conflicts and build consensus to achieve group goals; shares information, resources, and expertise and promotes critical thinking to solve problems and make decisions.
Initiative	The student looks for and acts on new ideas and opportunities for learning; demonstrates the capacity for innovation and a willingness to take risks; demonstrates curiosity and interest in learning; approaches new tasks with a positive attitude; recognizes and advocates appropriately for the rights of self and others.
Self-Regulation	The student sets own individual goals and monitors progress towards achieving them; seeks clarification or assistance when needed; assesses and reflects critically on own strengths, needs, and interests; identifies learning opportunities, choices, and strategies to meet personal needs and achieve goals; perseveres and makes an effort when responding to challenges.

Academic Honesty: Cheating and Plagiarism:

Plagiarism is a serious offense. It is defined as taking words, phrasing, sentence structure, or any other element of the expression of another person's **ideas**, and using them as if they were your own. Plagiarism is a violation of another person's rights, whether the material taken is excessive or small. Students will be assisted in developing strategies and techniques to avoid plagiarism. They need to be aware that plagiarized term work will be penalized and could result in a mark of zero.

Assignment Policy, Missed Tests and Attendance: Please refer to Student Contract Form

PROGRAM PLANNING CONSIDERATIONS FOR SCIENCE

Teachers planning a program in Science must take into account considerations in a number of important areas. Essential information that pertains to all disciplines is provided in the companion piece to this document, *Science. The Ontario*

Curriculum, Grades 11 and 12: Some Considerations for Program Planning, 2008. The areas of concern to all teachers include the following

- I. Instructional Approaches:
 - a. Pairing and small group activities throughout the course to support learning
 - b. Student/teacher conferencing and tutoring as required
- II. Health and Safety in Science
- III. Environmental Education
- IV. Critical Thinking and Critical Literacy in Science
- V. Literacy, Mathematical Literacy, and Investigation (Inquiry/Research) Skills
- VI. The Role of Information and Communications Technology in Science