

## Course Outline

School Name: **UMC High School**

Department Name: **SCIENCE**

**Ministry of Education Course Title:** Chemistry, Grade 11, University Preparation

**Grade Level:** 11, University Preparation

Ministry Course Code: **SCH3UX**

Instructor:

Developed by: Younga Kim

Date: August 2017

Revised by: Ye Jin Jang

Revision Date: August 2017

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

Required Texts:

*Chemistry 11, McGraw-Hill Ryerson, 2011 and Chemistry 11, Nelson, 2011*

Supplemental Resources:

- Teacher-made Worksheets
- Video lesson links
- Computers

Prerequisite: Science, Grade 10, Academic

Credits: 1

Length: 110 hours

Principal: \_\_\_\_\_

Head Teacher: \_\_\_\_\_

## 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 behavior 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 Curriculum Expectations

By the end of this course, students will:

### Strand A: Scientific Investigation Skills and Career Exploration

1. 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);
2. 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.

### Strand B: Matter, Chemical Trends, and Chemical Bonding

3. Analyze the properties of commonly used chemical substances and their effects on human health and the environment, and propose ways to lessen their impact;
4. Investigate physical and chemical properties of elements and compounds, and use various methods to visually represent them;
5. Demonstrate an understanding of periodic trends in the periodic table and how elements combine to form chemical bonds.

### Strand C: Chemical Reactions

6. Analyze chemical reactions used in a variety of applications, and assess their impact on society and the environment;
7. Investigate different types of chemical reactions;
8. Demonstrate an understanding of the different types of chemical reactions.

### Stand D: Quantities in Chemical Reactions

9. Analyze 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;
10. Investigate quantitative relationships in chemical reactions, and solve related problems;
11. Demonstrate an understanding of the mole concept and its significance to the quantitative analysis of chemical reactions.

**Strand E: Solutions and Solubility**

12. Analyze the origins and effects of water pollution, and a variety of economic, social, and environmental issues related to drinking water;
13. Investigate qualitative and quantitative properties of solutions, and solve related problems;
14. Demonstrate an understanding of qualitative and quantitative properties of solutions.

**Strand F: Gases and Atmospheric Chemistry**

15. Analyze 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;
16. Investigate gas laws that explain the behavior of gases, and solve related problems
17. Demonstrate an understanding of the laws that explain the behavior of gases.

## Course Content

<b>Unit 1</b>	<b>Matter, Chemical Trends and Chemical Bonds</b>  Strands: A, B Overall Expectations: 1-5	22 hours
<b>Unit 2</b>	<b>Chemical Reactions</b>  Strands: A, C Overall Expectations: 6-8, 1-2	20 hours
<b>Unit 3</b>	<b>Chemical Quantities:</b>  Strands: A, D Overall Expectations: 9-11, 1-2	22 hours
<b>Unit 4</b>	<b>Solutions and Solubility</b>  Strands: A, E Overall Expectations: 12-14, 1-2	20 hours
<b>Unit 5</b>	<b>Gases and Atmospheric Chemistry</b>  Strands: A, F Overall Expectations: 15-17, 1-2	18 hours
	<b>Final Project</b>  Strands: A-F Overall Expectations 1-17	6 hours
	<b>Final Exam</b> <b>Strands:</b> <ul style="list-style-type: none"> <li>B. Matter, Atomic Theory, Periodic Trends</li> <li>C. Chemical Reactions</li> <li>D. Quantities in Chemical Reactions</li> <li>E. Solutions and Solubility</li> <li>F. Gases and Atmospheric Chemistry</li> </ul> <b>Overall Expectations:</b> 3-17	2 hours

TOTAL 110hours

## Unit Descriptions

### Unit 1 – Matter, Chemical Trends and Chemical Bonds

Time: 22 hours

#### Description:

In this unit, students will demonstrate an understanding of the subatomic particles that make up an atom. They will investigate the different type of trends that are observed in the periodic table such as ionization energy, electron affinity, and electronegativity. Students will draw the Lewis structure of atoms as well as its structural formulae. They will develop the knowledge of naming compounds.

#### Specific Expectations:

A. Scientific Investigation Skills and Career Exploration: A1.1-A1.13, A2.1-A2.2

B. Matter, Chemical Trends, and Chemical Bonding: B1.1-B1.2, B2.1-B2.7, B3.1-B3.5

<b>Assessment For Learning (AFL)</b>	<b>K/U</b>	<b>T</b>	<b>A</b>	<b>C</b>
Homework questions	x	x	x	x
Student Notes	x	x	x	x
<b>Assessment As Learning (AAL)</b>				
Study Log	x	x	x	x
<b>Assessment Of Learning (AOL)</b>				
Unit 1 Assignment	x	x	x	x
Unit 1 Test	x	x	x	x

## Unit 2 – Chemical Reactions

Time: 20 hours

### Description:

In this unit, students will demonstrate an understanding of the different type of chemical reaction. They will be able to distinguish between a synthesis, decomposition, a single displacement, and a double displacement reaction, as well as predict the products of each reaction. They will examine different types of compounds that induce different reactions. They will also investigate the difference between complete combustion and incomplete combustion of hydrocarbons.

### Specific Expectations:

**Strand A.** Scientific Investigation Skills and Career Exploration: A1.1-A1.13, A2.1-A2.2

**Strand C.** Chemical Reactions: C1.1-C1.2, C2.1-C2.10, C3.1-C3.3

<b>Assessment For Learning (AFL)</b>	<b>K/U</b>	<b>T</b>	<b>A</b>	<b>C</b>
Homework questions	x	x	x	x
Student Notes	x	x	x	x
<b>Assessment As Learning (AAL)</b>				
Study Log	x	x	x	x
<b>Assessment Of Learning (AOL)</b>				
Unit 2 Assignment	x	x	x	x
Unit 2 Test	x	x	x	x

### Unit 3 –Chemical Quantities

Time: 22 hours

#### Description:

In this unit, student will be introduced to the concepts of moles and molar mass. Different composition of compounds will be analyzed to calculate its empirical and molecular formula. They will use moles to investigate the quantitative relationships in chemical reactions, and solve related problem such as percent yield and limiting reagent.

#### Specific Expectations:

**Strand A.** Scientific Investigation Skills and Career Exploration: A1.1-A1.13, A2.1-A2.2

**Strand D:**Quantities in Chemical Reactions:D1.1-D1.2, D2.1-D2.7, and D3.1-D3.4

<b>Assessment For Learning (AFL)</b>	<b>K/U</b>	<b>T</b>	<b>A</b>	<b>C</b>
Homework questions	x	x	x	x
Student Notes	x	x	x	x
<b>Assessment As Learning (AAL)</b>				
Study Log	x	x	x	x
<b>Assessment Of Learning (AOL)</b>				
Unit 3 Percent Yield Lab Report	x	x	x	x
Unit 3 Test	x	x	x	x

## Unit 4- Solutions and Solubility

Time: 20 hours

### Description:

Students will demonstrate an understanding of the chemical and physical properties of solutions and investigate the solubility of different compounds using the solubility guidelines. They will use stoichiometry to solve problems involving solutions and concentration. Student will also investigate the qualitative and quantitative properties of acid base reactions.

### Specific Expectations:

Strand A. Scientific Investigation Skills and Career Exploration: A1.1-A1.13, A2.1-A2.2

Strand E. Chemical Systems and Equilibrium: E1.1-E1.2, E2.1-E2.8, E3.1-E3.6

<b>Assessment For Learning (AFL)</b>	<b>K/U</b>	<b>T</b>	<b>A</b>	<b>C</b>
Homework questions	x	x	x	x
Student Notes	x	x	x	x
<b>Assessment As Learning (AAL)</b>				
Study Log	x	x	x	x
<b>Assessment Of Learning (AOL)</b>				
Unit 4 Titration Lab Report	x	x	x	x
Unit 4 Test	x	x	x	x



## Unit 5: Gases and Atmospheric Chemistry

Time: 18 hours

### Description:

In this unit, student will be introduced to the different gas laws and the kinetic molecular theory. Student will use the concepts of moles to solve problems related to chemical reaction in the gases state. They will also look at the technological and environmental impact of gases compounds.

### Specific Expectations:

**Strand A.** Scientific Investigation Skills and Career Exploration: A1.1-A1.13, A2.1-A2.2

**Strand F.** Electrochemistry: F1.1-F1.2, F2.1-F2.5, and F3.1-F3.6

<b>Assessment For Learning (AFL)</b>	<b>K/U</b>	<b>T</b>	<b>A</b>	<b>C</b>
Homework questions	x	x	x	x
Student Notes	x	x	x	x
<b>Assessment As Learning (AAL)</b>				
Study Log	x	x	x	x
<b>Assessment Of Learning (AOL)</b>				
Unit 5 Project (culminating task)	x	x	x	x
Unit 5 Test	x	x	x	x

## Teaching/Learning Strategies

A variety of strategies are used to allow students many opportunities to attain the necessary skills for success in this course and at university. The teacher uses a variety of whole class, small group and individual activities to facilitate learning. The following is a list of specific teaching/learning strategies that the teacher may use but is not limited to:

- Lecture
- Modeling/Direct Instruction
- Demonstration/exemplars
- Videos
- Graphic organizers (Venn Diagram, T-charts, KWL charts, Placemats)
- Problem-Solving
- Homework questions
- Researching Methods
- Self-Assessment
- Teacher's descriptive feedback
- Independent work
- Tests
- Quizzes
- Exam
- Labs

### ONLINE & OFFLINE COMPONENTS

The design of this course is intended to offer a rich balance between online and offline elements. The following is a summary of the course components and their delivery format. Please refer to the individual unit outlines for specific details. Course content & instruction: *online* Communication between teacher and students: *online & offline* Collaboration between students: *online* Assessment & evaluation: *online & offline* Practise exercises, textbook work, readings etc: *offline*

## 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:

**Strategies actually used in the classroom are indicated in the chart above and reflected in classroom instruction:**

**Levels:** There are four levels of achievement for students who are passing the course:

- Level 1 (50-59%)
- Level 2 (60-69%)
- Level 3 (70-79%)
- Level 4 (80-100%)

**Level 3 is the provincial standard for student achievement.**

**Final Grade:** The final grade will include the following weighting:

<b>Knowledge and Understanding</b> -35% -	<ul style="list-style-type: none"> <li>● Subject-specific content acquired in each course (knowledge)</li> <li>● The comprehension of its meaning and significance (understanding).</li> <li>● Tests, and assignments</li> </ul>
<b>Thinking and Investigation</b> - 20% -	<ul style="list-style-type: none"> <li>● The use of critical and creative thinking skills and inquiry, research, and problem-solving skills and/or processes.</li> <li>● Laboratory work, tests and assignments</li> </ul>
<b>Communication</b> - 25% -	<ul style="list-style-type: none"> <li>● The conveying of meaning through various forms.</li> <li>● This includes reading and writing in the context of science, and interpreting graphs, charts and diagrams.</li> <li>● Tests, labs write up and assignments</li> </ul>
<b>Application</b> - 20% -	<ul style="list-style-type: none"> <li>● The use of knowledge and skills to make connections within and between various contexts.</li> <li>● Relate to real-world problems</li> <li>● Assignments, test and assignments</li> </ul>

The evaluation for the course is broken down as follows:

- 70% COURSE WORK**  
This portion of the mark is based on performance on laboratories, assignments, quizzes, and tests 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
- 10% COURSE CULMINATING ACTIVITIES**  
All students do a research project (paper)
- 20%** All students write a final exam– 2 hours written exam
- Total**  
**100%**

## Program Planning

In order to accommodate students' needs, the teachers of UMC High School incorporate appropriate considerations in their program planning and delivery. These considerations may include, but not be limited to:

- ❑ Allow student to see the big ideas of scientific concepts learned by relating Science to Technology, Society, and the Environment (STSE)
- ❑ Develop the skills, strategies, and habits of mind required for scientific inquiry
- ❑ Allow students to investigate scientific concepts using a variety of equipment, materials, and strategies
- ❑ 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
- ❑ Encourage students to develop a willingness to persist, to investigate, to reason, to explore alternative solutions, to view challenges as opportunities to extend their learning
- ❑ Accommodate students with special education needs, consistent with the strategies outlined in their Individual Education Plan
- ❑ Vary presentation and instruction techniques
- ❑ Provide step-by-step instructions
- ❑ Provide opportunities to learn in a variety of ways – individually, cooperatively, independently, and collaboratively with teacher direction, through investigation involving hands-on experience, and through examples followed by practice
- ❑ Make connection between the scientific concepts learned in class and their application in the world around them and in real-life situations.
- ❑ Boost interests, “Student Involvement” and varying instruction should be emphasized as they increase achievement in chemistry
- ❑ Avoid giving students the impression that teachers are “experimenting” with them