

GRADE 12 CHEMISTRY (SCH4U) COURSE OUTLINE

Course Title: Chemistry, Grade 12, University Preparation

Ministry Course Code: SCH4U

Name of School: Lighthouse Academy

Department: Science

Course Developer: Dr. A B M Shamsur Rahman

Course Development Date: August, 2019

Course Revision date: September, 2019

Credit Value: 1.0

Secondary Policy Document: The Ontario Curriculum Grades 11 and 12 Science, 2008 (revised)

Prerequisite: Chemistry, Grade 11, University Preparation SCH3U

Course Description/Rationale:

This course enables students to deepen their understanding of chemistry through the study of organic chemistry, the structure and properties of matter, energy changes and rates of reaction, equilibrium in chemical systems, and electrochemistry. Students will further develop their problem-solving and investigation skills as they investigate chemical processes, and will refine their ability to communicate scientific information. Emphasis will be placed on the importance of chemistry in everyday life and on valuing the impact of chemical technology on the environment.

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

B. Organic Chemistry

- **B1.** assess the social and environmental impact of organic compounds used in everyday life, and propose a course of action to reduce the use of compounds that are harmful to human health and the environment;
- **B2.** investigate organic compounds and organic chemical reactions, and use various methods to represent the compounds;
- **B3.** demonstrate an understanding of the structure, properties, and chemical behaviour of compounds within each class of organic compounds;

C1. Structure and Properties of Matter

- **C1.** assess the benefits to society and evaluate the environmental impact of products and technologies that apply principles related to the structure and properties of matter;
- **C2.** investigate the molecular shapes and physical properties of various types of matter;
- **C3.** demonstrate an understanding of atomic structure and chemical bonding, and how they relate to the physical properties of ionic, molecular, covalent network, and metallic substances;

D. Energy Changes and Rates of Reaction

- D1. analyse technologies and chemical processes that are based on energy changes, and evaluate the min terms of their efficiency and their effects on the environment;
- D2. investigate and analyse energy changes and rates of reaction in physical and chemical processes, and solve related problems;
- D3. demonstrate an understanding of energy changes and rates of reaction;

E. Chemical Systems and Equilibrium

- E1. analyse chemical equilibrium processes, and assess their impact on biological, biochemical, and technological systems;
- E2. investigate the qualitative and quantitative nature of chemical systems at equilibrium, and solve related problems;
- E3. demonstrate an understanding of the concept of dynamic equilibrium and the variables that cause shifts in the equilibrium of chemical systems;

F. Electrochemistry

- F1. analyse technologies and processes relating to electrochemistry, and their implications for society, health and safety, and the environment;
- F2. investigate oxidation-reduction reactions using a galvanic cell, and analyse electro chemical reactions in qualitative and quantitative terms;
- F3. demonstrate an understanding of the principles of oxidation-reduction reactions and the many practical applications of electrochemistry.

Unit Titles (Sequence and Time Inclusive of final exam):

The course content has been divided into the following units of study, which has been developed to achieve the expectations outlined in Chemistry Grade 12 curriculum guideline.

Outline of the Course Content

Unit	Title	Hours
1	Organic Chemistry	25
2	Structure and Properties of Matter	20
3	Energy Changes and Rates of Reaction	24
4	Chemical Systems and Equilibrium	21
5	Electrochemistry	20
	TOTAL	110

* “Scientific Investigation Skills and Career Exploration” will be incorporated throughout the above units

Teaching Strategies:

A wide variety of instructional strategies will be used to provide learning opportunities that accommodate a range of learning styles and interests. These include:

Direct instruction	Individual work/ team work	Computer aided demonstrations
Laboratory activities	Problem solving	Molecular model construction
Multimedia presentations	Report/Project presentation	Discussion/ Question and answer sessions.

Learning Strategies:

To ensure student's skills such as the ability to work independently or in a team, efficient work habits, study skills and initiative, a variety of learning strategies will be used in order to obtain optimal understanding and application.

Brainstorming Webs	Discussion
Cooperative Learning	Independent Study
Role-playing	Work sheets
Researching	Reports

Learning Skills:

The following criteria will be used to assess Learning Skills:

- (i) Work habits (ii) Initiative (iii) Team Work (iv) Organization (v) Works independently

Assessment

For student success various assessment tools will be used such as a checklist, rubric, to assess their knowledge and skills. These criteria will be to ensure assessment as learning and assessment for learning (Growing Success- ministry of education) that needs to take place and will include strategies such as sharing learning goals and success criteria, providing feedback in relation to goals, and developing students' ability to self-assess – as a way of increasing student's engagement in and commitment to learning.

Evaluation of Student Performance

Evaluation will be based on assessment of learning for grading and reporting. Evidence of student achievement for evaluation will be collected over time from three different sources – teacher observation, conversation, and student products using multiple sources of evidence to ensure the reliability and validity of the evaluation of student learning. Evaluation will be focused on student's achievement of the overall expectations based on the four Ministry of Education achievement categories: Knowledge and Understanding, thinking, communication and application. A single evaluation may include one, more than one, or all of the categories in the weighting listed below:

Category	Description	Weighting
Knowledge and Understanding	Subject-specific knowledge and understanding based on course materials	30%
Application	The use of chemical knowledge and skills to make connections with texts: solving problems related to organic compounds, structures and properties of matter, energy change, and rates of reaction, equilibrium, and electrochemistry.	25%
Thinking and Inquiry	Critical thinking processes as follows: Processing Skills (analyzing, evaluating) Critical thinking processes (problem solving, decision making, research)	20%
Communication	Conveying of meaning: presentations, participation, Oral: debate on uses of chemical compounds Written: explanation of scientific understanding	25%

Final Grade

Term work will be **70%** of the final evaluation and conducted throughout the course in all the four categories. Students will use a variety of checklists, rubrics, rating scales, marking schemes, provided by the teacher from time to time.

Final evaluation of **30%** will comprise an ISU of **10%**, and an exam of **20%**, which will incorporate the work of the whole term, meeting all the overall expectations of the course in each achievement category.

Percentage of Final Grade		Evaluation Components
70%	40%	Test (Student Product) <ol style="list-style-type: none">1. Organic chemistry2. Structures and Properties of Matter3. Energy Changes and Rates of Reaction4. Chemical Systems and Equilibrium5. Electrochemistry
	30%	Assignments, Projects, and Lab (10% Each) (Observation and Conversation): <ol style="list-style-type: none">1. Organic chemistry (Assignment)2. Structure and Properties of Matter (Project)3. Energy Changes and Rates of Reaction (Assignment)4. Chemical Equilibrium (Lab)5. Electrochemistry (Project)
30%	10%	ISU (Observation, Conversation, and Student Product) Research project on topics related to Ministry Curriculum
	20%	Final Exam (Student Product)

Student's Expectation

- Come to class daily with proper materials (binder, pencil, eraser etc.)
- To use and care for books and study materials safely.
- Submit work that is original and represents your own effort.
- To seek clarification from your teacher if assignment criteria, theory or marking rubric is not fully understood.
- To take part in field trips.
- To hand in all projects and assignments on or before the assigned due date.

Late Assignments/ Missed Tests

- Student will be allowed a window to hand in work without penalty up to one day for minor assignments, and up to two days for major projects.
- You must present an acceptable reason for the late assignment on the missed due date to avoid consequences and a contract for an alternative assignment due date may be drawn up. Where possible, present reasons to the teacher prior to the due date.

- After this period, unless there are extenuating circumstances (accepted at the teacher's discretion), late assignments may receive a reduced mark based on the contract and situation and the expectations tied to the assignment.
- If a test is missed while you are absent for an acceptable reason, you must be prepared to write the missed test on the day you return to school. Consult with your teacher before the test is missed (if possible) or as soon as possible in other circumstances.

Rules and Regulations

- 1. Plagiarism / Dishonest Activity:** It is the responsibility of every student to ensure that all assignments and projects which are to be evaluated are original, personal works and are accurately documented as outlined by the teacher. Examples of plagiarism are:
 - the submission of someone else's work (in whole or in part) as your own; giving work to someone else to be copied and submitted; directly copying an existing work and claiming it is your own original creation.
 - buying or selling of assignments and projects
 - submitting work from one course as work in another course

Consequences of Plagiarism

- the teacher will inform parents/guardians that the student has submitted work which is not original.
 - student caught plagiarizing in any other forms as well, will get a straight zero for that assignment, project or test as a penalty for cheating. It will be teacher's discretion to allow/decline the student to resubmit the assignment and project after having discussion with parents and approval/disapproval from the principal.
- 2. Conduct:** Students must follow the school's Code of Conduct, participate fully in discussions, and complete all assignments in time to the best of their ability.
 - 3. Responsibility:** It is also the student's responsibility to make up for any missed work during their absences.

Program and Planning

For an effective program related to chemistry, a variety of activities will be conducted that will integrate expectations from different strands and provide for the explicit teaching of knowledge and skills. It will provide frequent opportunities for students to rehearse, practice, and apply skills and strategies, and to make their own choices. These considerations may include, but not be limited to:

- Provide effective instructional approaches and learning activities draw on students' prior knowledge, capture their interest, and encourage meaningful practice both inside and outside the classroom.
- Provide students with opportunities to learn in a variety of ways – individually, cooperatively, independently, with teacher direction, through hands-on experiences, and through examples followed by practice.
- Provide activities and challenges that actively engage students in inquiries that honor the ideas and skills students bring to them, while further deepening their conceptual understandings and essential skills.
- Provide students with opportunities to use of a variety of equipments and materials that helps deepen and extend their understanding of scientific concepts and further extends their development of scientific investigation skills.
- Make sure to follow 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.

- Motivate students to examine the opinions and values of others, detect bias, look for implied meaning in their readings, and use the information gathered to form a personal opinion or stance.
- Provides opportunities for students to engage in various oral activities in connection with expectations in all the strands, such as brainstorming to identify what they know about the new topic they are studying, discussing strategies for solving a problem, presenting and defending ideas or debating issues, and offering critiques of models and results produced by their peers.
- Encourage students to use ICT to support and communicate their learning.
- Motivate students to develop a variety of important capabilities, including the ability to identify issues, conduct research, carry out experiments, solve problems, present results, and work on projects both independently and as a team.
- Provide students with opportunities to explore various careers related to the areas of science under study and to research the education and training required for these careers.

Materials

Subject binder, stationary set; pen, pencils, eraser, sharpener, rule, geometry set, lined/grid graph paper, blank paper, Scientific calculator

Resources

A number of resources are required for this course.

1. **Text book:** Chemistry 12
2. **Handouts:** Relevant handouts will be given to students.
3. **Multimedia and presentation packages:** will be presented from time to time.
4. **Websites:** www.mcgrawhill/links

Acknowledgment

I have read and understood the course expectations, learning skills, assessment and evaluation strategies, and school rules for this **Chemistry 12** course outline.

Student's Name: _____

Student's Signature: _____ **Date:** _____

Parent's Signature: _____ **Date:** _____