

# M6 Additional Chemistry 5

## Course Syllabus - 2024 Term 2

**Teacher:** Kru Michael Nguyen

**Department:** Science

**Subject Code:** ST33205

**Periods per week:** 3

**Credits:** 1.5

### Course Description

This semester starts with a unit on electrochemistry. Students will apply their understanding of redox reaction to voltaic cells, batteries and electrolysis. The second unit is an introduction to organic chemistry. Topics include structure, properties and nomenclature of alkanes, alkenes and alkynes, isomerism and aromatic compounds. The course concludes with an overview of nuclear chemistry which covers the stability of the nucleus, radioactive decay, nuclear radiation, and applications of fission and fusion. As with any PHS science course, each unit will also include lab-based work.

### Course Content

1. Chapter 20: Electrochemistry
  - 1.1. Introduction to electrochemistry
  - 1.2. Voltaic Cells
  - 1.3. Electrolytic Cells
  
2. Chapter 22: Introduction to Organic Chemistry
  - 2.1. Organic compounds
  - 2.2. Hydrocarbons
  - 2.3. Alkanes, Alkenes, and Alkynes
  - 2.4. Aromatic hydrocarbons
  - 2.5. Other functional groups
    - 2.5.1. Alcohols
    - 2.5.2. Ethers

### 2.5.3. Carboxylic acids

3. Chapter 21: Introduction to nuclear chemistry
  - 3.1. The nucleus
  - 3.2. Radioactive Decay
  - 3.3. Nuclear Radiation
  - 3.4. Nuclear Fission and Nuclear Fusion

## Learning Outcomes

### 1. Electrochemistry

- Identify parts of an electrochemical cell and their functions.
- Write electrode half reactions for cathodes and anodes.
- Describe the operation of voltaic cells, including dry cells, lead-acid batteries, and fuel cells.
- Identify conditions that lead to corrosion and ways to prevent it.
- Describe the relationship between voltage and the movement of electrons.
- Calculate cell voltage/potentials from a table of standard electrode potentials.
- Describe the nature of electrolytic cells.
- Describe the process of electrolysis in the decomposition of water and in production of metals.
- Explain the process of electroplating.
- Describe the chemistry of a rechargeable cell.

### 2. Organic Chemistry

- Explain how the structure and bonding of carbon lead to the diversity and number of organic compounds.
- Understand that a homologous series is a series of compounds of the same family, with the same general formula, which differ from each other by a common structural unit.
- Compare the use of molecular and structural formulas to represent organic compounds.
- Understand that saturated compounds contain single bonds only and unsaturated compounds contain double or triple bonds.
- Compare structural and geometric isomers of organic compounds.
- Distinguish among the structures of alkanes, alkenes, alkynes, and aromatic hydrocarbons.

- Write structural formulas and names for alkanes, alkenes, and alkynes using IUPAC rules
- Explain the trends in boiling points of members of a homologous series.
- Define “functional group” and explain why functional groups are important.
- Identify alcohols, alkyl halides, ethers, aldehydes, ketones, carboxylic acids, esters, and amines based on the functional group present in each.
- Explain the relationships between the properties and structures of compounds with various functional groups.

### 3. Nuclear chemistry

- Identify the forces that affect the stability of the nucleus of atoms
- Write balanced nuclear equations
- Describe different types of radioactive decay (alpha, beta, and gamma)
- Complete calculations involving half-life
- Describe different methods for detecting radiation
- Describe different applications of nuclear radiation
- Compare fission and fusion and describe common applications of each.

## Learning Resources

Textbook: HMH Modern Chemistry (ISBN 9780544817845)

Lesson slides, lesson notes, worksheets, and lab handouts (all will be available in Google Classroom)

Virtual experiment from [Explorellearning.com](https://www.explorellearning.com) (Gizmos)

Other online learning resources ([PHeT](#), [EdPuzzle](#), [Quizizz](#), [CK12](#), [Simbucket](#), and others.)

## Assessment Methods

Assignments and in class quizzes will be used to assess students' skills and understanding of basic concepts within each unit. Assignments will not be graded based on accuracy, but will instead be graded for completion and submission by assigned deadlines. The quizzes will typically be short in duration and will be

open-note in order to assess students' ability to complete basic problems without the need to memorize formulas or the steps required to finish problems.

Students' lab work will be assessed on preparation and planning, attention to detail, ability to draw conclusions and depth of evaluation. Each semester students will also have to choose a project to demonstrate their level of understanding of a particular topic. Details will be provided at the appropriate time.

Unit tests and a formal final exam will include a range of problems. About 50% of the exam will consist of problems that will cover the fundamental skills. About 30% of the exam will consist of problems that will require a deeper understanding of each topic and will require students to combine skills from several topics. About 20% of the final exam will consist of real-world application problems.

## Homework Policy

An assignment that is complete and submitted on-time will receive 100% of the points.

Any complete assignment that is submitted up to 1 week late will receive 75% of the points. Any complete assignment that is submitted up to 3 weeks late will receive 50%.

Over three weeks after the due date, assignments will not be accepted and a grade of 0 will be given.

If students are absent when assignments are assigned or on an assignment due date, then it is the responsibility of the student to contact the teacher to make arrangements for submission.

Information on all assignments can be found in Google Classroom. Students should read instructions carefully to know how assignments should be submitted (either attached to Google Classroom or handed in during class) and the due date.

## Evaluation Breakdown

Assessments	30%
<ul style="list-style-type: none"><li>• Unit Tests</li><li>• Short Quizzes</li><li>• Lab Quizzes</li></ul>	
Student Work	40%
<ul style="list-style-type: none"><li>• Online Practice</li><li>• Homework/Classwork</li></ul>	

- Labs
- Projects

Final Exam

30%