The Chemistry 30 program consists of four units:

A. Thermochemical Changes  
B. Electrochemical Changes  
C. Chemical Changes of Organic Compounds  
D. Chemical Equilibrium Focusing on Acid-Base Systems

Students will be encouraged to:

a) Show interest in science-related questions and issues and confidently pursue personal interests and career possibilities within science-related fields.

b) Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds.

c) Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues.

d) Work collaboratively in planning and carrying out investigations and in generating and evaluating ideas.

e) Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment.

f) Show concern for safety in planning, carrying out and reviewing activities, referring to the Workplace Hazardous Materials Information System (WHMIS) and consumer product labeling information.

Unit A: Thermochemical Changes

Themes: Energy, Change and Systems

Overview: In this unit, students study energy as it relates to chemical changes and quantifying the energy involved in thermochemical systems, and consider the various aspects of energy use on society.

General Outcome: There are two major outcomes in this unit.

Students will:

1. determine and interpret energy changes in chemical reactions
2. explain and communicate energy changes in chemical reactions
Unit B: Electrochemical Changes

Themes: Change and Energy

Overview: In this unit, students study electrochemical change and analyze the matter and energy.

General Outcomes: There are two major outcomes in this unit.

1. explain the nature of oxidation-reductions
2. apply the principles of oxidation-reduction to electrochemical cells.

Unit C: Chemical Changes of Organic Compounds

Themes: Change, Diversity and Energy

Overview: In this introduction to organic chemistry, students learn about common organic compounds and describe their properties and reactions. The significance of organic chemistry, in the context of technological applications and quality of life, is explored.

General Outcomes: There are two major outcomes in this unit.

1. explore organic compounds as a common form of matter
2. describe chemical reactions of organic compounds
Key Concepts:
- organic compounds
- aliphatic and aromatic compounds
- esterification
- naming organic compounds
- saturated/unsaturated hydrocarbons
- combustion reactions
- structural formulas
- functional groups identifying polymerization
- monomers
- alcohols, carboxylic acids, esters
- addition, substitution
- polymers
- and halogenated hydrocarbons
- elimination

Unit D: Chemical Equilibrium Focusing on Acid-Base Systems

Themes: Change, Systems and Equilibrium

Overview: In this unit, the concept that chemical change eventually attains equilibrium is developed, followed by a focus on the quantitative treatment of reaction systems involving acid-base solutions.

General Outcome: There are two major outcomes in this unit

1. explain that there is balance of opposing reactions in chemical equilibrium systems
2. determine quantitative relationships in simple equilibrium systems

Key Concepts:
- chemical equilibrium systems
- reversibility of reactions
- Le Chatelier’s principle
- equilibrium law expressions
- equilibrium constants
- acid-base equilibrium
- Bronsted-Lowry acids and bases
- titration curves
- conjugate pairs of acids and bases
- amphiprotic/amphoteric substances
- buffers
- indicators

B) Teacher Notes
C) Chemistry IB Study Guide
D) Chemistry IB

Evaluation: The mark will be based upon some or all of the following:
a) chapter tests
b) quizzes
c) laboratory work
d) assignment checks
Mark Distribution and Determination:
A cumulative marking system based on raw scores will be used.

For Mr. Cavaliere’s Chemistry 30IB class the final grade is based on the total raw score points that are determined by the scale factor for each task.

Homework – completion 2 possible points each
Labs/assignments – 5-10 possible points each
Quizzes – 10-20 possible points each
Tests – 30-40 possible points each
Midterm Exam – approx. 10% of school awarded final grade

Your class mark will account for 50% of your grade for Chemistry 30IB. Your Alberta diploma exam mark will account for the other 50%.

Grading Criteria and Codes

Criteria Disclaimer
A wide range of assessment information is used in the development of a student’s final grade. At Archbishop MacDonald High School, individualized assessments provide specific information regarding student progress and overall performance in class. Student assessment may vary from student to student to adapt to differences in student needs, learning styles, preferences, and paces. It should be noted that not all assignments are used to determine the final grade.

The following may appear for a student in a task in a course:
1. a numeric value
2. Late – this indicates that the assignment is has not been turned in on time. Late penalties may apply.
3. Exempt – this is used for all items that are not to be included in that student’s grade calculation. (see disclaimer) No change to course grade will result.
4. Missing – The student has missed an assessment BUT has the opportunity to complete the required work. The work will be evaluated when submitted according to a timeline set up in consultation between the student and the teacher. Teacher has a duty to inform parents if the timeline is not being met. THIS CODE WILL CALCULATE AS A ZERO UNTIL THE CODE HAS BEEN REPLACED WITH A NUMERIC VALUE.

Course Materials:
- binder with lined, unlined and graph paper
- calculator (scientific notation)
- pen, pencil, eraser and ruler
Expectations:
1. Students are expected to be punctual to class and any bathroom activities done before class not during.
2. Regular attendance is important, however should you be absent please submit a note and obtain an admit slip from Student Services. Otherwise, it will be considered an unexcused absence and could affect your grade.
3. Materials required for class should be brought to all lessons.
4. Notebooks are to be kept up to date and in presentable condition, since they are records required throughout the entire year. Assignment checks for marks will be done periodically at random.
5. It is the student’s responsibility to maintain and update any notes or assignments following any absence.
6. Attendance at scheduled examinations is mandatory. In the event of an excused absence the teacher will determine if and when the remake test is to be administered.
7. Students on special projects by other teachers must have written permission by the set deadline. Marks may be subtracted for late submission.
8. Assignments such as reports, labs, projects, etc. should be submitted by the set deadline. Marks may be subtracted for late submissions.
9. During classroom exams always bring course materials just in case of early completion.
10. During examinations your answer sheets should be kept in the center of the desk to prevent any sharing of information.
11. Before an examination is distributed your desk should be clear of any unnecessary materials. Test booklets, answers sheets, data booklets, and scrap paper should be handed back. There should be no passing around of any materials or calculators during the examination.

Teacher Contact
- Students should approach teacher to determine appropriate time to discuss issues.

ICT Outcomes: (the following is common to all Chemistry 20/30 Matric, Honours and IB)

C1. Students will access, use and communicate information from a variety of technologies.
   4.1 plan and perform complex searches, using more than one electronic source
   4.2 select information from appropriate sources, including primary and secondary sources
   4.4 communicate in a persuasive and engaging manner, through appropriate forms, such as speeches, letters, reports and multimedia presentations, applying information technologies for context, audience and purpose that extend and communicate understanding of complex issues.

C2. Students will seek alternative viewpoints, using information technologies.
   4.1 consult a wide variety of sources that reflect varied viewpoints on particular topics

C3. Students will critically assess information accessed through the use of a variety of technologies.
   4.2 demonstrate discriminatory selection of electronically accessed information that is relevant to a particular topic (specific to 20IB & 30IB)

C6. Students will use technology to investigate and/or solve problems.
   4.1 investigate and solve problems of prediction, calculation and inference
   4.2 investigate and solve problems of organization and manipulation of information
   4.3 manipulate data by using charting and graphing technologies in order to test inferences and probabilities
4.4 generate new understandings of problematic situations by suing some form of technology to facilitate the process

C7. Students will use electronic research techniques to construct personal knowledge and meaning.
   4.1 use appropriate strategies to locate information to meet personal needs
   4.2 analyze and synthesize information to determine patterns and links among ideas
   4.3 use appropriate presentation software to demonstrate personal understandings

F1. Students will demonstrate an understanding of the nature of technology.
   4.2 solve mathematical and scientific problems by selecting appropriate technology to perform calculations and experiments.

F2. Students will understand the role of technology as it applies to self, work and society.
   4.1 use technology outside formal classroom settings
   4.2 analyze how technological innovations and creativity affect the economy
   4.3 demonstrate an understanding of new and emerging communication systems
   4.4 evaluate possible potential for emerging technologies

F3. Students will demonstrate a moral and ethical approach to the use of technology.
   4.1 demonstrate an understanding of how changes in technology can benefit or harm society
   4.2 evaluate the influence and results of digital manipulation on our perceptions (specific to 20IB & 30IB)
   4.3 respect, ownership and integrity of information

P1. Students will compose, revise and edit text.
   4.1 continue to demonstrate the outcomes achieved in prior grades and course subjects

P2. Students will organize and manipulate data.
   4.1 manipulate and present data through the selection of appropriate tools, such as scientific instrumentation, calculators, databases and/or spreadsheets.

P3. Students will communicate through multimedia.
   4.1 select and use, independently, multimedia capabilities for presentations in various subject areas
   4.2 support communication with appropriate images, sounds and music
   4.3 apply general principles of graphic layout and design to a document in process

P4. Students will integrate various applications
   4.1 integrate a variety of visual and audio information into a document to create a message targeted for a specific audience.
   4.2 apply principles of graphic design to enhance meaning and audience appeal
   4.3 use integrated software effectively and efficiently to reproduce work that incorporates data, graphics and text.

P6. Students will use communication technology to interact with others.
   4.1 select and use the appropriate technologies to communicate effectively with a targeted audience.
Students will study a core syllabus, and this is supplemented by the study of two options. Students are required to spend 40 hours on practical/investigative work. This includes 10 hours for the group 4 project. The group 4 project is an interdisciplinary activity in which all science students must participate. The exercise should be a collaborative experience where the emphasis is in the processes involved in scientific investigation.

Program of Studies is divided in two parts: the Core and the Option.

Core:

**Topic 1: Quantitative chemistry**
1.1 The mole concept and Avogadro’s constant
1.2 Formulas
1.3 Chemical equations
1.4 Mass and gaseous volume relationships in chemical reactions
1.5 Solutions

**Topic 2: Atomic structure**
2.1 The atom
2.2 The mass spectrometer
2.3 Electron arrangement

**Topic 3: Periodicity**
3.1 The periodic table
3.2 Physical properties
3.3 Chemical properties

**Topic 4: Bonding**
4.1 Ionic bonding
4.2 Covalent bonding
4.3 Intermolecular forces
4.4 Metallic bonding
4.5 Physical properties

**Topic 5: Energetics**
5.1 Exothermic and endothermic reactions
5.2 Calculation of enthalpy changes
5.3 Hess’s law
5.4 Bond enthalpies
Topic 6: Kinetics
6.1 Rates of reaction
6.2 Collision theory

Topic 7: Equilibrium
7.1 Dynamic equilibrium
7.2 The position of equilibrium

Topic 8: Acids and bases
8.1 Theories of acids and bases
8.2 Properties of acids and bases
8.3 Strong and weak acids and bases
8.4 The pH scale

Topic 9: Oxidation and reduction
9.1 Introduction to oxidation and reduction
9.2 Redox equations
9.3 Reactivity
9.4 Voltaic cells
9.5 Electrolytic cells

Topic 10: Organic chemistry
10.1 Introduction
10.2 Alkenes
10.3 Alkenes
10.4 Alcohols
10.5 Halogenoalkanes
10.6 Reaction pathways

Topic 11: Measurement and data processing
11.1 Uncertainty and error in measurement
11.2 Uncertainties in calculated results
11.3 Graphical techniques

Options SL and HL

Option A: Modern analytical chemistry
Core (SL and HL)
A1 Analytical techniques
A2 Principles of spectroscopy
A3 Infrared (IR) spectroscopy
A4 Mass spectrometry
A5 Nuclear magnetic resonance (NMR) spectroscopy
A6 Atomic absorption (AA) spectroscopy
A7 Chromatography
### Option B: Human biochemistry
**Core (SL and HL)**

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### Option C: Chemistry in industry and technology
**Core (SL and HL)**

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<td>C2</td>
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### Option D: Medicines and drugs
**Core (SL and HL)**

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### Option E: Environmental chemistry
**Core (SL and HL)**

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<td>Waste</td>
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Option F: Food Chemistry
Core (SL and HL)

F1  Food Groups
F2  Fats and oils
F3  Shelf life
F4  Colour
F5  Genetically modified foods
F6  Texture

Option G: Further organic chemistry
Core (SL and HL)

G1  Electrophilic additions reactions
G2  Nucleophilic additions reactions
G3  Elimination reactions
G4  Addition-elimination reactions
G5  Arenes
G6  Organometallic chemistry
G7  Reaction pathways
G8  Acid-base reactions

Assessment Outline

A. External Assessment:

Paper 1 is made up of multiple-choice questions that test knowledge of the core. Overall weighting is 20%.

Paper 2 tests knowledge of the core and is divided into two sections. There is a data based question that requires students to analyze a given set of short-answer questions and extended-response questions involving writing a number of paragraphs, solving a substantial problem or carrying out substantial analysis or evaluation. Overall weighting is 36%.

Paper 3 tests knowledge of the options and the overall weighting is 20%.

B. Practical Work and Internal Assessment:

The internal assessment is work 24% of the final assessment and consists of an interdisciplinary project and a mixture of short and long-term investigations.