Colonel by Secondary School

Course Outline: Grade 11 Chemistry, International Baccalaureate, IB (I), HL.

Course Code: SCH3UE (IB I)

Course Text: Chemistry Today I, Whitman, Nalepa, and Zinck
Sadru and Damji "IB - Chemistry"

Evaluation: Evaluations = 70 % Summative = 30 %

Overview:
The objectives for the Higher Level Chemistry is based on the International Baccalaureate Chemistry Prospectus (February 2014). To meet these objectives, specific material is covered in each of the two years. In covering the IB objectives, the Ontario Curriculum is also covered in depth.

Chemistry is the central science. Chemical principles underpin the physical environment in which we live, and all biological systems. As such the subject of chemistry has two main roles in the curriculum. It is a subject worthy of study in its own right as a preparation for employment or further study. Chemistry is also a prerequisite for many other courses in higher education, such as medicine, and biological and environmental sciences.

Chemistry is an experimental science that combines academic study with the acquisition of practical and investigational skills. The chemistry programme aims to balance the needs of an examination syllabus on one hand with the freedom of teachers to devise courses that meet the needs of their students on the other. The programme reflects, through the variety of options available, the need to ensure that the qualification will meet the needs of students who wish to enter higher education in the sciences and those for whom this will be their final formal study of science.

This is a two-year program designed for students who plan to write the Higher Level IB Chemistry Examination. Students are awarded the SCH3UE credit upon successful completion of the SCH3UE (IB, Higher Level, Year I) course requirements. Students are awarded the SCH4UE credit upon successful completion of the SCH4UE (IB, Higher Level, Year II) course requirements.

Students attain the Higher Level Chemistry qualification upon successful completion of IB external evaluations and practical work as 20 % of the total mark, with the IB external evaluation making up the remaining 80%.

Higher Level Chemistry consists of 240 hours (95 hours Core material + 60 hours HL material + 25 hours Option Unit). The Higher Level Chemistry also consists of 60 hours of practical scheme of work, PSOW, (40 hours of practical activities + 10 hours individual investigation - internal assessment- IA + 10 hours Group IV).

Standard Level Chemistry consists of 150 hours (95 hours Core material + 15 hours Option Unit). The Standard Level Chemistry also consists of 40 hours of practical scheme of work, PSOW, (20 hours of practical activities + 10 hours individual investigation - internal assessment- IA + 10 hours Group IV).
The practical scheme of work, **PSOW**, is a summary of all the investigative activities carried out by the student. The practicals include a wide variety such as computer simulations, using databases for secondary data, developing and using models, data analysis exercises, field work, short labs or projects extending over several weeks, etc. Details of the practical scheme of work are recorded on Form 4/PSOW.

IB HL Chemistry Syllabus:

IB Topic number		Title	N^{o} of Hrs: (Core)	N^{o} of Hrs: (HL)
Core	**HL**			
1		Stoichiometric relationships	13.5	
2	12	Structure	6	2
3	13	Periodicity	6	4
4	14	Bonding	13.5	7
5	15	Energetics	9	7
6	16	Kinetics	6	6
7	17	Equilibrium	4.5	4
8	18	Acids and Bases	6.5	10
9	19	Oxidation and Reduction	8	6
10	20	Organic Chemistry	11	12
11	21	Measurements & Data processing	10	2
		Total:	**95**	**60**

IB HL / SL Option Units:

Topic:	Title:	Hours	
		Core	**HL**
A	Materials	15	25
B	Biochemistry	15	25
C	Energy	15	25
D	Medicines and Drugs (Medicinal Chemistry)	15	25

Internal Assessment - IA:

- Duration: 10 hours
- Weighting: 20 %
- Individual investigation
- This investigation covers assessment objectives 1, 2, 3 and 4.

Internal assessment is an integral part of the chemistry course, a total of 10 hours of teaching time is allocated, consisting of one scientific investigation task, with a total mark of 24, and a weighting of 20 % of the final assessment in the SL and the HL courses. The work submitted for internal assessment must be the student's own work. Assessment criteria are the same for both SL and HL.
The write-up is expected to be 6 – 12 pages, exceeding this length will be penalized in the communication criterion as lacking in conciseness.
Internal assessment uses five assessment criteria to assess the final report of the individual investigation with the following raw marks and weightings assigned:

Criteria:

Personal engagement	Exploration	Analysis	Evaluation	Communication	Total
2 (8 %)	6 (25 %)	6 (25 %)	6 (25 %)	4 (17 %)	24 (100 %)

Each assessment criterion has level descriptors describing specific achievement levels together with an appropriate range of marks.

Personal engagement includes:

- How well students engages with exploration
- How well student addresses personal interest

Mark	Descriptor
0	The student's report does not reach a standard described by the descriptors below.
1	**The evidence of personal engagement with the exploration is limited with little independent thinking, initiative or creativity.** The justification given for choosing the research question and/or the topic under investigation does not demonstrate **personal significance, interest or curiosity.** There is little evidence of **personal input and initiative** in the designing, implementation or presentation of the investigation.
2	**The evidence of personal engagement with the exploration is clear with significant independent thinking, initiative or creativity.** The justification given for choosing the research question and/or the topic under investigation demonstrates **personal significance, interest or curiosity.** There is evidence of **personal input and initiative** in the designing, implementation or presentation of the investigation.

Exploration includes:

- How well student develops context for his exploration
- How well student uses techniques appropriate for course level
- How well student is aware of implications of their exploration

Mark	Descriptor
0	The student's report does not reach a standard described by the descriptors below.
1-2	The topic of the investigation is identified and a research question of some relevance is **stated but it is not focused.** The background information provided for the investigation is **superficial** or of limited relevance and does not aid the understanding of the context of the investigation. The methodology of the investigation is only appropriate to address the research question to a very limited extent since it takes into consideration few of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. The report shows evidence of limited awareness of the significant safety, ethical or environmental issues that are **relevant to the methodology of the investigation**.
3-4	**The topic of the investigation is identified and a relevant but not fully focused research question is described.** The background information provided for the investigation is **mainly appropriate** and relevant and aids the understanding of the context of the investigation. The methodology of the investigation is mainly appropriate to address the research question but has limitations since it takes into consideration only some of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. The report shows evidence of some awareness of the significant safety, ethical or environmental issues that are **relevant to the methodology of the investigation.**
5-6	**The topic of the investigation is identified and a relevant and fully focused research question is clearly described.** The background information provided for the investigation **is entirely appropriate and relevant** and enhances the understanding of the context of the investigation. The methodology of the investigation is highly appropriate to address the research question because it takes into consideration all, or nearly all, of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. The report shows evidence of full awareness of the significant safety, ethical or environmental issues that are **relevant to the methodology of the investigation.**

Analysis includes:

- How well student is able to interpret the data they produce

Mark	Descriptor
0	The student's report does not reach a standard described by the descriptors below.
1-2	The report includes **insufficient relevant raw data to support a valid conclusion to** the research question. **Some basic data processing is carried out but is either too inaccurate or too insufficient to lead to a valid conclusion.** The report shows evidence of little consideration of the **impact of measurement uncertainty** on the analysis. The **processed data is incorrectly or insufficiently interpreted** so that the conclusion is invalid or very incomplete.
3-4	The report includes **relevant but incomplete quantitative and qualitative raw data** that could support a simple or partially valid conclusion to the research question. **Appropriate and sufficient data processing** is carried out that could lead to a broadly valid conclusion but there are significant inaccuracies and inconsistencies in the processing . The report shows evidence of some consideration of the **impact of measurement uncertainty on the analysis.** The processed data is interpreted so that a **broadly valid** but **incomplete or limited conclusion** to the research question can be deduced.
5-6	The report includes **sufficient relevant quantitative and qualitative raw data** that could support a detailed and valid conclusion to the research question. Appropriate and sufficient data processing is carried out with the **accuracy** required to enable a conclusion to the research question to be drawn that is fully **consistent** with the experimental data. The report shows **evidence of full and appropriate consideration** of the impact of measurement uncertainty on the analysis. The **processed data is correctly interpreted so that a completely valid** and detailed conclusion to the research question can be deduced.

Evaluation includes:

- How well student is able to provide evidence of evaluation of the investigation and results.

Mark	Descriptor
0	The student's report does not reach a standard described by the descriptors below.
1-2	A conclusion is **outlined** which is not relevant to the research question or is not supported by the data presented. The conclusion makes **superficial comparison** to the accepted scientific context. Strengths and weaknesses of the investigation, such as limitations of the data and sources of error, are **outlined** but are restricted to an account of the **practical or procedural issues faced.** The student has **outlined** very few realistic and relevant suggestions for the improvement and extension of the investigation.
3-4	A conclusion is **described** which is relevant to the research question and supported by the data presented. A conclusion is **described** which makes some relevant comparison to the accepted scientific context. Strengths and weaknesses of the investigation, such as limitations of the data and sources of error, are **described and provide evidence** of some awareness of the methodological issues involved in establishing the conclusion. The student has **described** some realistic and relevant suggestions for the improvement and extension of the investigation.
5-6	A **detailed** conclusion is **described and justified** which is entirely relevant to the research question and fully supported by the data presented. A conclusion is **correctly described and justified** through relevant comparison to the accepted scientific context. Strengths and weaknesses of the investigation, such as limitations of the data and sources of error, are **discussed** and provide evidence of a clear understanding of the methodological issues involved in establishing the conclusion. The student has **discussed** realistic and relevant suggestions for the improvement and extension of the investigation.

Communication includes:

- How well student is able present information

Mark	Descriptor
0	The student's report does not reach a standard described by the descriptors below.
1-2	**The presentation of the investigation is unclear, making it difficult to understand the focus, process and outcomes.** The report is not well structured and is unclear: the necessary information on focus, process and outcomes is missing or is presented in an incoherent or disorganized way. The understanding of the focus, process and outcomes of the investigation is obscured by the presence of inappropriate or irrelevant information. There are many errors in the use of subject specific terminology and conventions.
3-4	**The presentation of the investigation is clear. Any errors do not hamper understanding of the focus, process and outcomes.** The report is well structured and clear: the necessary information on focus, process and outcomes is present and presented in a coherent way. The report is relevant and concise thereby facilitating a ready understanding of the focus, process and outcomes of the investigation. The use of subject specific terminology and conventions is appropriate and correct. Any errors do not hamper understanding.

Group 4 Project: (10 hours)

The group 4 project is an interdisciplinary activity in which all Diploma Programme science students must participate. The intention is that students from the different group 4 subjects analyze a common topic or problem. The exercise should be a collaborative experience where the emphasis is on the processes involved in, rather than the products of, such an activity. Its purpose is to help students -"develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge". If a student is taking multiple group four sciences they have to do a write-up for each of them. It is comprised of three stages: Planning, Action, Evaluation.

Planning:

- 2 hours
- Students mixed-science group will be brainstorming ideas on how to approach the central topic.

Action:

- 6 hours
- Lab work is done here as experiments are carried out.
- There should be collaboration during the action stage; findings of investigations should be shared with other students within the mixed/single-subject group.

Evaluation:

- 2 hours
- Students are expected to share their findings with other students. (How this information is presented is up to the teachers)

External Assessment:

	SL	HL
Paper 1	• 30 multiple choice questions • No calculators • Will be provided with a periodic table. • *45 Minutes* • *30 Marks*	• 40 multiple choice questions • No calculators • Will be provided with a periodic table. • *1 Hour* • *40 Marks*
Paper 2	• Short and Long answer questions • Calculators allowed • Data Booklet will be given • Answer all questions • *1 Hour 15 Minutes* • *50 Marks*	• Short and Long answer questions • Calculators allowed • Data Booklet will be given • Answer all questions • *2 Hour 15 Minutes* • *95 Marks*
Paper 3	• Section A: Data Analysis questions • Section B: Short and Long answer questions • Calculators allowed • Data Booklet will be given • Pick one option out of the four. • *1 Hour* • *35 Marks*	• Section A: Data Analysis questions • Section B: Short and Long answer questions • Calculators allowed • Data Booklet will be given • Pick one option out of the four. • *1 Hour 15 Minutes* • *45 Marks*

Assessment weighting (SL):

Component:	**Overall Weighting**	**Weighting of objectives:**	
		1+2	**3**
Paper 1	20%	10%	10%
Paper 2	40%	20%	20%
Paper 3	20%	10%	10%
Internal Assessment	20%	20%	

Assessment weighting (HL):

Component:	**Overall Weighting**	**Weighting of objectives:**	
		1+2	**3**
Paper 1	20%	10%	10%
Paper 2	36%	18%	18%
Paper 3	24%	12%	12%
Internal Assessment	20%	20%	