



**CARSON GRAHAM
SECONDARY**

COURSE OUTLINE – DP CHEMISTRY

Course Description:

IB Chemistry is an experimental science that combines academic study with the acquisition and development of practical and investigational skills. This two-year course aims to balance the needs of a content-oriented syllabus with the development of the critical-thinking skills required by the experimental scientist. The course reflects the need to ensure that the qualifications will be met for students wishing to enter university study in the sciences; it will also develop students' investigational skills in the use of the scientific method, involving the formation, testing and modification of a hypothesis through observation and measurement, under the controlled conditions of an experiment. The course will also allow students to develop their problem-solving and analytical skills, as well as provide opportunities for students to become more aware of the moral, ethical, social, economic and environmental implications of using science and technology. **Laboratory work forms an integral part of the course.**

Nature of Science (NOS)

The Nature of science (NOS) is an overarching theme in IB biology, chemistry and physics courses. Students will investigate throughout the course the nature of science in the 21st century in connection to the curricular content. The five lenses the course will be studied through are:

1. What is science and what is the scientific endeavour?
 2. The understanding of science
 3. The objectivity of science
 4. The human face of science
 5. Scientific literacy and the public understanding of science
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Group 4 aims

Through studying biology, chemistry or physics, students should become aware of how scientists work and communicate with each other. While the scientific method may take on a wide variety of forms, it is the emphasis on a practical approach through experimental work that characterizes these subjects.

The aims enable students, through the overarching theme of the Nature of science, to:

1. appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. acquire a body of knowledge, methods and techniques that characterize science and technology
3. apply and use a body of knowledge, methods and techniques that characterize science and technology
4. develop an ability to analyse, evaluate and synthesize scientific information
5. develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
6. develop experimental and investigative scientific skills including the use of current technologies
7. develop and apply 21st century communication skills in the study of science
8. become critically aware, as global citizens, of the ethical implications of using science and technology
9. develop an appreciation of the possibilities and limitations of science and technology
10. develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.





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Course Syllabus:

The syllabus content for the IB chemistry program consists of the core academic material (Topics 1-11), the Additional Higher Level material (Topics 12-20) and the Option. Experimentation and Internal Assessment tasks will be carried out throughout the course.

Year 1

Topic 1	Quantitative Chemistry
Topic 11	Measurement & Data Processing
Topic 2/12	Atomic Structure
Topic 3/13	Periodicity
Topic 4/14	Bonding
Topic 5/15	Energetics
Topic 10	Organic Chemistry
IA	Group 4 Project

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 analyse a common topic or problem. It is a collaborative experience where the emphasis is on the processes involved in, rather than the products of, such an activity.

Year 2

IA	Individual Investigation
Topics 6/16	Kinetics
Topics 7/17	Equilibrium
Topic 8/18	Acids and Bases
Topic 9/19	Oxidation and Reduction
Topic 10/20	Organic Chemistry
Topic 21	Measurement and Data Analysis
Option	One of Materials, Biochemistry, Energy, or Medicinal Chemistry

The Individual Investigation is an internal assessment task which is one practical scientific investigation taking about 10 hours and the write-up should be about 6 to 12 pages long. The task produced should be complex and it requires a purposeful research question and the scientific rationale for it.

Assessment Objectives:

The assessment objectives for biology, chemistry and physics reflect those parts of the aims that will be formally assessed either internally or externally. These assessments will centre upon the nature of science. It is the intention of these courses that students are able to fulfill the following assessment objectives:

1. Demonstrate knowledge and understanding of:
 - a. facts, concepts, and terminology
 - b. methodologies and techniques
 - c. communicating scientific information.
2. Apply:
 - a. facts, concepts, and terminology
 - b. methodologies and techniques
 - c. methods of communicating scientific information.
3. Formulate, analyse and evaluate:
 - a. hypotheses, research questions and predictions
 - b. methodologies and techniques
 - c. primary and secondary data
 - d. scientific explanations.
4. Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.





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Assessment Overview:

IB Assessment consists of two parts as specified by the International Baccalaureate Organization: External Assessments (Final Exams in May of Year 2) and Internal Assessment (Labwork, the Group 4 Project and the Individual Investigation).

Students in this course will be assessed by:

- using the IB 7-point scale on formative and summative assessments relating to the syllabus
- using assessment criteria rubrics for formative and summative assessments relating to labwork

The course will be geared towards preparing the students for the IB exams that take place in May of Year 2. Teachers will use cumulative evaluation (quizzes, unit tests, etc) throughout the course that will give both the student and the teacher a snapshot of the student's progress in terms of their understanding of the curriculum. Teachers will report out each term on a student's current IB level which culminates to an IB predicted score at the end of the course.

External Assessment

Paper 1

Multiple-choice questions on core (and AHL)
The use of calculators is not permitted.
Students will be provided with a periodic table.
No marks are deducted for incorrect answers.

Paper 2

Short-answer and extended-response questions on the core (and AHL)
The use of calculators is permitted.
A chemistry data booklet is to be provided by the school.

Paper 3

This paper will have questions on core, (AHL) and option material.
Section A: one data-based question and several short-answer questions on experimental work.
Section B: short-answer and extended-response questions from one option.
The use of calculators is permitted.
A chemistry data booklet is to be provided by the school.

Component	Overall weighting (%)	Approximate weighting of objectives (%)		Duration (hours)
		1+2	3	
Paper 1	20	10	10	1
Paper 2	36	18	18	2¼
Paper 3	24	12	12	1¼
Internal assessment	20	Covers objectives 1, 2, 3 and 4		10

Figure 1: HL Assessment Outline

Component	Overall weighting (%)	Approximate weighting of objectives (%)		Duration (hours)
		1+2	3	
Paper 1	20	10	10	¾
Paper 2	40	20	20	1¼
Paper 3	20	10	10	1
Internal assessment	20	Covers objectives 1, 2, 3 and 4		10

Figure 2: SL Assessment Outline

Internal Assessment

The internal assessment consists of a mixture of short- and long-term investigations (such as practical lab work and projects), an interdisciplinary project called the Group 4 Project and the Individual Investigation, which is assessed against the following five criteria;

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

Assessment Timeline

Quizzes, Tests, Labwork, etc

Ongoing throughout the course

Year 1

Group 4 Project Spring
Year 1 Exam June

Year 2

Individual Investigation Fall/Winter





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Grade Descriptors:

Grade 7

Displays comprehensive knowledge of factual information in the syllabus and a thorough command of concepts and principles. Selects and applies relevant information, concepts and principles in a wide variety of contexts. Analyses and evaluates quantitative and/or qualitative data thoroughly. Constructs detailed explanations of complex phenomena and makes appropriate predictions. Solves most quantitative and/or qualitative problems proficiently. Communicates logically and concisely using appropriate terminology and conventions. Shows insight or originality.

Demonstrates personal skills, perseverance and responsibility in a wide variety of investigative activities in a very consistent manner. Works very well within a team and approaches investigations in an ethical manner, paying full attention to environmental impact. Displays competence in a wide range of investigative techniques, pays considerable attention to safety, and is fully capable of working independently.

Grade 6

Displays very broad knowledge of factual information in the syllabus and a thorough understanding of concepts and principles. Selects and applies relevant information, concepts and principles in most contexts. Analyses and evaluates quantitative and/or qualitative data with a high level of competence. Constructs explanations of complex phenomena and makes appropriate predictions. Solves basic or familiar problems and most new or difficult quantitative and/or qualitative problems. Communicates effectively using appropriate terminology and conventions. Shows occasional insight or originality.

Demonstrates personal skills, perseverance and responsibility in a wide variety of investigative activities in a very consistent manner. Works well within a team and approaches investigations in an ethical manner, paying due attention to environmental impact. Displays competence in a wide range of investigative techniques, pays due attention to safety and is generally capable of working independently.

Grade 5

Displays broad knowledge of factual information in the syllabus. Shows sound understanding of most concepts and principles and applies them in some contexts. Analyses and evaluates quantitative and/or qualitative data competently. Constructs explanations of simple phenomena. Solves most basic or familiar problems and some new or difficult quantitative and/or qualitative problems. Communicates clearly with little or no irrelevant material.

Demonstrates personal skills, perseverance and responsibility in a variety of investigative activities in a fairly consistent manner. Generally works well within a team and approaches investigations in an ethical manner, paying attention to environmental impact. Displays competence in a range of investigative techniques, pays attention to safety and is sometimes capable of working independently.

Grade 4

Displays reasonable knowledge of factual information in the syllabus, though possibly with some gaps. Shows adequate comprehension of most basic concepts and principles but with limited ability to apply them. Demonstrates some analysis or evaluation of quantitative or qualitative data. Solves some basic or routine problems but shows limited ability to deal with new or difficult situations. Communicates adequately although responses may lack clarity and include some repetitive or irrelevant material.

Demonstrates personal skills, perseverance and responsibility in a variety of investigative activities, although displays some inconsistency. Works within a team and generally approaches investigations in an ethical manner, with some attention to environmental impact. Displays competence in a range of investigative techniques, pays some attention to safety although requires some close supervision.

Grade 3

Displays limited knowledge of factual information in the syllabus. Shows a partial comprehension of basic concepts and principles and a weak ability to apply them. Shows some ability to manipulate data and solve basic or routine problems. Communicates with a possible lack of clarity and uses some repetitive or irrelevant material.

Demonstrates personal skills, perseverance and responsibility in some investigative activities in an inconsistent manner. Works within a team and sometimes approaches investigations in an ethical manner, with some attention to environmental impact. Displays competence in some investigative techniques, occasionally pays attention to safety, and requires close supervision.

Grade 2

Displays little recall of factual information in the syllabus. Shows weak comprehension of basic concepts and principles with little evidence of application. Exhibits minimal ability to manipulate data and little or no ability to solve problems. Offers responses which are often incomplete or irrelevant.

Rarely demonstrates personal skills, perseverance or responsibility in investigative activities. Works within a team occasionally but makes little or no contribution. Occasionally approaches investigations in an ethical manner, but shows very little awareness of the environmental impact. Displays competence in a very limited range of investigative techniques, showing little awareness of safety factors and needing continual and close supervision.

Grade 1

Recalls fragments of factual information in the syllabus and shows very little understanding of any concepts or principles.

Rarely demonstrates personal skills, perseverance or responsibility in investigative activities. Does not work within a team. Rarely approaches investigations in an ethical manner, or shows an awareness of the environmental impact. Displays very little competence in investigative techniques, generally pays no attention to safety and requires constant supervision.





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BC Ministry Requirements:

In line with the philosophy of the IB Diploma Programme, students will be assessed against the course objectives at their current level of achievement on the 7-point scale throughout the course. As required by the Ministry of Education, students will also be given a percentage converted from the IB level that reflects their achievement in relation to the corresponding BC Curriculum course.

Approaches to Learning (ATL)

Approaches to learning across the Diploma Programme refer to deliberate strategies, skills and attitudes which are intrinsically linked with the learner profile attributes, enhance student learning and assist student preparation for the Diploma Programme assessment and beyond.

The five approaches to learning categories in the DP are:

- thinking skills
- social skills
- communication skills
- self-management skills
- research skills

Development of these skills are key to success in the Diploma Programme and will be formally and informally taught and assessed.

Academic Honesty and Personal Integrity

The faculty at Carson Graham expects our students to complete academic and nonacademic work that is authentic and respectful of intellectual property. As diploma candidates, you are expected to adhere to the school's Policy for Academic Integrity, and also to the principles and practices set out in the IB document, Diploma Programme: Academic Honesty, 2011. Ignorance of the standards related to academic honesty and student integrity is not an excuse for dishonesty, plagiarism and malpractice. You are expected to familiarize yourself with the policy.

<http://www.sd44.ca/school/carson/Documents/Carson%20Graham%20Policy%20for%20Academic%20Honesty%20June%202015.pdf>

