

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

IB CHEMISTRY SL

DATE: FEBRUARY 2015

COURSE LENGTH: ONE YEAR

PROPOSED GRADE LEVEL(s): 11 & 12

**SUBJECT AREA/CREDITS: PHYSICAL
SCIENCE, 5/SEMESTER**

GRADING: A-F

PREREQUISITES: Completion of Honors Chemistry or Chemistry AND Algebra II or Integrated Math III with a grade of B or better.

Intent to Pursue 'A-G' College Prep Status: ✓ Yes

COURSE DESCRIPTION:

The IB Diploma Programme Chemistry Standard Level course combines academic study with the acquisition of practical and investigational skills through the experimental approach. Students learn the chemical principles that underpin both the physical environment and biological systems through the study of quantitative chemistry, periodicity, kinetics and other subjects. The chemistry course covers the essential principles of the subject and, through selection of options is able to meet the interests of the students.

Through this course, a strong focus on the application of laboratory design skills will be emphasized.

Throughout this challenging course, students become aware of how scientists work and communicate with each other. Further, students enjoy multiple opportunities for scientific study and creative inquiry within a global context. In addition, students will participate in an interdisciplinary project, the Group 4 Project, with the other courses in the Group 4 Sciences category.

Through studying a science subject 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, the emphasis on a practical approach. In addition, through the overarching theme of the "Nature of Science" this knowledge and skills will be put into the context of way science and scientists work in the 21st Century and the ethical debates and limitations of creative scientific endeavor.

The sciences are taught practically. Students have opportunities to design investigations, collect data, develop manipulative skills, analyze results, collaborate with peers and evaluate and communicate their findings. The investigations may be laboratory based or they may make use of simulations and data bases. Students develop the skills to work independently on their own design, but also collegiately, including collaboration with schools in different regions, to mirror the way in which scientific research is conducted in the wider community.

GENERAL GOALS/ESSENTIAL QUESTIONS:

The primary goal of IB Chemistry SL is to prepare students to take the IB exams at the end of their senior year. In order to do this, students will need detailed knowledge of the unit topics listed below, as well as a sophisticated skill set that allows students to think, write and analyze like a scientist.

CCSS READING COMPONENT:

Students will read from various text sources including science texts, science journals, science news articles and a variety of science web materials. Students will cite strong and thorough textual evidence to support analysis of what the text says. Students will integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address scientific questions or solve scientific problems. Students will gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. Students will draw evidence from literary and/or informational texts to support analysis, reflection, and research on a variety of scientific topics.

CCSS WRITING COMPONENT:

Students will complete investigations that are complex and commensurate with the level of the IB Chemistry SL course. These will require a purposeful research question and scientific rationale. Students will write thorough lab reports with a detailed background, methodology, analysis, and conclusion. During the course, students will complete writing assignments and other investigations where students will state scientific claims and support them with evidence.

CCSS SPEAKING AND LISTENING COMPONENTS:

Students will initiate and participate effectively in collaborative discussions including one-on-one, in groups and teacher led. Students engage in peer teaching, presentations of research findings, class discussions.

In this course students will complete independent investigations. Students will complete a collaborative project with students in other Group 4 Sciences course investigating a scientific or technological problem where students will plan, implementing (action) and evaluate the project.

DETAILED UNITS OF INSTRUCTION:

This course will cover all of the core topics, as well as one of the four optional topics. In addition to the content, a significant portion of the course is dedicated to laboratory investigations. The internal assessment requires students to complete and extensive individual laboratory investigation. The final requirement of the course requires students to participate in an interdisciplinary project with the other Group 4 students.

Core Topics:	Recommended Hours
• Topic 1: Stoichiometric Relationships	13.5 Hours
1.1 Introduction to Particulate Nature of Matter and Change	
1.2 The Mole Concept	
1.3 Reacting Masses and Volumes	
• Topic 2: Atomic Structure	6 Hours
2.1 The Nuclear Atom	
2.2 Electron Configuration	
• Topic 3: Periodicity	6 Hours
3.1 Periodic Table	
3.2 Periodic Trends	
• Topic 4: Chemical Bonding and Structure	13.5 Hours
4.1 Ionic Bonding and Structure	
4.2 Covalent Bonding	
4.3 Covalent Structures	

- 4.4 Intermolecular Forces
- 4.5 Metallic Bonding
- **Topic 5: Energetics/thermochemistry** **9 Hours**
 - 5.1 Measuring Energy Changes
 - 5.2 Hess's Law
 - 5.3 Bond Enthalpies
- **Topic 6: Chemical Kinetics** **7 Hours**
 - 6.1 Collision Theory and Rates of Reaction
- **Topic 7: Equilibrium** **4.5 Hours**
 - 7.1 Equilibrium
- **Topic 8: Acids and Bases** **6.5 Hours**
 - 8.1 Theories of Acids and Bases
 - 8.2 Properties of Acids and Bases
 - 8.3 The pH Scale
 - 8.4 Strong and Weak Acids and Bases
 - 8.5 Acid Deposition
- **Topic 9: Redox Processes** **8 Hours**
 - 9.1 Oxidation & Reduction
 - 9.2 Electrochemical Cells
- **Topic 10: Organic Chemistry** **11 Hours**
 - 10.1 Fundamentals of Organic Chemistry
 - 10.2 Functional Group Chemistry
- **Topic 11: Measurement and Data Processing** **10 Hours**
 - 11.1 Uncertainties and Errors in Measurements and Results
 - 11.2 Graphical Techniques
 - 11.3 Spectroscopic Identification of Organic Compounds

Options: Only ONE Taught **15 Hours**

- **A: Materials**
 - A.1 Materials Science Introduction
 - A.2 Metals and Inductively Coupled Plasma (ICP) Spectroscopy
 - A.3 Catalysts
 - A.4 Liquid Crystals
 - A.5 Polymers
 - A.6 Nanotechnology
 - A.7 Environmental Impact – Plastics
- **B: Biochemistry**
 - B.1 Introduction to Biochemistry
 - B.2 Proteins and Enzymes
 - B.3 Lipids
 - B.4 Carbohydrates
 - B.5 Vitamins
 - B.6 Biochemistry and Environment
- **C: Energy**

- C.1 Energy Sources
- C.2 Fossil Fuels
- C.3 Nuclear Fusion and Fission
- C.4 Solar Energy
- C.5 Environmental Impact – Global Warming
- **D: Medicinal Chemistry**
 - D.1 Pharmaceutical Products and Drug Action
 - D.2 Aspirin and Penicillin
 - D.3 Opiates
 - D.4 pH Regulation of the Stomach
 - D.5 Anti-viral Medications
 - D.6 Environmental Impacts of Some Medications
- **Practical Scheme of Work** **40 Hours**
 - Practical Activities* 20 Hours
 - Individual Investigation (Internal Assessment)* 10 Hours
 - Group 4 Project* 10 Hours

TEXTBOOKS AND RESOURCE MATERIALS:

IB Chemistry. Oxford University Press, 2014.
 IB Chemistry Kerboodle Student Online Resources. Oxford University Press, 2014.
 IB Chemistry, Standard Level, 2nd Edition. Pearson Baccalaureate, 2014.
 IB Chemistry, Standard Level, 2nd Ed. Online E-book. Pearson Baccalaureate, 2014.
 General Chemistry - Atoms First 2nd Edition. Pearson Education Inc. 2014.
 Chemistry. Raymond Chang. McGraw Hill Higher Education. 2014.

COMMON CORE STANDARDS to be ADDRESSED:

IB courses promote student-led, inquiry based lessons. While teachers are there to provide contextual knowledge, much of the deeper analytical work is done by students. Students will gain the skills of a scientist allowing them to conduct independent research, independently analyze newly learned scientific information, and have a contextual understanding of world events. IB Chemistry SL will give students a strong foundation from which to become life-long learners.

DISTRICT ESLRs to be ADDRESSED:

Students will be:

- **Self-Directed Learners:** Students will choose a topic in chemistry to research, investigate and write about during their Internal Assessment.
- **Effective Communicators:** Students will communicate through discussion and written work.
- **Quality Producers/Performers:** Students will produce college-level scientific work.
- **Constructive Thinkers:** Students will analyze the common hurdles and challenges of the past and connect them with the challenges of the present.
- **Collaborative Workers:** Students will work together to understand the context and significance of various aspects of science.
- **Responsible Citizens:** The course will support their work in CAS which requires students to serve within their community.

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