WOODSIDE PRIORY SCHOOL

COURSE SYLLABUS – AP CHEMISTRY

Course Overview:
The AP Chemistry course is designed to be the equivalent of the general chemistry course taken during the first college year. Students in this course should attain a depth of understanding of fundamentals and a reasonable competence in dealing with chemical problems. This course should contribute to the development of the students' abilities to think clearly and to express their ideas, orally and in writing, with clarity and logic.

AP Chemistry differs from the regular high school chemistry course in two ways. Qualitatively, AP Chemistry uses a college textbook, covers advanced topics, emphasizes more on chemical calculations and the mathematical formation of principals, and demands higher level of laboratory work done by students. Quantitatively, AP Chemistry involves an increase number of topics covered, requires students to spend significantly more time outside of their regular class schedules, and the nature and variety of experiments done in the laboratory.

AP Chemistry Essential Questions

- How does the structure of atoms affect all changes in terms of matter and energy?
- How can many natural phenomena relating to matter and energy be fundamentally explained by the particle interactions at the atomic and the subatomic levels?

AP Chemistry Enduring Understanding (Big Ideas)

1. Quantities in chemistry are expressed at both the macroscopic and atomic scale. Explanations, predictions, and other forms of argumentation in chemistry require understanding the meaning of these quantities, and the relationship between quantities at the same scale and across scales.
2. Properties of substances observable at the macroscopic scale emerge from the structures of atoms and molecules and the interactions between them. Chemical reasoning moves in both directions across these scales. Properties are predicted from known aspects of the structures and interactions at the atomic scale. Observed properties are used to infer aspects of the structures and interactions.
3. At its heart, chemistry is about the arrangement of matter. Understanding the details of these transformations requires reasoning at many levels, as one must quantify what is occurring both macroscopically and at the atomic level during the process. This reasoning can be as simple as monitoring amount of products made or as complex as visualizing the intermolecular forces among the species in a mixture. The rate of a transformation is also of interest, as particles must move and collide to initiate reaction events.
4. Energy has two important roles in characterizing and controlling chemical systems. The first is accounting for the distribution of energy among the components of a system and the ways that heat exchanges, chemical reactions, and phase transitions redistribute this energy. The second is in considering the enthalpic and entropic driving forces for a chemical process. These are closely related to the dynamic equilibrium present in many chemical systems and the way in which changes in experimental conditions alter the positions of these equilibria.

AP Chemistry Science Practices (Skills)

1. Describe models and representations, including across scales.
2. Determine scientific questions and methods.
3. Create representations or models of chemical phenomena.
4. Analyze and interpret models and representations on a single scale or across multiple scales.
5. Solve problems using mathematical relationships.
6. Develop and explanation or scientific argument.

Learning Competencies Expected from an AP Chemistry Student:

Critical Thinking:
Students will be able use evidence based observations and logical reasoning to explain various chemical phenomena. Throughout the course, students will learn how to think instead of what to think.

Collaboration:
During regular labs and inquiry-based labs, students are given opportunities and are encouraged to work together effectively. Peer reviews are expected, as it is one of the foundations of modern sciences.

Creativity:
In AP Chemistry, students are expected to come up with lab procedurea. Similar to Honour Chemistry, they are to develop statements of understanding when examining various chemical phenomena in lab reports as well as tests. Students are to acquire the confidence to formulate original and defendable reasoning to justify their conclusions.

Resilience:
It is very common for students to encounter difficulties in chemistry due to the use of mathematical and nanoscopic analysis. Hence, they need to cultivate the grit to handle these struggles. This can mean better studying strategies, reviewing and relearning some mathematical fundamentals, as well as utilizing many different approaches to visualize these problems to ensure enduring understanding.

Communication:
Students are expected to convey their ideas in a clear and concise manner. This includes written (in words and mathematics), verbal and pictorial explanations. Although we will no longer assign "Statements of Understanding", these statements consist of listing scientific evidences and observations, combining with logical and at times mathematical reasoning, follow by reasonable justification are expected in many tests and labs.

Science, Technology and Society (STS)

In addition to scientific knowledge, *students will be expected to demonstrate* an understanding of the processes by which scientific knowledge is developed, and of the interrelationships among science, technology and society, including:

- The central role of evidence in the accumulation of knowledge, and the ways proposed theories may be supported, modified or refuted.
- The inability of science to provide complete answers to all questions.
- The functioning of processes or products based on scientific principles.
- The ways in which science advances technology and technology advances science.
- The use of technology to solve practical problems.
- The limitations of scientific knowledge and technology.
- The influence of the needs, interests and financial support of society on scientific and technological research.
- The ability and responsibility of society, through science and technology, to protect the environment and use natural resources judiciously to ensure quality of life for future generations.