

# WOODSIDE PRIORY SCHOOL

## COURSE SYLLABUS – HONOUR CHEMISTRY

### Course Overview:

Chemistry is the study of matter and its changes. Through the study of chemistry, students are given an opportunity to explore and understand the natural world and to become aware of the profound influence of chemistry in their lives.

Chemistry, as with all sciences, is an experimental discipline requiring creativity and imagination. Methods of inquiry characterize its study. In Chemistry, students further develop their ability to ask questions, investigate and experiment; to gather, analyze and assess scientific information; and to test scientific laws and principles and their applications. In the process, students exercise their creativity and develop their critical thinking skills.

Students are active learners and will assume increased responsibility for their learning as they work through the program. The study of chemistry is required to give students an understanding that encourages them to make appropriate applications of scientific concepts to their daily lives. Students are expected to participate actively in their own learning. An emphasis on the key concepts and principles of chemistry provides students with a more unified view of sciences and a greater awareness of the connections among them.

In this conceptual and analytical chemistry course, designed for students pursuing a college science degree, numerical problem-solving skills are emphasized along with the knowledge of various chemical concepts. Lab activities, both simple and complex, will develop the skill sets needed in a college laboratory setting. More importantly, they are designed to help students become better critical thinkers and reach their personal goals of self-discovery.

### 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 nanoscopic level?

### Chemistry Enduring Understanding

1. The chemical elements are fundamental building materials of matter, and all matter can be understood in terms of arrangements of atoms. These atoms retain their identity in chemical reactions.
2. Chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them.
3. Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.
4. The laws of thermodynamics describe the essential role of energy and explain and predict the changes in matter.
5. Any bond or intermolecular attraction that can be formed can be broken depending on initial conditions and external perturbation.

### Learning Competencies Expected from a 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 lab activities and classroom exercises, 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:**

Aside from developing a statement of understanding when examining various chemical phenomena, students are to acquire the confidence to formulate original and defensible 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. Students will be evaluated based on expressing “Statements of Understanding”. These statements consist of listing scientific evidences and observations, combining with logical and at times mathematical reasoning, in order to justify proper conclusions to a variety of chemical phenomena.

**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 might 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.