**Florida Department of Education**

**COURSE DESCRIPTION - GRADES 9-12, ADULT**

**Subject Area**: Science
**Course Number**: 2003350
**Course Title**: Chemistry I Honors
**Credit**: 1.0
**Will meet graduation requirement for Science**

**A.** **Major Concepts/Content.** The purpose of this course is to study the composition, properties, and changes associated with matter, and their applications.

The content should include, but not be limited to, the following:

- the nature of science
- matter: its classification, structure, and changes
- atomic theory
- the periodic table
- bonding
- chemical formulas, chemical reactions, and balanced equations
- stoichiometry
- reaction rates and equilibrium
- acids and bases
- oxidation and reduction
- behavior of gases
- dynamics of energy
- chemistry of life

This course shall integrate the Goal 3 Student Performance Standards of the Florida System of School Improvement and Accountability as appropriate to the content and processes of the subject matter.

**B.** **Special Note.** Laboratory investigations, which include the use of scientific methods, measurement, laboratory apparatus, and safety procedures, are an integral part of this course. This course should also include the use of mathematical processes, graphical representation, and data analysis.

Students earning credit in Chemistry I Honors may not earn credit in Fundamentals of Chemistry or Chemistry I.

The course requirements for this honors course are consistent with Chemistry I, Course Number 2003340. The district shall develop a description of additional requirements to provide for in-depth or enriched study of the course requirements.

**C. Course Requirements.** These requirements include, but are not limited to, the benchmarks from the Sunshine State Standards that are most relevant to this course. Benchmarks correlated with a specific course requirement may also be addressed by other course requirements as appropriate. Some requirements in this course are not fully addressed in the Sunshine State Standards.

Benchmarks from Science, Strand H, should not be taught and assessed in isolation, but should be combined with other benchmarks listed for this course.

**After successfully completing this course, the student will:**

**1. Apply knowledge of the nature of science and scientific habits of mind to solve problems, and employ safe and effective use of laboratory technologies.**

SC.H.1.4.1 know that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories.

SC.H.1.4.2 know that from time to time, major shifts occur in the scientific view of how the world works, but that more often, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge.

SC.H.1.4.3 understand that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth.

SC.H.1.4.4 know that scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis.

SC.H.1.4.5 understand that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors.

SC.H.1.4.6 understand that in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism and that in the long run, theories are judged by how they fit with other theories, the range of observations they explain, how well they explain observations, and how effective they are in predicting new findings.

SC.H.1.4.7 understand the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings.

SC.H.2.4.1 know that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex but that scientists operate on the belief that the rules can be discovered by careful, systemic study.

SC.H.2.4.2 know that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns.

**2. Demonstrate understanding of matter, its classification, structure, and changes.**

SC.A.1.4.1 know that the electron configuration in atoms determines how a substance reacts and how much energy is involved in its reactions.

SC.A.1.4.3 know that a change from one phase of matter to another involves a gain or loss of energy.

**3. Demonstrate understanding of atomic theory.**

SC.A.2.4.1 know that the number and configuration of electrons will equal the number of protons in an electrically neutral atom and when an atom gains or loses electrons, the charge is unbalanced.

SC.A.2.4.3 know that a number of elements have heavier, unstable nuclei that decay, spontaneously giving off smaller particles and waves that result in a small loss of mass and release a large amount of energy.

SC.A.2.4.4 know that nuclear energy is released when small, light atoms are fused into heavier ones.

SC.A.2.4.6 understand that matter may act as a wave, a particle, or something else entirely different with its own characteristic behavior.

SC.C.2.4.4 know that the forces that hold the nucleus of an atom together are much stronger than electromagnetic force and that this is the reason for the great amount of energy released from the nuclear reactions in the sun and other stars.

**4. Demonstrate understanding of the application of the periodic table.**

SC.A.2.4.5 know that elements are arranged into groups and families based on similarities in electron structure and that their physical and chemical properties can be predicted.

**5. Demonstrate understanding of covalent and ionic bonding.**

SC.A.1.4.2 know that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together.

SC.A.1.4.5 know that connections (bonds) form between substances when outer-shell electrons are either transferred or shared between their atoms, changing the properties of substances.

SC.C.2.4.2 know that electrical forces exist between any two charged objects.

SC.C.2.4.5 know that most observable forces can be traced to electrical forces acting between atoms or molecules.

**6. Use chemical formulas to write balanced equations and predict reaction products.**

SC.A.2.4.2 know the difference between an element, a molecule, and a compound.

SC.B.1.4.2 understand that there is conservation of mass and energy when matter is transformed.

**7. Explain the behavior of gases in terms of gas laws and kinetic molecular theory.**

SC.B.1.4.3 know that temperature is a measure of the average translational kinetic energy of motion of the molecules in an object.

**8. Demonstrate understanding of reaction rates and equilibrium.**

SC.A.1.4.4 experiment and determine that the rates of reaction among atoms and molecules depend on the concentration, pressure, and temperature of the reactants and the presence or absence of catalysts.

SC.G.2.4.2 know that changes in a component of an ecosystem will have unpredictable effects on the entire system but that the components of the system tend to react in a way that will restore the ecosystem to its original condition.

**9. Demonstrate understanding of the dynamics of energy.**

SC.B.1.4.1 understand how knowledge of energy is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of the Earth).

SC.B.1.4.6 know that the first law of thermodynamics relates the transfer of energy to the work done and the heat transferred.

SC.B.1.4.7 know that the total amount of usable energy always decreases, even though the total amount of energy is conserved in any transfer.

SC.G.2.4.1 know that layers of energy-rich organic materials have been gradually turned into great coal beds and oil pools (fossil fuels) by the pressure of the overlying earth and that humans burn fossil fuels to release the stored energy as heat and carbon dioxide.

**10. Demonstrate understanding of the interactions of chemistry with technology and society.**

SC.B.1.4.5 know that each source of energy presents advantages and disadvantages to its use in society (e.g., political and economic implications may determine a society's selection of renewable or nonrenewable energy sources).

SC.H.3.4.1 know that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure.

SC.H.3.4.2 know that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.

SC.H.3.4.3 know that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events.

SC.H.3.4.4 know that funds for science research come from federal government agencies, industry, and private foundations and that this funding often influences the areas of discovery.

SC.H.3.4.5 know that the value of a technology may differ for different people and at different times.

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| SC.H.3.4.6 | know that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account. |