# LINCOLN-WOODSTOCK COOPERATIVE SCHOOL DISTRICT
# COURSE SYLLABUS

Course Name: Chemistry
Length: Full Year
Teacher: Katie Parent

Course Description: Chemistry is a fast-paced college preparatory course designed to meet the needs of students pursuing careers in science. This course will cover topics in the structure of matter, chemical dynamics, reaction stoichiometry, and the mole concept, mathematical modeling, mathematical analysis, problem-solving, analytical laboratory techniques, and critical thinking are all emphasized. Ideas are introduced through hands-on activities, while daily assignments, homework, and class discussions are used to reinforce the ideas introduced in the laboratory.

---

NGSS Standards Assessed:
HS.Structure and Properties of Matter

- HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms
- HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
- HS-PS1-8. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
- HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

HS.Chemical Reactions

- HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
- HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
- HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
- HS-PS1-6. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
- HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS.Energy

- HS-PS3-1. Create a computational model to calculate the change in the energy of one

component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

- HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
- HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).
- HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

HS.Waves and Electromagnetic Radiation

- HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
- HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.
- HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Anchor Texts or Major Curriculum:

CK-12 Chemistry for High School- Online FlexBook 2.0

Prentice Hall - Chemistry, Wilbraham, Staley, Matta, Waterman

Course Outline (major units of study):

| Unit Title | Essential Question or Overarching Understanding |
|---|---|
| Unit 1-Introduction to Chemistry | What is Chemistry? |
| Unit 2- Matter and Change | What is matter and how does it change? |
| Unit 3-Measurement | How do we measure matter? |
| Unit 4-Atomic Structure | How has the model of the atom changed over time? |

**LINCOLN-WOODSTOCK COOPERATIVE SCHOOL DISTRICT**

**COURSE SYLLABUS**

| | |
|---|---|
| Unit 5-Electrons in Atoms | What are energy levels? |
| Unit 6-The Periodic Table | How is the periodic table organized and used? |
| Unit 7-Chemical Nomenclature | What does a molecular formula tell us? |
| Unit 8-Ionic and Metallic Bonding | How are electrons organized in atoms? |
| Unit 9-Covalent Bonding | How are electrons shared? How do ionic bonds differ from covalent bonds in terms of how electrons are shared? |
| Unit 10-The Mole | How big is a mole? |
| Unit 11-Chemical Reactions | How do chemical reactions follow the law of conservation of mass? |
| Unit 12- Stoichiometry | Why is a balanced chemical equation needed? |
| Unit 13- States of Matter | What is the kinetic molecular theory? |
| Unit 14- The Behavior of Gases | What factors affect gas pressure? |
| Unit 15- Water | What properties of water make it so unique? |
| Unit 16- Solutions | What is a solution? |
| Unit 17- Thermochemistry | What is chemical potential energy? |
| Unit 18- Kinetics | What are reaction rates? |
| Unit 19- Equilibrium | What is chemical equilibrium? |
| Unit 20- Entropy and Free Energy | How much energy is available? |
| Unit 21- Acids and Bases | How do you raise tropical fish? |
| Unit 22- Oxidation-Reduction Reactions | Why must oxidation-reduction reactions occur together? |
| Unit 23- Electrochemistry | What is an electrochemical reaction? |

| | |
|---|---|
| Unit 24- Nuclear Chemistry | Why are some elements radioactive and others are not? What type of nuclear decay only emits energy? |
| Unit 25- Organic Chemistry | How many carbon-containing molecules are there? |
| Unit 26- Biochemistry | What are the basic macromolecules of life? |

**Portrait of a Learner**

**Independent Learner**
I make thoughtful plans and do my best to reach personal goals using feedback to work through challenges.

**Responsible Collaborator**
I work with others to achieve shared goals by listening actively, contributing ideas, and managing conflict.

**Critical Thinker**
I analyze information, ask thoughtful questions, and apply reasoning skills to solve problems and make decisions.

**Effective Communicator**
I express ideas clearly, adapting strategies based on the audience, setting, and/or purpose.

**Global Citizen**
I show that I care and take responsibility by helping in my community and the world around me.

Additional Classroom Expectations:
**Lab safety and following the procedural steps are most important!**
**Laboratory Reports:** Electronic laboratory reports will be encouraged to be “turned in” via Google Classroom. All lab reports are due after the completion of the lab with the assigned reports. Lab reports must include the following sections:
**Name of student and any partners and date of lab** (0.5 points)
**Title of Lab** (0.5 points)
**Purpose of lab** (0.5 points)
**Introduction** (2 points)Background information/concepts covered by the lab
**Materials and safety** (0.5 points)
**Procedure** (not instructions) (1 point)
**Results** (2 points)
(may include one or more of the following weights, melting points, calculations, tables, charts, and spectra)
**Discussions** (2 points)

Explain how information from the results helps to verify the purpose. You may also suggest what you will do to avoid any failures and get better results.

**Conclusion** (2 points)

Summarize discussions, explain how the purpose was accomplished. Explain any errors and what should change if the lab were to be repeated for better results. Results only provide evidence to support or refute a claim; please avoid terms such as correct or proven.

Material in this course, in some instances, may be sensitive or emotionally provocative. As you review the syllabus, or at any time during the course, please let me know if you anticipate or are having a problem with any assignment or classroom activity. We can then discuss how this assignment or activity can be considered. We can also discuss extra help options and other resources that you may find helpful in dealing with your concerns.