ESSENTIAL LEARNING OUTCOMES (ELOs)

ELOs stand for Essential Learning Objectives. Essential Learning Objectives (ELOs) are statements for each grade level and content that represent what we feel students at Cochrane-Fountain City should know and be able to do upon completion of that school year. Teachers and students work on the ELOs throughout the school year and assess and monitor students' progress continually.

ESSENTIAL LEARNING OUTCOMES ARE:

- Essential outcomes represent the essential understandings that a student must learn to reach high levels of learning.
- Essential outcomes identify non-negotiable learning which informs planning and instruction.
- Essential outcomes help identify which students did not master specific essential outcomes and need additional support.
- Essential outcomes support common assessment development.

ESSENTIAL LEARNING OUTCOMES ARE NOT:

- Essential outcomes do not represent all that is being taught.
- Essential outcomes do not omit parts of the curriculum.
- Essential outcomes are not for reporting purposes only.

Grade: 7th | Course: Science

Students will:

- Conduct numerous investigations to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells.
- Explore how the human body and its various systems interact and function in our daily lives.
- Describe the factors that influence the growth of organisms and their ability to reproduce.
- Demonstrate how ecosystems are organized, how resources are cycled in an ecosystem, and how those resources affect populations in an ecosystem.
- Analyze information to determine the relationships between organisms in an ecosystem and how changes to an ecosystem affect its populations.
- Identify and describe the differences between renewable and nonrenewable energy resources and their implications in our lives.
- Explain how distribution of nonrenewable resources around the globe is due to past geologic events.
- Using chains, springs, and computer simulations to model wave behavior, students will explore how waves transfer energy.
- Design and carry out a controlled experiment.
- Make a scientific claim and support it with evidence and reasoning.

Grade: 8th | Course: Science

Students will:

- Develop models to describe the atomic composition of simple molecules and extended structures.
- Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
- Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individual's probability of surviving and reproducing in a specific environment.
- Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
- Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
- Using models and data, students will describe how the sun, Earth, and moon interact affecting seasons, tides, and lunar phases as well as the role of gravity in the universe.

Grade: 10th | Course: Biology

Students will:

- Understand much of science deals with constructing explanations of how things change and how they remain stable.
- Identify factors that affect the size of populations.
- Explain and identify the difference between abiotic and biotic factors.
- Identify relationships (predator-prey, symbiosis, competition) that affect living things.
- Draw a model of a food web and identify trophic levels.
- Describe how energy is transferred through a food web.
- Describe the function of cell organelles and how they relate to cell function.
- Distinguish between a prokaryote and eukaryote and plant and animal cells.
- Explain how materials move across a cell membrane.
- Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
- Illustrate that cellular respiration is a chemical process whereby the bond of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
- Use a model to illustrate the role of cellular division(mitosis) and differentiation in producing and maintaining complex organisms.
- Construct an explanation of the statistics and probability which explains the variation and distribution of expressed traits in a population.

- Clarify the relationships regarding the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
- Use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- Recognize basic anatomical structures through dissections.
- Explain how organ systems work together to maintain homeostasis.

Grade: 9th | Course: Physical Science

Students will:

- Know if an object is in motion, calculate an object's velocity, and calculate an object's acceleration.
- Know how Newton's laws explain and distinguish motion in the world.
- Know how you can calculate the mechanical advantage of a simple machine.
- Investigate the concepts of work and energy.
- Be introduced to the concepts of different forms of energy and the conservation of energy.
- Learn about simple machines.
- Introduced to the concepts of waves, interactions of waves and the transfer of energy through waves.
- Review the principles of atomic structure and the periodic table.
- Describe atomic theory and determine the atomic number and mass of different elements.
- Learn about the electron configurations of different elements and the type of chemical bonds that elements make.
- Learn about the five types of chemical reactions, write the balanced equation for a chemical reaction, and explain how activation energy affects a chemical reaction.
- Describe cell theory and identify the major organelles of the cells.
- Study Mendelian genetics and be able to analyze the crossing of alleles.

Grade: 11th – 12th | Course: Environmental Science

Students will:

- Learn about Earth's biogeochemical systems, and levels of organization of life into individuals, populations, communities, ecosystems, biomes, and the biosphere.
- Learn about the dynamics of human populations. This unit has a special focus on human population growth and consequences and resulting challenges. The unit will also examine environmental health issues facing humans.
- Study the structure and dynamics of the atmosphere. They will study general principles of weather. They will learn how pollution affects air quality and how it is regulated. They will also learn about the topic of climate change.
- Examine how humans use fossil fuels as our main energy source and renewable alternatives to fossil fuels.
- Learn about marine and riparian ecosystems. They will study humans' use of freshwater and water pollution.
- Examine the dynamics of forest ecology soil science.

Grade: 11th – 12th | Course: Chemistry

Students will:

- Be introduced to the topic of chemistry, the importance of chemistry, SI units, scientific notation, and factor conversion.
- Learn the relevancy of chemistry, how to solve mathematical problems using scientific notation and factor conversion techniques.
- Learn proper lab safety techniques.
- Review atomic structure and understand the particulate nature of matter. They will learn electron configurations and periodic law.
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- Learn electron configurations and periodic law.
- Investigate Covalent and Ionic Compounds and how they determine Chemical Reactions.
- Balance equations and use the octet rule to predict the products of a reaction.
- Calculate the quantities of reactants and products in a chemical reaction.
- Identify create solutions and determine the concentration of an unknown solution.
- Apply stoichiometry and solution calculations.
- Use the gas laws to determine the unknown variable in a gas problem.

- Determine the equilibrium constant of a chemical reaction, state the definitions of acids and bases, and calculate the pH and pOH of a solution.
- Use the concepts of enthalpy, entropy, and Gibbs free energy to determine if a chemical reaction will occur.
- Use the concepts of organic chemistry and biochemistry to explain the structure of macromolecules and cells.

Grade: 12th	Course: AP Physics

Students will:

- Explore the abstract concept of acceleration.
- Conduct comprehensive algebraic analysis of moving objects such as vehicles and projectiles.
- Predict the velocity and acceleration of objects through calculations and test these predictions through lab experiments.
- Explore forces and analyze data to support the claim that Newton's laws of motion.
- Describe the mathematical relationship among the net force on a macroscopic object, its mass, friction, and acceleration.
- Portray object force interactions through graphs, diagrams, and mathematical relationships.
- Explore how energy is an extension of the principles of Newton's laws of motion.
- Learn how conservation of energy, kinetic, potential energy explains changes in the Universe.
- Learn algorithms to calculate various scenarios involving energy and conduct experiments to verify their calculations.
- Study Newton's law of gravity and rotational motion equations (example: students will combine equations for circular motion and gravity; to describe the orbit of planets around the sun).
- Explore how energy and momentum are extensions of the principles of Newton's laws of motion.
- Learn algorithms to calculate various scenarios involving momentum; and conduct experiments to verify their calculations.
- Study harmonic motion and oscillators.
- Learn how mathematical relationships explain physical phenomena such as sound and energy.
- Explore the algorithms that explain torque and rotational motion.
- Learn the similarities and differences of torque and rotational motion from linear motion.

Grade: 11th – 12th	Course: Science Research

Students will:

- Be introduced to the process of engineering, reverse engineering, and science communication skills, such as keeping a lab notebook.
- Learn about the processes of science through an in depth, individualized research project.
- Choose a science or engineering project of their choice and conduct an experiment, or engineering project.
- Present their projects at the regional science fair.

Grade: 7th – 8th	Course: Robotics

Students will:

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