IRVINE UNIFIED SCHOOL DISTRICT

Year at a Glance – Tenth Grade Science (Integrated Science 2)
Guiding Crosscutting Concepts: Energy is transferred between microscopic particles & at macroscopic scales, influencing Earth's systems and living organisms. As energy on Earth and in living organisms changes, this stability & change is altered by molecules with structures that disrupt the flow of energy.
Official 2019-20 Version

What Students Learn
Students explain how different systems in our natural world interact and are affected by energy. • They recognize that matter is made up of tiny particles that form large chains of substances. They argue how changing energy exposure to these particles (on both the microscopic and macroscopic scale) will alter the way they interact. • Students will investigate the effect of altering energy in living organisms through the living organisms' ability to survive, reproduce, and grow. • Students can mathematically model the transfer and conversion of different forms of energy, causing conservation in Earth's system. They are able to explain how different substances can affect the rate of energy transfer. • They model how energy is capable of changing the molecular structure of DNA or a cell and that this results in variation in the genetic traits within a population. • They use this information to communicate how humans have changed the amount of available energy in our atmosphere and design a solution to determine how we can reduce the energy problems associated with global climate change. By the end of this course, students have developed the skills to analyze data and develop a claim on the overall effect of energy in a living system.

Units	Key Learning Outcomes
1. Energy Transfer in Cells 2. Biotic Components of Energy Transfer 3. Conservation of Energy and Energy Transfer 4. Earth's Effect on Organisms 5. Energy Affecting the Earth 6. Reducing our Impact on Earth	• HS-PS1-7:Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reactions. • HS-LS2-4:Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. • HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, • HS-ESS2-6: Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. The carbon cycle is a property of the Earth system that arises from interactions among the hydrosphere, atmosphere, geosphere, and biosphere. • HS-LS2-2:Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales (only graphing, not formulas.) • 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-PS3-4:Plan and conduct and investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics.) • HS-ETS1-4:Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. • HS-PS1-7:Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reactions. • 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-ETS1-1:Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. • HS-ETS1-2:Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. • HS-ETS1-3:Design a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. • HS-ESS2-4:Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. • HS-ESS3-5:Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.