

**Year at a Glance – Eleventh Grade Science**

**Guiding Crosscutting Concept: The laws of physics are used to interpret processes that shape the Earth system. Nuclei of atoms undergoing fission, fusion & radioactive decay release energy & can be used to help explain processes & structures we see on Earth today.**

**Official 2019-20 Version**
**What Students Learn**

Students understand that physical processes govern everything in the universe. They recognize that geoscientists require a strong background in the laws of physics in order to interpret processes that shape the Earth system, and that physicists benefit from applying their models in a range of contexts. Students can describe the forces involved in moving water pushing tiny particles of sand along beds of rivers, sometimes hard enough that they collide with the rocks with such force that a piece of the river bed breaks off. They explain phenomena such as the formation of the Grand Canyon. They model the forces of gravity constantly pulling on rocks at the surface of the Earth. Students explain how the nuclei of atoms thousands of miles below the surface, that have remained stable for millions of years, can spontaneously explode apart, releasing massive amounts of energy and heating up the surrounding rock. They interpret phenomena such as a geyser of hot steam erupting in California, releasing excess heat to the surface. Students act as earth and space scientists who study the physics of various situations, using computer models to fast forward millions of years of energy transfer from fission, fusion & radioactive decay to explain what we see on Earth today. Alongside this scientist is a team of engineers, hoping to use this understanding to design and test solutions to many of society's problems from natural hazards to global warming, or to minimize our impact on the natural world.

| Units                              | Key Learning Outcomes   |
|------------------------------------|---|
| Forces & Motion                    | <ul style="list-style-type: none"> <li>● HS-PS2-1: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.</li> </ul>   |
| Forces at a Distance               | <ul style="list-style-type: none"> <li>● HS-PS2-3: Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.</li> </ul>  |
| Energy Conversion                  | <ul style="list-style-type: none"> <li>● 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.</li> </ul>   |
| Nuclear Processes                  | <ul style="list-style-type: none"> <li>● 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.</li> </ul>   |
| Waves & Electromagnetic Radiation  | <ul style="list-style-type: none"> <li>● 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.</li> </ul>                                 |
| Stars & the Origin of the Universe | <ul style="list-style-type: none"> <li>● HS-PS3-3: Design, build and refine a device that works within given constraints to convert one form of energy into another form of energy.</li> <li>● HS-ESS3-2: Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.</li> </ul> |