

Piedmont Unified School District

**M E M O R A N D U M**

**To:** Board of Education

**From:** Randy Booker, Superintendent  
Cheryl Wozniak, Assistant Superintendent

**Date:** May 8, 2019

**Re:** First Reading of High School Science Courses: *Physics of the Universe and Honors Physics of the Universe*

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**I. SUPPORT INFORMATION**

**Next Generation Science Standards**

On September 4, 2013, California adopted new science standards that align with the national science standards, or Next Generation Science Standards (NGSS). In 2016, at a series of School Board meetings, Dr. Cheryl Wozniak, Principal Sati Shah, and teacher representatives from the NGSS Leadership Team presented the NGSS High School Course Models and the Accelerated Model Course Pathway options. On February 8, 2017, the Board voted unanimously to adopt the following models for high school: Three-Course Modified Science Domains and Doubling Up the Three-Course Modified Science Domains for advanced science learners.

**Three-Course Modified Science Domains Model for High School**

The NGSS Leadership Team recommended and the School Board adopted the “Three-Course Modified Domains” model for high school, which integrates one-third of the earth and space science and engineering standards into courses taught in 9th, 10th, and 11th grades. In this model, 9th grade students will learn biology standards, one-third of the earth and space science standards, and some engineering standards; 10th grade students will learn chemistry standards, one-third of the earth and space science standards, and some engineering standards; and 11th grade students will learn the physics standards, one-third of the earth and space science standards, and some engineering standards. Honors Chemistry and Honors Physics will be offered for advanced science learners who want a more rigorous science learning experience. Advanced science learners may opt to double up and take more than one science course their junior and senior years.

*Biology and the Living Earth*, the first of the three course series, was adopted by the School Board on May 10, 2017. *Chemistry in the Earth System* and *Honors Chemistry in the Earth System* were adopted by the School Board on May 23, 2018.

**New Course: Physics of the Universe**

This course follows the California Next Generation Science Standards as delineated by the three course model in Chapter 7 of the California 2016 Science Framework. To this end, the focal discipline is physics with disciplinary core ideas (DCIs) from earth and space sciences integrated to

ensure that over the three years of science, Piedmont High School students will have had the opportunity to learn all of the disciplinary core ideas described in the standards while developing proficiency in the science and engineering practices (SEPs) in the context of the crosscutting concepts (CCC).

Throughout this course, students will engage with phenomena and design challenges to make sense of abstract physical principles, such as wave/particle duality and electromagnetic fields, and complex earth and space science phenomena, such as stellar evolution and Earth's internal structure. The rigor of this course will prepare students for collegiate studies in physics and for engaging in civic discourse around socio-scientific issues, such as human impacts on the environment. Students will demonstrate their ability to use this knowledge in a wide range of formative and summative assessment tasks including laboratory experiments, quizzes, individual and group projects, essays, and exams.

### **Honors Physics in the Universe**

This honors course includes the foundational phenomena and themes of the standard Physics of the Universe course but increases the conceptual demand on students. For example, the California NGSS clearly state in the assessment boundary that calculations using Newton's first law are "limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds." This guideline is followed in the standard Physics of the Universe course, while in the the honors Physics of the Universe course, students calculate forces in two dimensions and explore the meaning of Einstein's famous equation describing special relativity. Honors students will receive less scaffolding for the concepts that are shared with the standard Physics of the Universe course and move through the content at an accelerated pace in order to achieve a deeper level of conceptual understanding and more sophisticated engagement in the science and engineering practices. For each unit, a paragraph in the course outline describes the unit and how it specifically differs from the standard Physics of the Universe course.

## **II. RECOMMENDATION: First Review of Physics of the Universe and Honors Physics of the Universe**

The District recommends the School Board review the content of the college preparatory and honors level of a third in a series of three new high school science courses aligned to NGSS: *Physics in the Universe* and *Honors Physics in the Universe*. Upon Board approval, this new 11th grade science course will be submitted for UC a-g approval.