

## SCIENCE DEPARTMENT

### Science Courses

| <b>Course</b>                        | <b>Grade Level</b> | <b>Prerequisite</b>   | <b>Credit</b> |
|--------------------------------------|--------------------|---|---------------|
| Biology                              | 9                  | 8th Grade Science   | 1             |
| Pre-AP Biology                       | 9                  | 8th Grade Science   | 1             |
| Chemistry                            | 10-12              | Algebra I /Biology  | 1             |
| Pre-AP Chemistry                     | 10-12              | Algebra I /Biology  | 1             |
| Physics                              | 11                 | Algebra I   | 1             |
| Pre-AP Physics                       | 11                 | Algebra I   | 1             |
| Environmental Systems                | 12                 | Biology   | 1             |
| <b>Course</b>                        | <b>Grade Level</b> | <b>Prerequisite</b>   | <b>Credit</b> |
| Forensic Science                     | 12                 | Biology and Chemistry   | 1             |
| Engineering Design & Problem Solving | 11-12              | Geometry, Algebra II, Chemistry, and Physics  |               |
| Anatomy and Physiology               | 12                 | Three years of high school science including Biology                                | 1             |
| AP Biology                           | 10-12              | Biology and Chemistry   | 1             |
| AP Environmental Science             | 11-12              | Algebra I and Biology   | 1             |
| AP Chemistry                         | 11-12              | Chemistry/ Completion or concurrent enrollment in Algebra II is highly recommended. | 1             |
| AP Physics 1                         | 10-12              | Completion or concurrent enrollment in Algebra II is highly recommended.            | 1             |
| AP Physics 2                         | 11-12              | Pre-AP Physics OR AP Physics 1  | 1             |
| AP Physics C                         | 11-12              | Pre-AP Physics OR AP Physics 1 OR AP Physics 2                                      | 1             |

## Biology

**Offered in:** 9      **Credits:** 1      **Level:** On level

**Prerequisites:** 8th Grade Science

Biology is designed to acquaint students with basic concepts in science process skills, laboratory skills, and the study of living organisms. Topics discussed include: ecosystem and the environment; metabolism and energy transfer in living organism; living system; homeostasis; cells, tissues, and organs; nucleic acids and genetics; classification, taxonomy, and biological evolution. Students in this course will be required to complete a grade level appropriate science project that will constitute 20% of the final grade in the course.

## Pre-AP Biology

**Offered in:** 9      **Credits:** 1      **Level:** Pre AP

**Prerequisites:** 8th Grade Science

Pre-AP Biology is designed to acquaint students with basic concepts in science process skills, laboratory skills, and the study of living organisms. Topics discussed include: ecosystem and the environment; metabolism and energy transfer in living organism; living system; homeostasis; cells, tissues, and organs; nucleic acids and genetics; classification, taxonomy, and biological evolution. In addition, students will learn to set up inquiry investigations, use descriptive statistic to analyze data and write investigation report. Students are expected to develop critical thinking, problem solving and writing skills necessary to be successful in the AP Biology course. The course can be considered college preparatory, suggested for the average to above average student. Any student enrolled in this course will be required to take the SAT II Biology exam. Furthermore, students in this course will be required to complete a grade level appropriate science investigation project that will constitute 20% of the final grade in the course.

## Chemistry

**Offered in:** 10-12      **Credits:** 1      **Level:** On level

**Prerequisites:** Algebra I, Biology

Chemistry provides students with a broad survey of basic chemistry. The first semester examines chemical and physical properties, the qualitative nature of chemical reactions, chemical periodicity, and bonding. The second semester continues with the quantitative nature of chemical reactions, states of matter, gaseous behavior, and solutions. Throughout the year, the course makes use of laboratory investigations to better develop the

relationships between experiment and theory. Students in this course will be required to complete a grade level appropriate science event project that constitutes 20% of the final grade in the course.

## Pre-AP Chemistry

**Offered in:** 10-12      **Credits:** 1      **Level:** Pre AP

**Prerequisites:** Algebra I, Biology

Pre-AP Chemistry covers many of the same topics as Chemistry in greater depth, and a special emphasis is placed on rigorous mathematical examination of chemical principles. The first semester focuses on basic concepts of chemistry, including the qualitative nature of chemical reactions, atomic structure, chemical bonding and molecular geometry. The second semester opens with stoichiometry and the quantitative nature of chemical equations. These concepts are then applied to various topics such as the kinetic theory of gases, reaction kinetics, equilibrium, acid-base chemistry and oxidation-reduction chemistry. Students enrolled in this course are required to complete a grade level appropriate science (or math) project (i.e. Level II or III PBL) that constitutes 20% of the final grade in the course.

## Physics

**Offered in:** 11      **Credits:** 1      **Level:** On level

**Prerequisites:** Algebra I

Physics, as the most basic of all sciences, introduces the nature of basic things around us such as matter, energy, heat, motion, forces, light, and sound. This course is designed to teach the laws of nature in their simplicity, and problem solving skills corresponding to both ideal and real world situations. The course of physics is integrated with basic mathematical rules including mechanics, heat and thermodynamics, waves and optics, electricity and magnetism, and atomic and nuclear physics. A set of experiments will allow students to implement the theory into the real world as well as appreciate the beauty of the natural world. Students in this course will be required to complete a grade level appropriate science event project that constitutes 20% of the final grade in the course.

## Pre-AP Physics

**Offered in:** 11      **Credits:** 1      **Level:** Pre AP

**Prerequisites:** Algebra I

Pre-AP Physics is a comprehensive introductory physics course covering the major topics of classical physics including mechanics, thermodynamics, waves, optics, electromagnetism, and atomic

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## Course Descriptions

theory. Pre-AP Physics is a first year course in Physics designed to prepare the student for entry into AP level Physics in a subsequent year. Mathematics is very important for physics, and will be used extensively in this class, therefore a solid background in algebra and trigonometry is essential for student success. Laboratory investigations emphasize accurate observations, collection, analysis, and presentation of data, and safe manipulation of laboratory apparatus and materials. In this Pre-AP class, students will be challenged to design their own laboratory investigations following scientific principles of research and proper lab practices.

### Environmental Science

**Offered in:** 12    **Credits:** 1    **Level:** On level

**Prerequisites:** Biology

According to TEA's 19 TAC Chapter 112 Texas Essential Knowledge and Skills for Science, Subchapter C, High School Section §112.37, student in this course conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students will study a variety of topics that include: biotic and abiotic factors in habitats, ecosystems and biomes, interrelationships among resources and an environmental system, sources and flow of energy through an environmental system, relationships between carrying capacity and changes in populations and ecosystems, and changes in environments.

### Forensic Science

**Offered in:** 12    **Credits:** 1    **Level:** On level

**Prerequisites:** Biology, Chemistry

According to TEA's 19 TAC Chapter 130 Texas Essential Knowledge and Technical Education, Subchapter L Section §130.295, students in this course use a structured and scientific approach to the investigation of crimes of assault, abuse and neglect, domestic violence, accidental death, homicide, and the psychology of criminal behavior. Students will learn terminology and investigative procedures related to crime scenes, questioning, interviewing, criminal behavior characteristics, truth detection, and scientific procedures used to solve crimes. Using scientific methods, students will collect and analyze evidence through case studies and simulated crime scenes such as fingerprint analysis, ballistics, and blood spatter analysis. Students will learn the history, legal aspects, and career options for forensic science.

### Anatomy and Physiology

**Offered in:** 12    **Credits:** 1    **Level:** On level

**Prerequisites:** Three years of high school science, including Biology

According to TEA's 19 TAC Chapter 130 Texas Essential Knowledge and Technical Education, Subchapter H, Section §130.206, this course is designed for students to conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students in Anatomy and Physiology will study a variety of topics, including the structure and function of the human body and the interaction of body systems for maintaining homeostasis.

### AP Biology

**Offered in:** 10-12    **Credits:** 1    **Level:** AP/Dual

**Prerequisites:** Biology, Chemistry

The AP Biology course is designed to be the equivalent of a college introductory biology course usually taken by biology majors during their first year. The course is centered on preparing students for the College Board's AP Biology Exam, given May each year. The course syllabus is designed around four big ideas as suggested by College Board's AP Biology curriculum framework 2012-2013 (1) The process of evolution drives the diversity and unity of life; (2) Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis; (3) Living systems store, retrieve, transmit, and respond to information essential to life processes; (4) Biological system interact, and these systems and their interactions possess complex properties. This course may require a two hour lab one evening per week.

### AP Environmental Science

**Offered in:** 11-12    **Credits:** 1    **Level:** AP/Dual

**Prerequisites:** Algebra I, Biology

The AP Environmental Science course is designed to be the equivalent of an introductory college course in environmental science. The course draws from a diverse range of scientific disciplines, including biology, chemistry, geology, and ecology. AP Environmental Science combines scientific principles and analysis with an extensive research and field-based laboratory components to provide students with the methodologies and concepts to understand the interrelationships in the natural

world, to identify and analyze problems both natural and human-made, to evaluate the risks associated with these problems, and to examine alternative solutions to preventing and resolving them. Students will be exposed to and participate in forward-moving research and problem solving in the environmental science community.

## AP Chemistry

**Offered in:** 11-12 **Credits:** 1 **Level:** AP/Dual

**Prerequisites:** *Chemistry, Completion or concurrent enrollment in Algebra II is highly recommended*

The AP Chemistry course provides students with a college-level foundation to support future advanced coursework in chemistry. Students cultivate their understanding of chemistry through inquiry-based investigations, as they explore topics such as: atomic structure, intermolecular forces and bonding, chemical reactions, kinetics, thermodynamics, and equilibrium. Created by the AP Chemistry Development Committee, the course curriculum is compatible with many Chemistry courses in colleges and universities. Students are expected to take the AP Examination given by the Educational Testing Service in May. As it is mentioned in the College Board's course requirements, a minimum twenty-five percent of instructional time is devoted to inquiry based laboratory investigations. Students ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress. This course may require a two hour lab one evening per week.

## AP Physics I

**Offered in:** 10-12 **Credits:** 1 **Level:** AP/Dual

**Prerequisites:** *Completion or concurrent enrollment in Algebra II is highly recommended*

AP Physics I is an algebra-based, introductory, college-level physics course. Students cultivate their understanding of physics through inquiry-based investigations as they explore topics such as Newtonian mechanics (including rotational motion), work, energy, and power, mechanical waves and sound, and both introductory and simple circuits. 25 percent of the instructional time will be spent on hands-on laboratory work, with an emphasis on inquiry-based investigations that provide students with opportunities to apply science practices.

## AP Physics II

**Offered in:** 11-12 **Credits:** 1 **Level:** AP/Dual

**Prerequisites:** *Pre-AP Physics or AP Physics 1*

AP Physics II is an algebra-based, introductory, college-level physics course. Students cultivate their understanding of physics through inquiry-based investigations as they explore topics such as fluid statics and dynamics, thermodynamics with kinetic theory, PV diagrams and probability, electrostatics, electrical circuits with capacitors, magnetic fields, electromagnetism, physical and geometric optics, and quantum, atomic, and nuclear physics. 25 percent of the instructional time will be spent on hands-on laboratory work, with an emphasis on inquiry-based investigations that provide students with opportunities to apply science practices. Students should have taken or be concurrently taking pre-calculus or an equivalent course.

## AP Physics C

**Offered in:** 11-12 **Credits:** 1 **Level:** AP/Dual

**Prerequisites:** *Pre-AP Physics or AP Physics 1 or AP Physics II*

AP Physics C is a calculus-based, college-level physics course, especially appropriate for students planning to specialize or major in physical science or engineering. The course explores topics such as kinematics, Newton's laws of motion, work, energy and power, systems of particles and linear momentum, circular motion and rotation, and oscillations and gravitation (under AP Physics C – Mechanics and Electrostatics); and conductors, capacitors, and dielectrics, electric circuits, magnetic fields, and electromagnetism (under AP Physics C – Electricity and Magnetism). Two different tests are given: AP Physics C – Mechanics and Electrostatics, and AP Physics C – Electricity and Magnetism. Introductory differential and integral calculus skills are used throughout the course, and it includes a hands-on laboratory component comparable to a semester-long introductory college-level physics laboratory course. A minimum of 20 percent of instructional time will be spent on hands-on laboratory work. Students ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting in which they direct and monitor their progress. Students should have taken or be concurrently taking calculus. This course may require a two hour lab one evening per week.