

# SCIENCE

Course Title	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Earth Science	X				
Physical Science		X			
Biology			X	X	X
AP Biology				X	X
Chemistry			X	X	X
Physics **				X	X
PLTW Principles of Engineering with Physics**			X	X	X
AP Physics I				X	X
Adv. Astronomy and Meteorology			X	X	X
Adv. Geology and Paleontology			X	X	X

\*\*Physics and PLTW POE with Physics meet the same Physics standards. Students may choose one of those courses. If a second Physics course is desired, students should take AP Physics I.

Graduation requirements are Earth Science (8th grade), Physical Science (9th grade), Biology or AP Biology, and one additional credit of Chemistry or any of the Physics courses.

## COLLEGE BOUND:

It is highly recommended that college bound students successfully complete 4 full years of science in grades 9-12. Check the requirements of your college to help select the appropriate science courses. A strong math background is recommended for all advanced science courses.

### Earth Science

**Course#:** A-S1 (0180) B-S2 (0181) – Full Year Required Course

**Grade Levels:** 8

**Prerequisites:** None

**Course Description:** Earth Science will provide students with opportunities to explore all physical aspects of our earth: air, land, water, and its place in the universe. Portions of the course are devoted to astronomy, meteorology, oceanography, geology, resource development, and careers in earth science.



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**Instructional Methods and Assessments:** Instructional methods include lectures, discussions, reading for content, group work, and individual labs. Assessments include daily work, quizzes, unit tests, semester finals, and the State of Minnesota MCA Test.

**Basis for Student Success:** Student success in Earth Science depends on the willingness to adapt to the High School. Students are required to use their Schoology calendar and planner to complete their work and stay on pace. A struggling student must proactively seek help during their advisory. Students who work hard and study for tests can expect to be successful and enjoy the class.

## Physical Science

**Course#: A-S1 (0182) B-S2 (0183) – Full Year Required Course**

**Grade Levels: 9**

**Prerequisites: None**

**Course Description:** Physical Science gives students a beginning knowledge of the physical world and offers insight into the means by which scientific knowledge is acquired. Physical Science includes the study of the inner workings of Earth's systems, energy, motion and forces. This course is designed to serve as a foundation for Biology, Chemistry, Physics, and Earth Science. Students will be involved in hands-on laboratory experiments, guided learning, problem solving, and classroom discussion.

**Instructional Methods and Assessments:** Interactive boards, virtual labs, Vernier based labs, labs, demonstrations, lectures, reading for science content, group work, math based problems, unit tests, quizzes, and semester finals.

**Basis for Student Success:** Students should be prepared to devote time to reading, working on homework, participating in labs and studying for tests. A calculator is needed for this course.

## Biology

**Course#: A-S1 (0184) B-S2 (0185) – Full Year Required Course**

**Grade Levels: 10 - 12**

**Prerequisites: None**

**Course Description:** Biology is an in-depth study of living things and their interactions between each other and planet earth. Nowhere has the explosion of knowledge and the impact of modern technology on human lives been more apparent than in the field of biology. In general, the course includes microbiology, plants, animals, and ecology. The theory that species change over time, evolution, is discussed. Class work includes reading, discussion, laboratory and written work. Laboratory work does include experience in dissection. In this course, students are given a solid foundation they need to understand the expanding role of biology in modern society and the skills to excel in future science courses.



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**Instructional Methods and Assessments:** Instructional methods include lectures with the aid of SMART Board technology, laboratory experience, videos, and biological presentations by the student. Assessments include chapter quizzes, unit tests and observation assignments.

**Basis for Student Success:** Biology requires more extensive reading than many students have experienced in past science courses. A willingness to increase your biology vocabulary is critical to success and understanding.

**Minnesota State Standards:** Minnesota State Life Science Standards were used to develop the curriculum for the biology course.

## Chemistry

**Course#: A-S1 (0187) B-S2 (0188) – Full Year Course**

**Grade Levels: 10 - 12**

**Geometry (or concurrent registration)**

**Course Description** Chemistry is an investigation into the nature of matter. This course introduces the big ideas of chemistry necessary to understand relevant societal topics and prepare students for continued education beyond high school. This class revolves around the scientific method, atomic structure, chemical reactions, chemical quantities, and properties of matter.

**Instructional Methods and Assessments:** Personalized classroom (students choose learning methods and work at their own pace), interactive boards, experiments, digital curriculum, Google Apps, lab reports, math-based problems, and essential questions.

**Basis for Student Success:** Ability to solve applied algebra problems; Engineer solutions to problem based scenarios. Chromebooks are used everyday in class. A 3-ring binder with loose leaf paper and dividers and a scientific calculator are needed.

## Physics

**Course#: A-S1 (0192) B-S2 (0193) – Full Year Course**

**Grade Levels: 11 - 12**

**Prerequisites: Must have completed FST or be currently enrolled**

**Course Description:** This is a year-long course where students study the fundamental concepts of the universe. Topics include: Newton's laws of motion, energy, waves, sound, light, and electricity. This course takes a problem solving approach to learning. An understanding of geometry, algebra, and trigonometry is essential. Labs, demonstrations, and research add to the interest and excitement of Physics. Homework is a weekly expectation. **STEAM Integrated Physics and Physics meet the same Physics standards. Students may choose one or the other course. If a second Physics course is desired, students should take AP Physics.**

**Instructional**

**Methods and Assessments:** Labs, Vernier demonstrations, lectures, reading for science content, group work, math based problems, unit tests, quizzes, and semester finals.



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**Basis for Student Success:** Students should be prepared to devote time to reading, working on homework, participating in labs and studying for tests. Must have a scientific calculator.

## PLTW Principles of Engineering with Physics

**Course #:** S1 (0289) S2 (0290) Year Long Elective

**Grade Levels:** 10 – 12

**Prerequisites:** Must be enrolled in or completed Algebra II or Algebra II X

**\*This course satisfies one of the three credit science requirements (includes biology and chemistry or physics) in physics for graduation**

**Course Description:** This survey course of engineering exposes students to some of the major concepts they'll encounter in a postsecondary engineering course of study. Students will have an opportunity to investigate engineering and high-tech careers and employ engineering and scientific concepts in the solution of engineering design problems. The course will also address physics topics that include electricity and magnetism, electric circuits, energy and work, and waves, sound and light. In addition students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. **Possible to earn 3 college credits.**

**There is a \$10.00 fee for class materials.**

**Instructional Method and Assessments:** Hands-on and direct teaching instruction. Students are assessed based on class assignments and project completion.

**Basis for Student Success:** Consistent attendance, participation, and ability to work independently and in a group atmosphere.

## AP Physics I

**Course#:** A-S1 (0198) B-S2 (0199) – Full Elective Course

**Grade Levels:** 11 - 12

**Prerequisites:** Algebra 2X (or concurrent registration)

**AP Physics I is a year-long course, commitment is for the full year.**

**Course Description:** Students will discover the explanations of our physical environment. Students will use trigonometry-based mathematics to learn Newtonian mechanics (including rotational dynamics and angular momentum); work, energy, and power; and mechanical waves and sound. Students will also be introduced to electric circuits. AP Physics is designed for motivated students wishing to study science, math, or engineering in post-secondary education. Students may earn college or university credit (the standards for competency vary for each college/university) upon completion of the AP exam.

**Instructional Methods and Assessments:** Interactive boards, virtual labs, Vernier based labs, personal-response systems, lab reports, math based problems, practice AP test sections, tests, and reading quizzes.



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**Basis for Student Success:** Students should be prepared to devote time to reading, working problem sets, and writing lab reports. Students will be expected to sit for the AP exam in the spring. Students must have a scientific calculator.

## AP Biology

**Course # A-S1 (0196) B-S2 (0197) – Full Year Elective Course**

**Grade Level: 11 - 12**

**Prerequisite: Chemistry and completion of required summer assignment.**

**Strongly Recommended: 10<sup>th</sup> grade Biology.**

**Course Description:** The AP Biology course is a fast paced and challenging year long biology course designed to be the equivalent of a college introductory course usually taken by biology majors in their first year at colleges and universities across the nation. The two main goals of AP Biology are to help students develop a conceptual framework for modern biology and to help students gain an appreciation of science as a process. The AP Biology course has a high rigor in respect to the kind of textbooks used, the range and depth of topics covered, the development of higher order thinking skills and the time and effort required of students. Success in this course will depend on your study skills, reading and writing abilities, motivation and maturity. This course will culminate in the taking of the Advanced Placement Biology Examination. Upon passing the AP Biology examination a student may receive college credit for an introductory biology course (the standards accepted for competency differ from school to school).

**Instructional Methods and Assessment:** Class time will include the following components: Lecture presentations, laboratory work, class projects, independent/student work, online activities and laboratory work. Students will be assessed on homework, tests/quizzes, lab journals, and laboratory/class participation.

**Basis for student success:** Students accepting the challenge of an Advanced Placement course will be required to actively participate in all lectures, assignments and laboratory activities that are conducted during the year. Students who do well in AP Biology are self-motivated and mature enough to handle the rigor of the course throughout the school year. **REQUIRED MATERIALS: 2-inch OR 3-ring binder with loose leaf paper and 8 divider; graphing composition notebook**

## Advanced Astronomy and Meteorology

**Course#: 0194 – Semester Elective**

**Grade Levels: 10 - 12**

**Prerequisites: None**

**Course Description:** Astronomy explores the formation of galaxies, stars, and planets from the formation of their atoms to their explosive end. You will learn to recognize everything from nebulae to globular clusters. The best part of the class is the optional nighttime star parties. We join the Minnesota Astronomical Society for 15 extra-credit night adventures. Wait until you see the telescopes.



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Meteorology investigates the dynamic and stormy nature of our atmosphere. You will delve into the science of thunderstorms, hurricanes, and tornadoes. You will search for the causes of our changing climate from the ice ages endured by the first people of Mound to our tropical Cretaceous past. The instructor's goal is to provide you with the knowledge to pursue these subjects as possible lifelong hobbies and to prepare you for the college general education requirements in science.

**Instructional Methods and Assessments:** Instructional methods include lectures, discussions, reading for content, the analysis of data, group work, and individual labs. Assessments include daily work, quizzes, model construction, a midterm, and a final test.

**Basis for Student Success:** Astronomy requires the student to read for understanding. He/She must be willing to look up words they do not know and take notes on their reading. As with any class, a student must proactively seek help if they are struggling. Students who work hard and study for tests can expect to be successful and enjoy the class.

## Advanced Geology and Paleontology

**Course#:** 0195 - Semester Elective

**Grade Levels:** 10 - 12

**Prerequisites:** None

**Course Description:** It has never been this important for us to understand how our planet works and changes. Today's citizens need to be able to join the debate balancing our obligations to progress, growth, and stewardship. Geology examines how the earth works from the electromagnetic fields emanating from our core to the formation of coal, oil, and metals which drive our techno-age. We will study mountain building, earthquakes, plate tectonics, hydrology, and much more. We have a fascinating planet.

Paleontology allows us to travel back in time. We will start with the oldest fossil organism ever found and follow the ever changing evolution of life all the way to the present. Wait until you see all the strange creatures that once lived in Mound. You will even learn where to hunt fossils locally. Earth Science is often the most common science elective taken in college. You will be all set.

**Instructional Methods and Assessment:** Instructional methods include lectures, discussions, reading for content, analysis of data, group work, and individual labs. Assessments include daily work, quizzes, model construction, a midterm, and a final test.

**Basis for Student Success:** Geology/Paleontology requires the student to read for understanding. He/She must be willing to look up words they do not know and take notes on their reading. As with any class, a student must proactively seek help if they are struggling. Students who work hard and study for tests can expect to be successful and enjoy the class.

