

# SCIENCE

◆THREE (3) CREDITS REQUIRED FOR GRADUATION.

◆ Course offerings not having sufficient enrollment after registration will be discontinued for the 2018-2019 school year.

## Required Science Curriculum will consist of:

Number in parentheses (e.g., (9)) indicate the recommended grade level for enrolled students.

◆ **Biology: 1 year**

◆ **\*Any Physical Science: 1 year**

\*Includes: Physical Science 1 and 2, Chemistry, Physics, Earth Science Courses, AP Chemistry, AP Physics 1 and 2, etc.

◆ **\*\*Chemistry or Physics: 1 year**

\*\*With school and parent/guardian approval, a student may be excused from this course in favor of a more appropriate course. If a student is excused from Chemistry or Physics, the student must still take three (3) units of Lab Science.

**Physical Science 1 / Lab  
(9) (Stevens HS only)**

**One Semester - 1/2 Credit**

**(9-10-11-12) (Central and Rapid City HS only)**

Physical Science 1 will emphasize matter, energy, and their interactions. Topics will include: kinetic theory, heat transfer, waves, conservation laws, atomic structure and theory, the periodic table, chemical bonds, and reaction types. The emphasis will be on the close relationship between these areas and how they are important to the individual student and society. Critical thinking and lab skills (including data reporting, safety in the lab, use of conversions, scientific equipment, and formula manipulation) will be an additional focus of this class.

**Physical Science 2 / Lab  
(9) (Stevens HS only)**

**One Semester - 1/2 Credit**

**(9-10-11-12) (Central and Rapid City HS only)**

Physical Science 2 will emphasize forces, motion, energy, work, power, electricity, and magnetism. The emphasis will be on the close relationship between these areas and how they are important to the individual student and society. Critical thinking and lab skills (including data reporting, safety in the lab, use of conversions, scientific equipment, and formula manipulation) will be an additional focus of this class.

**Biology 1 / Lab (9\*-10)**

**One Semester - 1/2 Credit**

▶ **Required for graduation.**

▶ ***\*It is suggested that students who wish to take Biology 1, in lieu of or concurrently with Physical Science 1, successfully pass Integrated Math 1 and successfully complete their 8<sup>th</sup> grade science course.***

Biology 1 emphasizes cell structures, cell processes, and inheritance. Topics will include: biochemistry, cells, DNA, genetics, and human reproductive system with an emphasis on laboratory investigations in all areas.

**Biology 2 / Lab (9\*-10)****One Semester - 1/2 Credit**

► *Required for graduation.*

► *\*It is suggested that students who wish to take Biology 2, in lieu of or concurrently with Physical Science 2, successfully pass Integrated Math 1 and successfully complete their 8<sup>th</sup> grade science course.*

Biology 2 emphasizes biological unity, diversity, and ecosystems. Topics will include: mechanisms of genetic change, classification of organisms, the relationships between structures and functions, and the identification of factors that can affect changes in stability of populations, communities, and ecosystems.

**Anatomy and Physiology 1 / Lab (11-12)****One Semester - 1/2 Credit**

► *It is recommended that students who register for this class have received a grade of "C" or better in Biology 1 and Biology 2.*

Anatomy and Physiology 1 will provide an in-depth study of body orientation, tissues, integumentary system, the skeletal system, and the muscular system.

**Anatomy and Physiology 2 / Lab (11-12)****One Semester - 1/2 Credit**

► *It is recommended that students who register for this class have received a grade of "C" or better in Biology 1 and Biology 2.*

Anatomy and Physiology 2 will provide an in-depth study of the following systems: nervous, cardiovascular, endocrine, and digestive.

**Chemistry / Lab (10-11-12)****One Year - 1 Credit**

► *Chemistry or Physics is required for graduation.*

► *Completion of or concurrent registration in Integrated Math 3 is suggested.*

► *Chemistry may be taken concurrently with Biology 1 and 2.*

This course will consist of laboratory work, demonstrations, discussion, lecture, and videos with an emphasis on experimentation in the laboratory. Chemistry integrates the scientific method with critical thinking, technical writing, and communication skills. Chemistry is essential for careers in medicine, dentistry, pharmacy, nursing, veterinary work, sociology, dietetics, family and consumer science, agriculture, forestry and engineering. Content will include metric measurement, significant figures, conversions, atomic structure, nomenclatures and formulas, periodicity, bonding, stoichiometry, thermochemistry, solutions, equilibrium, plus acids and bases. Chemistry is necessary in virtually all STEM careers.

**Advanced Placement Chemistry / Lab (11-12)****One Year - 1 Credit**

► *Successful completion of chemistry with a "B" or higher is strongly recommended.*

► *This course, designed for the college or university-bound student, is taught at a college level.*

► *This class will be weighted on the 5.0 scale.*

Advanced Placement Chemistry will include laboratory work, demonstrations, discussion, and lecture dealing with the basic principles of chemistry. This class will culminate in the Advanced Placement Chemistry examination which may be taken at the end of the school year at the student's expense. If students score high enough on this test, they may qualify for up to a year's worth of Chemistry credit from most colleges or universities.

**Microbiology / Lab (11-12)****One Semester - 1/2 Credit**

► *It is recommended that students who register for this class have received a grade of "C" or better in Biology 1 and Biology 2.*

► *This course will be offered at Central in 2018-2019*

The practical laboratory techniques used in this class would be beneficial for any student considering a career in any lab or medical related field. In this hands-on class, students will spend the majority of their time in the laboratory on the study, identification, isolation, and control of microorganisms, with emphasis on bacteria.

**Introduction to Organic Chemistry / Lab (11-12)****One Semester - 1/2 Credit**

► *It is recommended that students pass Chemistry with an A or B before taking this class.*

In this class, students will be introduced to the description nomenclature, structural formulas, and reactions of organic compounds. Organic chemistry will include laboratory work, demonstrations, discussion and lecture. This course is especially valuable for students who are planning a career in medicine, pharmacy, forestry, nursing, agriculture, family and consumer science, dentistry, or dietetics.

**Physics / Lab (11-12)****One Year - 1 Credit**

► *Chemistry or Physics required for graduation.*

► *Completion of or concurrent registration in Integrated Math 3 is strongly recommended.*

*Physics requires strong mathematical skills, and proficiency in trigonometry is suggested*

Physics will emphasize the laws governing the workings of the Universe, from the smallest subatomic scales to transgalactic scales. Topics will include: kinematics, forces, gravitation, momentum, energy, oscillations, light, and an introduction to electricity, magnetism, and modern physics. This laboratory-oriented course includes both in-class experiments and engineering-oriented projects. Physics is necessary in virtually all STEM careers.

**Advanced Placement Physics 1 / Lab (11-12)****One Year - 1 Credit**

► *Successful completion of Physics is recommended.*

► *This course, designed for the college or university-bound student, is taught at a college level.*

► *Advanced Placement Physics 1 and Advanced Placement Physics 2 are independent of each other; and may be taken alone, concurrently or consecutively.*

► *This class will be weighted on the 5.0 scale.*

AP Physics 1 is equivalent to a first-semester algebra-based college physics course, and it has a significant laboratory/project component. The course emphasizes Newtonian mechanics (including projectile motion, torque and angular momentum) as well as energy, power, mechanical waves (like earthquakes), and sound. It will introduce electric circuits.

**Advanced Placement Physics 2 / Lab (11-12)****One Year - 1 Credit**

► *Successful completion of Physics is highly recommended.*

► *This course, designed for the college or university-bound student, is taught at a college level.*

► *Advanced Placement Physics 1 and Advanced Placement Physics 2 are independent of each other; and may be taken alone, concurrently or consecutively.*

► *This class will be weighted on the 5.0 scale.*

AP Physics 2 is equivalent to a second-semester algebra-based college physics course, and it has a significant laboratory/project component. The course emphasizes fluid mechanics, thermodynamics, electricity and magnetism, optics, and atomic/nuclear physics.

**Ecology / Lab (11-12) (Central & Rapid City HS only) One Semester - 1/2 Credit**

▶ *This course will be offered at Central in 2019-20.*

▶ *Approved Career and Technical Education Course*

▶ *Offered to 10th graders by teacher recommendation only.*

▶ *It is recommended that students take Biology 1 and Biology 2 before taking this class.*

Students will investigate the diverse interrelationships organisms have with each other and with their environment. Problems with populations, communities, and ecosystems will be explored and researched. The cycling of matter and the flow of energy through the living world will be included in this course. This course will also include an in-depth study of the structure and function of plants.

**Astronomy: Special Topics In Earth Science / Lab (11-12)**

**(Central only)**

**One Semester - 1/2 Credit**

▶ *Offered to 10th graders by teacher recommendation only.*

Students will study the characteristics of planets, stars, and galaxies as they strive to understand the patterns of our solar system and its place in the universe. Students will also be introduced to a variety of astronomical tools used to study the stars and planets. This will include a unit on space exploration using materials from NASA and discussion of future space explorations.

**Geology: Special Topics In Earth Science / Lab (11-12)**

**(Central only)**

**One Semester - 1/2 Credit**

▶ *This course will be offered at Central in 2019-20.*

▶ *Offered to 10th graders by teacher recommendation only.*

This class will offer students an overview of the earth's features, forces, and paleontology. The student will also be offered an opportunity to investigate rock types, mineral resources, and the geologic history specific to the Black Hills. The class will provide a basis for appreciating the events that have shaped the Black Hills area, which possesses a vast array of geological features in a relatively small area.

**Meteorology: Special Topics In Earth Science / Lab (11-12)**

**(Central only)**

**One Semester - 1/2 Credit**

▶ *This course will be offered at Central in 2018-19.*

▶ *Offered to 10th graders by teacher recommendation only.*

This course is an introduction to atmospheric conditions contributing to various weather phenomena. This class will study the factors that create the daily variations of weather conditions as well as the factors needed to develop into major storms such as tornadoes or hurricanes. The impact of natural disasters created by severe weather pose some of our greatest challenges. Students will gain an understanding of the weather and how to prepare for these natural disasters. Through the use of meteorological instruments, weather maps, and computer models, students will learn the factors used to forecast the weather. Analysis of global weather patterns and climate will complete the course. Numerous outdoor investigations will be included.

**Principles of Biomedical Sciences  
(10-11-12) (Central only)**

**One Year - 1 Credit**

► *Approved Career and Technical Education Course*

► *It is recommended that students earn a B or higher in Biology 1 before taking this class.*

Students investigate the human body systems and various health conditions including heart disease, diabetes, sickle-cell disease, hypercholesterolemia and infectious diseases. They determine the factors that led to the death of a fictional person, and investigate lifestyle choices and medical treatments that might have prolonged the person's life. The activities and projects introduce students to human physiology, medicine, research processes and bioinformatics. Key biological concepts including homeostasis, metabolism, inheritance of traits and defense against disease are embedded in the curriculum. Engineering principles including the design process, feedback loops and the relationship of structure to function are also incorporated. This course is designed to provide an overview of all the courses in the Biomedical Sciences Program and lay the scientific foundation for subsequent courses.

**Human Body Systems (10-11-12) (Central only)**

**One Year - 1 Credit**

► *Approved Career and Technical Education Course*

► *It is recommended that students earn a B or higher in Biology 1 before taking this class.*

Students examine the interactions of body systems as they explore identity, communication, power, movement, protection, and homeostasis. Students design experiments, investigate the structures and functions of the human body, and use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration. Exploring science in action, students build organs and tissues on a skeletal manikin, work through interesting real world cases and often play the role of biomedical professionals to solve medical mysteries.

**Earth Science 1 / Lab (11-12)  
(Stevens & Rapid City HS only)**

**One Semester-1/2 Credit**

Earth Science 1 will emphasize hydrology, meteorology, and astronomy. Through the use of various hands-on activities, maps, computer models, and current scientific methodology, students will research the importance and scarcity of fresh, attainable water, the factors that drive oceanic currents and their effect on weather patterns, and the many factors that create both regional and global weather fluctuations and long term climate trends. Students will conclude the semester by exploring the observable patterns and details about our solar system's formation, its characteristics, and Earth's place in the larger universe.

**Earth Science 2 / Lab (11-12)  
(Stevens only)**

**One Semester-1/2 Credit**

Earth Science 2 will emphasize geology and its effects on ecology. Students will use hands-on activities, maps, global positioning system data, computer models, and current scientific methodology to explore Earth's interior composition, tectonic forces, and the resulting hazards produced by earthquakes, volcanoes, and other movements of the planet's crust. This exploration will focus on both the processes themselves, and the potential risks they pose to humanity and ecologic systems. Next, students will explore the rock cycle and geologic history by investigating the Earth processes involved in the creation of sedimentary, igneous, and metamorphic rocks, and the minerals they are composed of. Finally, students will investigate the ecologic consequences of mankind's use of natural resources through history.