Physical Science Syllabus

2023-2024 School Year

Mrs. Kari Cruze

I. Course Description and Requirements

Physical Science is designed to serve as a foundation for other high school courses, especially chemistry and physics. Physics units include Newton's 3 laws of motion, forces, scientific definitions of work and power, momentum, conservation and conversions of energy, relationships between electricity and magnetism, and wave phenomena and behavior (including characteristics and calculations) including electromagnetic and sound waves. Chemistry units include composition and classification of matter, history of atomic structure up to the present-day model, learning the periodic table to include, but not limited to: all chemical symbols, patterns, trends and isotopes, chemical bonding, compound naming, and chemical reactions.

Because experimentation is the basis of science, laboratory demonstrations and investigations are an integral part of this course. Students should be prepared to conduct projects each quarter and write a formal lab report. Instruction centers around inquiry-based learning that is incorporated into class activities. Learning activities include teacher-lead instruction, group work, student seatwork, project-based learning, and lab exercises with both student-choice and teacher-choice grouping.

Students can expect to start each day with a bell ringer assignment followed by learning activities and/or lecture. At times students will work independently from the teacher to achieve student autonomy that will be expected of high school students. Classes are structured to utilize every minute for learning and assessing understanding. Real world application is a daily objective. Higher-level thinking will be incorporated into each lesson as well as use of technology when applicable to increase student achievement. Students are expected to participate in all activities and actively engage and ask questions during teacher-led lectures. Students are also expected to review and study the content covered in class outside of school ***daily.***

Tennessee Physical Science Standards

PSCI.PS1: Matter and Its Interactions

1) Using the kinetic molecular theory and heat flow considerations, explain the changes of state for solids, liquids, gases, and plasma.
2) Graphically represent and discuss the results of an investigation involving pressure, volume, and temperature of a gas.
3) Construct a graphical organizer for the major classifications of matter using composition and separation techniques.
4) Apply scientific principles and evidence to provide explanations about physical and chemical changes.
5) Trace the development of the modern atomic theory to describe atomic particle properties and position.
6) Characterize the difference between atoms of different isotopes of an element.
7) Use the periodic table as a model to predict the relative properties of elements.
8) Using the patterns of electrons in the outermost energy level, predict how elements may combine.
9) Use the periodic table as a model to predict the formulas of binary ionic compounds. Explain and use the naming conventions for binary ionic and molecular compounds.
10) Develop a model to illustrate the claim that atoms and mass are conserved during a chemical reaction (i.e., balancing chemical equations).
11) Use models to identify chemical reactions as synthesis, decomposition, single-replacement, and double-replacement. Given the reactants, use these models to predict the products of those chemical reactions.
12) Classify a substance as acidic, basic, or neutral by using pH tools and appropriate indicators.
13) Research and communicate explanations on how acid rain is created and its impact on the ecosystem.
14) Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
15) Communicate scientific and technical information about nuclear energy and radioactive isotopes with respect to their impact on society.

PSCI.PS2: Motion and Stability: Forces and Interactions

1) Use mathematical representations to show how various factors (e.g., position, time, direction of force) affect one-dimensional kinematics parameters (distance, displacement, speed, velocity, acceleration). Determine graphically the relationships among those one-dimensional kinematics parameters.
2) Algebraically solve problems involving constant velocity and constant acceleration in one-dimension.
3) Use free-body diagrams to illustrate the contact and non-contact forces acting on an object.

4) Plan and investigate to gather evidence and provide a mathematical explanation about the relationship between force, mass, and acceleration. Solve related problems using F=ma.
5) Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
6) Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on an object during a collision.
7) Plan and investigate to provide evidence that an electric current can produce a magnetic field.

PSCI.PS3: Energy
1) Identify and give examples of the various forms of energy (kinetic, gravitational potential, elastic potential) and solve mathematical problems regarding the work-energy theorem and power.
2) Plan and investigate to provide evidence that thermal energy will move as heat between objects of two different temperatures, resulting in a more uniform energy distribution (temperature) among the objects.
3) Design, build, and refine a device within design constraints that has a series of simple machines to transfer energy and/or do mechanical work.
4) Collect data and present your findings regarding the law of conservation of energy and the efficiency, mechanical advantage, and power of the refined device.
5) Investigate the relationships among kinetic, potential, and total energy within a closed system (the law of conservation of energy).
6) Determine the mathematical relationships among heat, mass, specific heat capacity, and temperature change using the equation $Q = mC_p\Delta T$.
7) Demonstrate Ohm's Law through the design and construction of simple series and parallel circuits.
8) Plan and conduct an experiment using a controlled chemical reaction to transfer thermal energy and/or do mechanical work.
9) Demonstrate the impact of the starting amounts of reacting substances upon the energy released.

PSCI.PS4: Waves and Their Applications in Technologies for Information Transfer
1) Use scientific reasoning to compare and contrast the properties of transverse and longitudinal waves and give examples of each type.
2) Design/investigate and interpret gathered data to explain how mechanical waves transmit energy through a medium.
3) Develop and use mathematical models to represent the properties of waves including frequency, amplitude, wavelength, and speed.
4) Describe and communicate the similarities and differences across the electromagnetic spectrum. Research methods and devices used to measure these characteristics.
5) Research and communicate scientific explanations about how electromagnetic waves are used in modern technology to produce, transmit, receive, and store information. Examples include: medical imaging, cell phones, and wireless networks.

II. Class Expectations
- Students are expected to **be present** and active members of the classroom each day.
- Students are expected to come to class **prepared** with all necessary materials and completed assignments to learn and participate in all lectures and activities.
- Students are expected to **be respectful** of the teacher, the classroom, and their peers.
- Students must follow **ALL** classroom rules.
- **NO CELLPHONES** are allowed out in class ever!
- **No earbuds** are allowed out without express teacher permission.
- Hats and hoods must be **removed** inside the classroom.
- Read, Sign, and Agree to the Summary of Rules **AND** the Classroom Procedure Handouts

III. Class Discipline
Students who are not acting present, coming prepared, being respectful, or following all classroom/school rules will earn one of the following consequences:
- Warning in class
- Removal from class activity AND teacher/student conference after class
- Parent contact by phone or email
- Written referral to AP

*Any student caught cheating on an assignment will receive a zero and be referred to the Assistant Principal.

IV. Required Materials

All students must come to class each day with the following materials:

- A three-ringed binder with paper.
- Pencil/pen, highlighters
- Charged Chromebook (bring your charger if you have trouble remembering to charge your Chromebook)
- Calculator recommended

V. Assessment and Grading Plan

We will cover nine units over the course of the year. Each unit consists of 1-4 major assessments. The amount of minor assessments varies per unit. Students will have a daily ***open-note*** quiz each day that will add up to a weekly minor grade. All unit tests include both multiple choice and open response questions. **Note: *Assignments checked for completion will not be accepted late. Assignments collected and graded for accuracy will be accepted late with a penalty of 20% off the first day late, and a zero afterwards. Students must then see me to discuss how to make up any missing assignments.***

Minor Assessments

- *Classwork/labs:* Each unit is packed with engaging activities, labs, and practice to help master the content. These assignments range from 15-100 points, depending on the length and depth of material.
- *Daily quizzes*: At the start of each day the students will complete a small quiz, called a Prime-Time Bell ringer, over content covered during the previous class period. Students who were absent the previous class period will not be expected to complete the Prime Time the day they return, if it is over content they missed. Their grade on each day's quiz will be added up for one weekly Prime Time grade of 25 points each week.
- *Homework*: Students will be expected to complete notes in class. They will then be given practice problems/independent work to complete in class to assist in mastery of content. Students will often be given plenty of time during class to complete classwork. Any classwork not finished in class is automatically homework that night.
- *Study guides*: Students will be required to make study guides for each test to help them review the material each day and prepare for the unit tests. Study guides will be made off the first sheet of each packet by answering the objectives and defining the vocabulary for each concept. Study guide is worth 10 points.

Major Assessments

(number of units, as well as assessments, is subject to change)

1st 9 weeks	2nd 9 weeks
Unit 1: Scientific Method - Math Skills Quiz (25 pts) - Unit 1 Test: Sci Method (100 pts) **Unit 2: Motion and Forces** - Unit 2a Test: Motion (100 pts) - Forces Quiz (25 pts) - Unit 2b Test: Forces (100 pts) - Newton's Laws Project (100 pts) **Unit 3: Energy** - Conservation of Energy Quiz (25 pts) - Unit 3 Test: Energy (100 pts) **Unit 4: Electricity and Magnetism** - Electricity Quiz (25 pts) - Unit 4 Test: Electricity and Magnetism (100 pts) - Midterm Review Project (100 pts) **Unit 5: Waves** - Waves Quiz (25 pts) - Unit 5 Test: Waves (100 pts) **Midterm Exam**	**Unit 6: Matter** - Classification and Properties Quiz (25 pts) - Unit 6 Test: Matter (100 pts) - Lab Report Final Draft (100 pts) **Unit 7: Atomic Structure** - Elements Mini-Quizzes (30-50 pts) - Unit 7 Test: Atomic Structure (100 pts) **Unit 8: Bonding** - Polyatomic Ion Quiz (20 pts) - Elemental Superhero Projects (100 pts) - Naming Quiz (25 pts) - Unit 8 Test: Bonding (100 pts) **Unit 9: Reactions** - Balancing and Classifying Quiz (25 pts) - Unit 9 Test: Reactions (100 pts) ***Unit 10: Nuclear Chemistry (Radiation)*** **If time Allows* - *Nuclear Chemistry Quiz (25 pts)* - *Unit 10 Test: Nuclear Chemistry (100 pts)* **Final Exam**

*****Accessing Grades and Assignments: Parents, if you want access to your student's grades and assignments in this class, follow these directions. Log on to the Franklin County School District website www.fcstn.net Scroll to the bottom of the page. At the right side of the screen, find the SKYWARD logo and tap the "Student/Family Access". Type YOUR name as: first initial and last name (no capital letters) and 000. Your temporary password will be: pass1234. You will be asked to change your password. If this does not work for you please call FCHS Guidance at 931-967-2294 for assistance. ********

VI. Communication

I will regularly post on my google classroom updates, announcements, lecture notes, and assignments for students to access. If you ever want to know something, check the website first! Students and parents are also encouraged to contact me via email. I will respond to all emails within 24 hours during the school week and can respond in much more detail and speed than if you attempt to call. Students are also strongly encouraged to attend tutoring T & TH afternoon from 3:15-4:15 if they ever need help! ***If you would like to schedule a conference, my planning is from 8:00-9:30 each school day.***

Email: **kari.cruze@fcstn.net**

FCHS Teacher Webpage: **http://fchs.fcstn.net/ Tap "School Staff" on the left column to find my teacher webpage and class information.**