Warren County School District

PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: Science 8

Course Number: 00307

Course Prerequisites:

Course Description: (Include "no final exam" or "final exam required")

Eighth grade science covers physical science, chemistry and physics in the areas of matter, energy sources, force and motion. Unifying themes, inquiry and design, and technological devices are incorporated within those areas of study.

Suggested Grade Level: 8

Length of Course: ____ One Semester __X__ Two Semesters ____ Other (Describe)

Units of Credit: None (Insert ***NONE*** if appropriate.)

PDE *Certification and Staffing Policies and Guidelines (CSPG)* Required Teacher Certification(s) (Insert certificate title and CSPG#) Chemistry, Biology, Earth and Space, General Science, Middle Level Science, Physics

Certification verified by WCSD Human Resources Department:
__X__ Yes ____ No

Board Approved Textbooks, Software, Materials:
Title:
Publisher:
ISBN #:
Copyright Date:
Date of WCSD Board Approval:

BOARD APPROVAL:

Date Written: September 2009

Date Approved: _____

Implementation Year: _____

Suggested Supplemental Materials: (List or insert **None**)

Course Standards

PA Academic Standards: (List by Number and Description)

3.1.10 Unifying Themes
- A. Discriminate among the concepts of systems, subsystems, feed back and control in solving technological problems.
- B. Describe concepts of models as a way to predict and understand science and technology.
- C. Apply patterns as repeated processes or recurring elements in science and technology.
- D. Apply scale as a way of relating concepts and ideas to one another by some measure.
- E. Describe patterns of change in nature, physical and man made systems.

3.2.10 Inquiry and Design
- A. Apply knowledge and understanding about the nature of scientific and technological knowledge.
- B. Apply process knowledge and organize scientific and technological phenomena in varied ways.
- C. Apply the elements of scientific inquiry to solve problems.
- D. Identify and apply the technological design process to solve problems.

3.4.10 Physical Science, Chemistry and Physics
- A. Explain concepts about the structure and properties of matter.
- B. Analyze energy sources and transfers of heat.
- C. Distinguish among the principals of force and motion.
- D. Explain essential ideas about the composition and structure of the universe.

3.7.10 Technological Design
- A. Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.
- B. Apply appropriate instruments and apparatus to examine a variety of objects and processes.

3.8.10. Science Technology and Human Endeavors
- B. Analyze how human ingenuity and technological resources satisfy specific human needs and improve the quality of life.
- C. Evaluate possibilities, consequences and impacts of scientific and technological solutions.

WCSD Academic Standards: (List or **None**)

None

Industry or Other Standards: (List, Identify Source or **None**)
None

WCSD EXPECTATIONS

WCSD K-12 Expectations for instruction in writing, reading, mathematics and, technology have been developed and revised annually. The teacher will integrate all WCSD Expectations into this planned instruction.

SPECIAL EDUCATION AND GIFTED REQUIREMENTS

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (IEP) or Gifted Individual Education Plan (GIEP).

SPECIFIC EDUCATIONAL OBJECTIVES/CORRESPONDING STANDARDS AND ELIGIBLE CONTENT WHERE APPLICABLE

(List Objectives, PA Standards #'s, Other Standards (see samples at end))

S11.A The Nature of Science

S11.A.1 Reasoning and Analysis

S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.

PA Standards References: 3.1.10.A, 3.2.10.A, 3.1.10.E

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.A.1.1.1** Compare and contrast scientific theories, scientific laws, and beliefs (i.e., the law of universal gravitation, how light travels, formation of moons, stages of ecological succession).			
B.	**S11.A.1.1.2** Analyze and explain the accuracy of scientific facts, principles, theories, and laws.			
C.	**S11.A.1.1.3** Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).			
D.	**S11.A.1.1.4** Explain how specific scientific knowledge or technological design concepts solve practical problems (e.g., momentum, Newton's universal law of gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, atomic theory, theory of relativity, Pasteur's germ theory, relativity, heliocentric theory, ideal gas laws).			
E.	**S11.A.1.1.5** Analyze or compare the use of both direct and indirect observation as means to study the world and the universe (e.g., behavior of atoms, functions of cells, birth of stars).			

S11.A.1.2 Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications.

PA Standard References: 3.2.10.A, 4.3.10.B

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.A.1.2.1** Explain and explain scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).			

B.	**S11.A.1.2.2** Use case studies (e.g., Wright brothers' flying machine, Tacoma Narrows Bridge, Henry Petoskey's Design Paradigms) to propose possible solutions and analyze economic and environmental implications of solutions for real-world problems.			

S11.A.1.3 Describe and interpret patterns of change in natural and human-made systems.

PA Standard References: 3.1.10.C, 3.1.10.E, 4.8.10.A

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.A.1.3.1** Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).			
B.	**S11.A.1.3.2** Describe or interpret dynamic changes to stable systems (e.g., chemical reactions, human body, food webs, tectonics, homeostasis).			
C.	**S11.A.1.3.3** Describe how changes in physical and biological indicators (e.g., soil, plants, or animals) of water systems reflect changes in these systems (e.g. changes in bloodworm populations reflect changes in pollution levels in streams).			
D.	**S11.A.1.3.4** Compare the rate of use of natural resources and their impact on sustainability.			

S11.A.2 Processes, Procedures and Tools of Scientific Investigations

S11.A.2.1 Apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process.

PA Standard References: 3.2.10.B, 3.2.10.D

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.A.2.1.1** Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.			
B.	**S11.A.2.1.2** Critique the elements of the design process (e.g., identify the problem, understand criteria, create solutions, select solution, test/evaluate, and communicate results) applicable to a specific technological design.			
C.	**S11.A.2.1.3** Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits.			
D.	**S11.A.2.1.4** Critique the results and conclusions of scientific inquiry for consistency and logic.			
E.	**S11.A.2.1.5** Communicate results of investigations using multiple representations.			

S11.A.2.2 Evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide.

PA Standard References: 3.7.10.B, 3.8.10.B

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.A.2.2.1** Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality.).			
B.	**S11.A.2.2.2** Explain how technology (e.g., GPS, spectroscope,			

	scanning electron microscope, pH meters, probe interface, imaging technology, telescope) is used to extend human abilities and precision.			

S11.A.3 Systems, Models and Patterns

S11.A.3.1 Analyze the parts of a simple system, their roles, and their relationships to the system as a whole.

PA Standard References: 3.1.10.A, 3.1.10.E, 4.3.10.C

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.A.3.1.1** Apply systems analysis, showing relationships (e.g., flowcharts, concept maps), input and output, and measurements to explain to explain a system and its parts.			
B.	**S11.A.3.1.2** Analyze and predict the effect of making a change in one part of a change in one part of a system on the system as a whole.			
C.	**S11.A.3.1.3** Use appropriate quantitative data to describe or interpret a system (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).			
D.	**S11.A.3.1.4** Apply the universal systems model of inputs, processes, outputs, and feedback to a working system (e.g. heating, motor, food production) and identify the resources necessary for operation of the system.			

S11.A.3.2 Compare observations of the real world to observations of a constructed model.

PA Standard References: 3.1.10.B, 3.2.10.B, 4.1.10.B, 4.6.10.A

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.A.3.2.1** Compare the accuracy of predictions represented in a model to actual observations and behavior.			
B.	**S11.1.3.2.2** Describe advantages and disadvantages of using models to simulate processes and outcomes.			
C.	**S11.A.3.2.3** Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., dimensions of object within the solar system, life spans, size of atomic particles, topographic maps).			

S11.A.3.3 Compare and analyze repeated processes or recurring elements in patterns.

PA Standard References: 3.1.10.C, 3.2.10.B

X – performance assessed during that semester

A.	**S11.A.3.3.1** Describe or interpret recurring patterns that form the basis of biological classification, chemical periodicity, geological order, or astronomical order.	**1**	**2**	**Assessment**
B.	**S11.A.3.3.2** Compare stationary physical patterns (e.g., crystals, layers of rocks, skeletal systems, tree rings, atomic structure) to the object's properties.			
C.	**S11.A.3.3.3** Analyze physical patterns of motion to make predictions or draw conclusions (e.g., solar system, tectonic plates, weather systems, atomic motion, waves).			

S11.C. Physical Sciences

S11.C.1 Structure, Properties, and Interaction of Matter and Energy

S11.C.1.1 Explain the relationship between the structure and properties of matter.

PA Standard References: 3.4.10.A

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.C.1.1.1** Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., proton, neutrons, electrons).			
B.	**S11.C.1.1.2** Explain the relationship between the physical properties of a substance and its molecular or atomic structure.			
C.	**S11.C.1.1.3** Explain the formation of compounds (ionic and covalent) and their resulting properties using bonding theories .			
D.	**S11.C.1.1.4** Explain how the relationships of chemical properties of elements are represented in the repeating patterns within the periodic table.			
E.	**S11.C.1.1.5** Predict the behavior of gases though the application of laws (e.g., Boyle's law, Charles' law, or ideal gas law).			
F.	**S11.C.1.1.6** Describe factors that influence the frequency of collisions during chemical reactions that might affect the reaction rates (e.g., surface area, concentration, catalyst, temperature).			

S11.C.2 Forms, Sources, Conversion, and Transfer of Energy

S11.C.2.**1** Analyze energy sources and transfer of energy, or conversion of energy.

PA Standard References: 3.4.10.B

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.C.2.1.1** Compare or analyze waves in the electromagnetic spectrum (e.g., ultraviolet, infrared, visible light, x-rays, microwaves) as well as their properties, energy levels and motion.			
B.	**S11.C.2.1.2** Describe energy changes in chemical reactions.			
C.	**S11.C.2.1.3** Apply the knowledge of conservation of energy to explain common systems (e.g., refrigeration system, rocket propulsion, heat pump).			
D.	**S11.C.2.1.4** Use Ohm's Law to explain resistances, currents and voltage.			

S11.C.2.2 Demonstrate that different ways of obtaining, transforming, and distributing energy have different environmental consequences.

PA Standard References: *3.4.10.B, 4.8.10.C, 4.2.10.A*

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.C.2.2.1** Explain the environmental impacts of energy use by various economic sectors (e.g., mining, logging, and transportation) on environmental systems.			
B.	**S11.C.2.2.2** Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion, resource depletion).			
C.	**S11.C.2.2.3** Give examples of renewable energy resources (e.g., wind, solar, biomass) and nonrenewable resources (e.g., coal, oil, natural gas) and explain the environmental and economic advantages and disadvantages of their use.			

S11.C.3 Principles of Motion and Force

S11.C.3.1 Use the principles of motion and force to solve real-world challenges.

PA Standard References: 3.4.10.C, 3.6.10.C

X – performance assessed during that semester

	Performance Indicators	1	2	Assessment
A.	**S11.C.3.1.1** Explain common phenomena (e.g., a rock in a landslide, an astronaut during a space walk, a car hitting a patch of ice on the road) using an understanding of conservation of momentum.			
B.	**S11.C.3.1.2** Design or evaluate simple technological or natural systems that incorporate the principles of force and motion (e.g., simple and compound machines).			
C.	**S11.C.3.1.3** Describe the motion of an object using variables (i.e. acceleration, velocity, displacement).			
D.	**S11.C.3.1.4** Explain how electricity induces magnetism and magnetism induces electricity as two aspects of a single electromagnetic force.			
E.	**S11.C.3.1.5** Calculate the mechanical advantage for moving an object by using a simple machine.			
F.	**S11.C.3.1.6** Identify elements of simple machines in compound machines.			

ASSESSMENTS

PSSA Assessment Anchors Addressed: The teacher must be knowledgeable of the PDE Assessment Anchors and/or Eligible Content and incorporate them into this planned instruction. Current assessment anchors can be found at pde@state.pa.us.

Suggested Formative Assessments: The teacher will develop and use standards-based assessments throughout the course.

- Pre-Assessments of prior knowledge (e.g. entrance cards or KWL chart)
- Labs/lab reports
- Bell ringers/Problems of the Day(PODs)
- Discussions
- Teacher observation/Questioning
- Graphic organizers (e.g. Venn diagrams, word mapping, webbing, KWL chart, etc.)
- Summarizing
- Retelling
- Notetaking
- Problem-based learning modules
- Authentic assessment
- Oral presentations
- Outlining
- Journaling
- Student presentations/projects
- Open-ended response
- Quizzes/tests
- Activities
- Classroom Performance System (CPS)
- White boards

Suggested Summative Assessments:

- Essays

- Open-Ended Responses
- Projects
- Quizzes/tests
- Student presentations
- Portfolios
- Lab Practical
- Lab Report

District Approved Assessment Instruments

- PSSA Tests-Grades 4, 8 and 11 only

Differentiated Instructional Assessment Strategies

District Approved Assessment Instruments

- PSSA Tests-Grades 4, 8 and 11 only

Differentiated Instructional Assessment Strategies

Portfolio Assessment: _____ Yes __X__ No

District-wide Final Examination Required: _____ Yes __X__ No

Course Challenge Assessment (Describe):

REQUIRED COURSE SEQUENCE AND TIMELINE

(Content must be tied to objectives)

This is a topical outline. Specific content is identified in the assessment anchors.

Content Sequence	Dates

I. Nature of science **18 weeks**
   A. Scientific theories and laws
   B. Observations and inferences
   C. Quantitative and qualitative data
   D. Data analysis

II. Properties of matter
   A. Matter

B. Atoms
C. Physical/chemical properties
D. States of matter
E. Compounds and mixtures

III. Atoms
A. Elements
B. Subatomic particles
C. Atomic numbers
D. Energy levels

IV. Energy changes
A. Kinetic Molecular theory
B. Chemical changes and changes in energy

V. Chemical bonding
A. Ionic bonding
B. Chemical bonding

VI. Periodic table
A. Arrangement
B. Metals, nonmetals and metalloids

VII. Energy sources **3 weeks**
A. Forms of energy
B. Transfer of energy
C. Conservation of energy
D. Convection, conduction, radiation

VIII. Force and motion **15 weeks**
A. Newton's laws
B. Notion of an object
C. Balanced and unbalanced forces
D. Inertia

Objectives:

1. Understand that everything is made of matter, which can be characterized by physical and chemical properties.
2. Recognize that atoms are the smallest unit of an element which defines the chemical and physical properties of that element.
3. Identify that changes in matter are accompanied by changes in energy.
4. Illustrate that chemical bonding occurs as a result of attractive forces between atoms.
5. Define chemical bonding as a result of attractive forces between atoms.
6. Show that periodic trends in properties of atoms allow for the prediction of physical and chemical properties.
7. Illustrate the fact that energy can be transferred among objects and/or can be converted to different forms of energy.
8. Identify the importance of forces in regards to motion of objects.

WRITING TEAM: Tracy Vile, Al McLaughlin, Conrad Danielson, Carolyn Yurick, Kari Sullivan

WCSD STUDENT DATA SYSTEM INFORMATION

1. Is there a required final examination? _ Yes _____X No
2. Does this course issue a mark/grade for the report card?

   ___XYes _____ No
3. Does this course issue a Pass/Fail mark? _____Yes ___X___ No
4. Is the course mark/grade part of the GPA calculation?

   _____Yes ___X___ No
5. Is the course eligible for Honor Roll calculation? ___X Yes _____ No
6. What is the academic weight of the course?

   ___X___ No weight/Non credit _____ Standard weight

   _____ Enhanced weight (Describe)