District Course Syllabus

A district course syllabus is a legal document that informs teachers of the standards, scope and sequence, assessments and materials expected of that course. Its audience is usually school and district personnel and the Minnesota Department of Education. Organizations such as the NCAA, post-secondary institutions and school districts nationwide also rely on district syllabi to assess the rigor and credit-worthiness of a course.

Course Title: Physical Science 6

Course Number: S306001

Prerequisite(s): None

Subject Area: Science

Grade(s): 6

Course Mapping: S- Science

Course Length:
36 weeks (36 weeks of content taught every day for a school year)

License Type Required:
Science 5-8 (130600) OR Science 5-9 (130500)

Standards Addressed:
Minnesota K-12 Academic Standards in Science (2009)

Course Description:
Physical Science 6 is a year-long physical science course that covers basic middle school physics and chemistry concepts as well as the engineering design process and the nature of science. Students learn about the properties of matter, how materials and atoms interact in a physical change, types of energy, waves, light, forces and motion. Students use observations, laboratory investigations, and problem solving to analyze and understand the science of everyday physics and chemical phenomena. This laboratory course prepares students for Life Science 7 or Accelerated Science 7.

Content or instructional materials needed to teach this course:
Interactive Science: Light and Sound, Pearson, 2011
Interactive Science: Forces and Energy, Pearson, 2011
Interactive Science: Introduction to Chemistry, Pearson, 2011

Discovery Techbook: Discovery Education (digital curriculum)

The needs of English Language Learners will be addressed in this course by:
Video and Discovery Techbook that are part of the adopted materials should be used to present and supplement learning of science concepts with out a text. Hands on labs, classroom discussions, and reflections will also be used to help students create an understanding of a science concept. When possible, reading selections will be differentiated to accommodate varied reading levels. Multiple modes of learning will be incorporated.

The needs of students receiving Special Education Services will be addressed in the course by:
Collaborate with specialist staff members to adapt instruction according to Individual Educational Plans (IEP). Possible areas of accommodation may include: use of video and Discovery Techbook, hands on labs, classroom discussions, and reflections to help students create a deeper understanding of a science concept. When possible, reading selections will be differentiated to accommodate varied reading levels. Multiple modes of learning will be incorporated.

The needs of students who need acceleration will be addressed in this course by:
Possible areas of accommodation may include: use of video and Discovery Techbook, hands on labs, classroom discussions, and reflections to help students create a deeper understanding of a science concept. When possible, reading selections will be differentiated to accommodate varied reading levels. Multiple modes of learning will be incorporated.

Racial equity and culturally relevant teaching will be addressed in this course by:

1. In science we elicit, then build on prior knowledge. Daily instruction is built around scientific questions and engineering challenges that are meaningful and relevant to the students with whom we work. Understanding is constructed together rather than delivered from teacher to student.
2. A guiding question should be used daily to focus the lesson and student learning.
    a. Question should use student friendly language
    b. Question should be reflective of students' background and interests
    c. Students should be provided with multiple pathways to explore the guiding question
3. Communicate clear and specific expectations in what you expect students to know and be able to do
4. Create an environment in which there is genuine respect for students and a belief in their capability
    a. Encourage students to meet expectations for a particular task
    b. Offer praise when standards are met
5. Vary teaching strategies
    a. Use cooperative learning especially for material new to the students
    b. Assign independent work after students are familiar with concept
    c. Use role-playing strategies
    d. Assign students research projects that focus on issues or concepts that apply to their own community or cultural group
    e. Provide various options for completing an assignment
6. Create inquiry based/discovery oriented curriculum
7. Use resources other than textbooks for study
8. Develop learning activities that are more reflective of students' backgrounds
9. Vary teaching approaches to accommodate diverse learning styles and language proficiency.

Integrated learning using technology will be fully utilized by:
Student and teachers will have access to *Discovery Techbook* resources online via iPads. Students will use measurement/data-gathering equipment and Internet resources. Where appropriate and available, students and teachers should use electronic sensors and probes, computer simulations, multi-media presentations and electronic whiteboards.

Scope and Sequence

Quarter 1

UNIT: SAFETY, RITUALS, AND ROUTINES
Timing Guide: 1 week
This unit addresses benchmark:

6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a physical science context.

Formative and a summative assessment should be used. Possible instructional strategies that can be used include: Pair share, small group and whole class discussion, modeling, and teacher questioning.

UNIT: NATURE OF SCIENCE AND ENGINEERING
Timing Guide: 2 weeks
(plus 3 weeks of Nature of Science and Engineering embedded during the year)
This unit addresses benchmarks:

6.1.2.1.1 Identify a common engineered system and evaluate its impact on the daily life of humans. For example: Refrigeration, cell phone or automobile.
6.1.2.1.2 Recognize that there is no perfect design and that new technologies have consequences that may increase some risks and decrease others. For example: Seat belts and airbags.
6.1.2.1.3 Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.
6.1.2.1.4 Explain the importance of learning from past failures, in order to inform future designs of similar products or systems. For example: Space shuttle or bridge design.
6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

Review Grade 5 and preview Grade 7 Nature of Science and Engineering Benchmarks throughout the year.

Formative and summative assessments, as well as labs should be used to assess students' progress. Possible instructional strategies that can be used include: Inquiry activities; pair share, small group and whole class discussion; modeling; labs; and teacher questioning.

UNIT: MATTER AND ENERGY
Timing: 12 weeks
(6 weeks in Qtr 1 and 6 weeks in Qtr 2)
This unit addresses benchmarks:

6.2.1.1.1 Explain density, dissolving, compression, diffusion and thermal expansion using the particle model of matter.
6.2.1.2.1 Identify evidence of physical changes, including changing phase or shape, and dissolving in other materials.
6.2.1.2.2 Describe how mass is conserved during a physical change in a closed system. For example: The mass of an ice cube does not change when it melts.
6.2.1.2.3 Use the relationship between heat and the motion and arrangement of particles in solids, liquids and gases to explain melting, freezing, condensation and evaporation.
6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. For example: A bicycle, light bulb or automobile.
6.2.3.2.3 Describe how heat energy is transferred in conduction, convection and radiation.
6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
6.1.3.1.2 Distinguish between open and closed systems. For example: Compare mass before and after a chemical reaction that releases a gas in sealed and open plastic bags.
6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.
6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

Formative and summative assessments, as well as labs should be used to assess students' progress. Possible instructional strategies that can be used include: Inquiry activities; pair share, small group and whole class discussion; modeling; labs; and teacher questioning.

<u>Quarter 2</u>

UNIT: MATTER AND ENERGY - Continued
Timing: 12 weeks
(6 weeks in Qtr 1 and 6 weeks in Qtr 2)
This unit addresses benchmarks:

6.2.1.1.1 Explain density, dissolving, compression, diffusion and thermal expansion using the particle model of matter.
6.2.1.2.1 Identify evidence of physical changes, including changing phase or shape, and dissolving in other materials.
6.2.1.2.2 Describe how mass is conserved during a physical change in a closed system. For example: The mass of an ice cube does not change when it melts.
6.2.1.2.3 Use the relationship between heat and the motion and arrangement of particles in solids,

liquids and gases to explain melting, freezing, condensation and evaporation.
6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. For example: A bicycle, light bulb or automobile.
6.2.3.2.3 Describe how heat energy is transferred in conduction, convection and radiation.
6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
6.1.3.1.2 Distinguish between open and closed systems. For example: Compare mass before and after a chemical reaction that releases a gas in sealed and open plastic bags.
6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.
6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

Formative and summative assessments, as well as labs should be used to assess students' progress. Possible instructional strategies that can be used include: Inquiry activities; pair share, small group and whole class discussion; modeling; labs; and teacher questioning.

UNIT: MOTION AND ENERGY
Timing: 11 weeks
(3 weeks in Qtr 2 and 8 weeks in Qtr 3)
This unit addresses benchmarks:

6.2.2.1.1 Measure and calculate the speed of an object that is traveling in a straight line.
6.2.2.1.2 For an object traveling in a straight line, graph the object's position as a function of time, and its speed as a function of time. Explain how these graphs describe the object's motion
6.2.2.2.1 Recognize that when the forces acting on an object are balanced, the object remains at rest or continues to move at a constant speed in a straight line, and that unbalanced forces cause a change in the speed or direction of the motion of an object.
6.2.2.2.2 Identify the forces acting on an object and describe how the sum of the forces affects the motion of the object. For example: Forces acting on a book on a table or a car on the road.
6.2.2.2.3 Recognize that some forces between objects act when the objects are in direct contact and others, such as magnetic, electrical, and gravitational forces can act from a distance.
6.2.2.2.4 Distinguish between mass and weight.
6.2.3.2.1 Differentiate between kinetic and potential energy and analyze situations where kinetic energy is converted to potential energy and vice versa.
6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. For example: A bicycle, light bulb or automobile.
6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
6.1.3.1.2 Distinguish between open and closed systems. For example: Compare mass before and after a chemical reaction that releases a gas in sealed and open plastic bags.

6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.
6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

Formative and summative assessments, as well as labs should be used to assess students' progress. Possible instructional strategies that can be used include: Inquiry activities; pair share, small group and whole class discussion; modeling; labs; and teacher questioning.

<u>**Quarter 3**</u>

UNIT: MOTION AND ENERGY - Continued
Timing: 11 weeks
(3 weeks in Qtr 2 and 8 weeks in Qtr 3)
This unit addresses benchmarks:

6.2.2.1.1 Measure and calculate the speed of an object that is traveling in a straight line.
6.2.2.1.2 For an object traveling in a straight line, graph the object's position as a function of time, and its speed as a function of time. Explain how these graphs describe the object's motion
6.2.2.2.1 Recognize that when the forces acting on an object are balanced, the object remains at rest or continues to move at a constant speed in a straight line, and that unbalanced forces cause a change in the speed or direction of the motion of an object.
6.2.2.2.2 Identify the forces acting on an object and describe how the sum of the forces affects the motion of the object. For example: Forces acting on a book on a table or a car on the road.
6.2.2.2.3 Recognize that some forces between objects act when the objects are in direct contact and others, such as magnetic, electrical, and gravitational forces can act from a distance.
6.2.2.2.4 Distinguish between mass and weight.
6.2.3.2.1 Differentiate between kinetic and potential energy and analyze situations where kinetic energy is converted to potential energy and vice versa.
6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. For example: A bicycle, light bulb or automobile.
6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
6.1.3.1.2 Distinguish between open and closed systems. For example: Compare mass before and after a chemical reaction that releases a gas in sealed and open plastic bags.
6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.
6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

Formative and summative assessments, as well as labs should be used to assess students' progress.

Possible instructional strategies that can be used include: Inquiry activities; pair share, small group and whole class discussion; modeling; labs; and teacher questioning.

__Quarter 4__

UNIT: WAVES AND ENERGY (LIGHT AND SOUND)
Timing: 6 weeks
This unit addresses benchmarks:

6.2.3.1.1 Describe properties of waves, including speed, wavelength, frequency and amplitude.
6.2.3.1.2 Explain how the vibration of particles in air and other materials results in the transfer of energy through sound waves.
6.2.3.1.3 Use wave properties of light to explain reflection, refraction and the color spectrum.
6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. For example: A bicycle, light bulb or automobile.
6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
6.1.3.1.2 Distinguish between open and closed systems. For example: Compare mass before and after a chemical reaction that releases a gas in sealed and open plastic bags.
6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.
6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

During this unit, revisit 6.2.1.1.1 Explain density, dissolving, compression, diffusion and thermal expansion using the particle model of matter.

Formative and summative assessments, as well as labs should be used to assess students' progress. Possible instructional strategies that can be used include: Inquiry activities; pair share, small group and whole class discussion; modeling; labs; and teacher questioning.

UNIT: ENGINEERING
Timing: 1 week
This unit addresses benchmarks:

6.1.2.1.1 Identify a common engineered system and evaluate its impact on the daily life of humans. For example: Refrigeration, cell phone, or automobile.
6.1.2.1.2 Recognize that there is no perfect design and that new technologies have consequences that may increase some risks and decrease others. For example: Seat belts and airbags.
6.1.2.1.3 Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.
6.1.2.1.4 Explain the importance of learning from past failures, in order to inform future designs of similar products or systems. For example: Space shuttle or bridge design.

6.1.2.2.1 Apply and document an engineering design process that includes identifying criteria and constraints, making representations, testing and evaluation, and refining the design as needed to construct a product or system to solve a problem. For example: Investigate how energy changes from one form to another by designing and constructing a simple roller coaster for a marble.
6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
6.1.3.1.2 Distinguish between open and closed systems. For example: Compare mass before and after a chemical reaction that releases a gas in sealed and open plastic bags.
6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.
6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

Other information about this course:
This course uses inquiry activities in an experimental setting, with strong emphasis on the content and the process of science and the engineering design cycle. Students will explore scientific concepts through group and individual work. Activities may include hands-on activities, modeling, projects, scientific investigations, real-world observations, data collection, data analysis and presentations.