St. Lucie County Public Schools Chemistry Scope and Sequence 2012-2013

Course: 8th Grade/Comp.Sci.III **Course Code: 2002100** **Quarter: 3**

RESOURCES **COMMON CORE** **SCIENCE CENTER** **PACING GUIDE**

Topic(s) of Study: Galaxies and Stars and Sun-Earth-Moon Systems
Bodies of Knowledge: Earth and Space Science
Big Idea(s): Earth in Space and Time
Essential Questions: What makes up the universe? **(2-1)** What are the properties of stars? **(2-2)** How have people modeled the solar system? **(3-1)** Why is gravity important in the solar system? **(3-2)** What are the properties of the sun? **(3-3)** What is known about the terrestrial planets? **(3-4)** What is known about the gas giant planets? **(3-5)** What is in the solar system besides the sun, planets, and moons? **(3-6)**

Vocabulary: solar system, galaxy, planet, light-year, star, universe, star, luminosity, apparent magnitude, absolute magnitude parallax, heliocentric, geocentric, gravity, perihelion, planetesimal, orbit, centripetal force, aphelion, solar nebula, nuclear fusion, solar flare, sunspot, prominence, terrestrial planet, astronomical unit, gas giant, planetary ring, dwarf planet, comet, meteoroid, Kuiper belt, Oort cloud, meteor, Kuiper Belt object, asteroid, meteorite

Common Inquiry Labs:

- **SC. 8.E.5.2**-Modeling Galaxies Fusion Lab Manual pg. 62**(2-1)**
- **SC. 8.E.5.3**-Modeling Galaxies Fusion Lab Manual pg. 64**(2-1)**
- **SC. 8.E.5.5**-Modeling Star Magnitudes Fusion Lab Manual pg. 66**(2-2)**
- **SC.8.E.5.3-**Exploring the Relationship between Mass and Shape Fusion Manual pg. 80**(2-2)**
- **SC.8.E.5.8**-Geocentric Model of the Solar System Fusion Manual pg. 109**(3-1)**
- **SC.8.E.5.4**-Gravity's Effect Fusion Manual pg. 117**(3-2)**
- **SC.8.E.5.6**-Model Solar Composition Fusion Manual pg. 123**(3-3)**
- **SC.8.E.5.7**-Weights on Different Celestial Bodies Manual pg. 154**(3-3)**
- **SC. 8.E.5.1**-Schoolyard Solar System Fusion Lab Manual pg. 133**(3-4)**

NGSSS	Outline of Content (Concept)	Target
SC.8.E.5.3 Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar systems, galaxy and universe, including distance, size and composition. (2-1)(3-3) (3-4)(3-5)(3-6) **SC.8.E.5.1** Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand distance. (2-1) **Complexity: Moderate** **SC.8.E.5.2** Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars. (2-1)	**Unit 2 Lesson 1 (E5.1, E5.2, E5.3)** **Structure of the Universe** **Solar System and Planets** 1. Define solar system 2. Define planets 3. Describe the sizes of the planets 4. Explain the differences in composition of planets **Stars and Galaxies** 1. Define star. 2. Describe the sizes and composition of stars 3. Define Galaxy 4. Describe the sizes and composition of galaxies **Structure and Size of the Universe** 1. Define universe 2. Describe the composition of the universe 3. Define light-year. 4. Describe the scale distance in the universe. 5. Describe the enormous amounts of time it takes spacecraft to	• Identify and construct models of the arrangement of the planets in orbit around the Sun, the relative size of the planets and the relative distance between the planets by having students create scaled models of our solar system in various ways. • Identify characteristics of planets in the solar system, including order and distance from the sun, size, composition, number of moons, atmosphere, and unique features by having students chose an object or planet in our solar system to present to the class. • Compare and contrast the historical models of the Solar System by having students present the different models

Complexity: Low **Complexity: High** **SC.8.E.5.5** Describe and classify specific physical properties of stars; apparent magnitude (brightness), temperature (color), luminosity (absolute brightness). (2-2) **Complexity: Moderate** **SC.8.E.5.8** Compare various historical models of the solar system, including geocentric and heliocentric. (3-1) **Complexity: Moderate** **SC.8.E.5.4** Explore the law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar system and in determining their motions (3-2) **Complexity: High** **SC.8.E.5.6** Create models of solar properties including: rotation, structure of the sun, convection, sunspots, solar flared, and prominences. (3-4) **Complexity: Low** **SC.8.E.5.7** Compare and contrast the properties of objects in the solar system including the sun, planets, and moons to those of Earth, such as gravitational force, distance from the sun, speed, movement, temperature, and atmospheric conditions. (3-4) (3-5)(3-6) **Complexity: Moderate** **LA.8.2.2.3** The student will organize information to show understanding or relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing,	travel long distances. **<u>Unit 2 Lesson 2 (E5.5)</u>** **<u>Stars</u>** **Stars** 1. Define star. 2. Identify the different types of star systems **Brightness and Luminosity** 1. Describe the way in which astronomers the brightness of stars 2. Define luminosity 3. Describe the way in astronomers measure the luminosity of stars. **Temperature and Size** 1. Analyze the way in which astronomers use color to determine the surface temperature of stars. 2. Describe the way in which astronomers use the sun as a yardstick to measure the size of stars. 3. Compare the size of the sun to the size of other stars. **<u>Unit 3 Lesson 1 (E5.8)</u>** **<u>The Solar System</u>** **Historical Models of the Solar System** **Solar System Overview** 1. Define solar system 2. Define geocentric and heliocentric **Early Theories** 1. Describe Aristotle's explanation of the universe and how Aristarchus' view of the solar system differed from Aristotle. 2. Define parallax and explain the "parallax problem." **A Heliocentric Model** 1. Explain the contributions of Copernicus, Kepler, and Galileo to the heliocentric model of the solar system. **<u>Unit 3 Lesson 2 (E5.4)</u>** **<u>Gravity and the Solar System</u>** **Gravity Overview** 1. Define gravity **The Laws of Planetary Motion** 1. State Kepler's first, second, and third laws of planetary motion.	of the solar system throughout history. • Relates discoveries made by scientists to our modern day understanding of the universe (e.g. Copernicus, Kepler, Galileo, Newton and Einstein) by citing contributions of scientists. • Explores the reasons why scientists use light years and Astronomical Units to measure distance in space by having students report the measurements in more commonly used units (e.g. miles) for comparison. • Identify the sun as one of many stars in our galaxy • Identify the location of our solar system in the Milky Way galaxy through classroom discussion while using various media (e.g. pictures, video clips, books, etc.) to create a reasonable representation of the location • Describe the Big Bang Theory and universal expansion by using a video clip of the red shift and creating a model of the expanding universe. • Identify similarities in the age, brightness, size, temperature, chemical elements, and distance of stars within the Milky Way Galaxy by creating a data table • Identify characteristics of stars using the Hertzsprung-Russell (HR) diagram by looking at specific stars within the chart • Understand the classification of stars and how they evolve

summarizing or comparing/contrasting.(2-1)(3-1)(3-2)(6-6) **MA.6.A.3.6** Construct and analyze tables, graphs, and equations to describe linear functions and other simple relationships using both common language and algebraic notation. (3-3)	**Universal Gravitation** 1. State Newton's law of universal gravitation. 2. Define centripetal force. **Formation of the Solar System** 1. Describe the formation of the solar system. **Unit 3 Lesson 3 (E5.6, E5.7)** **The Sun** **Composition and Structure** 1. Describe the sun's composition. 2. Describe the sun's structure **The Sun's Energy** 1. Explain how the sun produces energy 2. Define nuclear fusion. 3. Define convection. 4. Identify where convection takes place in the sun. **Rotation** 1. Define differential rotation. 2. Explain what is different about th sun's rotation.. **Sunspots, Solar Flares and Prominences** 1. Define sunspot, solar flare, and prominence. **Unit 3 Lesson 4 (E5.7)** **The Terrestrial Planets** **Mercury** 1. Define terrestrial planet and identify some general physical properties 2. Describe the physical properties of Mercury. **Venus** 1. Describe the physical properties of Venus. 2. Explain the difference between prograde and retrograde rotation. **Earth** 1. Describe the physical properties of Earth. **Mars** 1. Describe the physical properties of Mars.	by using the HR diagram and a timeline to chart the life and death of a star • Describe the gas components and life cycle of stars within the Milky Way Galaxy by constructing a timeline for the life of our sun as a class • Describe characteristics of other galaxies beyond the Milky Way by creating a class list of characteristics through a collaborative effort • Distinguish between absolute and apparent magnitude by comparing and contrasting the apparent and absolute magnitudes of Betelgeuse and Sirius • Give examples of how advances in technology have affected scientific theories and laws by comparing primitive and modern telescopes and how our understanding of stars has changed • Describe the creative means scientists must use to design an investigation by exploring ways scientists have collected data about stars • Identify properties that are common to all hydrogen-burning stars (fusion and chemical composition) and properties that may differ (temperature, brightness, and distance from Earth, age, and size) by having students report to the class on a star of their choice • Give examples of visual/physical, mathematical, and conceptual models as used in science by using the HR

	Unit 3 Lesson 5 (E5.7) **The Gas Giant Planets** **Jupiter** 1. Define gas giant planet and identify some physical properties. 2. Describe the physical properties of Jupiter **Saturn** 1. Describe the physical properties of Saturn **Uranus** 1. Describe the physical properties of Uranus **Neptune** 1. Describe the physical properties of Neptune **Unit 3 Lesson 6 (E5.3)** **Small Bodies in the Solar System** **Dwarf Planets** 1. Define dwarf planet 2. Describe the composition, size and speed of dwarf planets and where they are located. **Kuiper Belt Objects, Comets and the Oort Cloud** 1. Define and describe the Kuiper Belt and the Kuiper Belt objects, including comets. 2. Define and describe the Oort cloud. **Asteroids** 1. Define and describe an asteroid **Meteors** 1. Define and describe meteoroids, meteors, and meteorites	diagram as an example (C3). • Create one, two or three dimensional models of solar properties. (D • Distinguish between laws and theories by understanding that laws describe *the what* and theories explain *the why* by comparing and contrasting using a Venn diagram of the Law of Universal Gravitation and Einstein's Theory of Gravity • Explain that the greater the mass of an object, the greater the gravitational force by constructing a data table of the different masses of planets and their gravitational accelerations • Explain why the planets stay in orbit around the sun and satellites stay in orbit around their planets by having students watch various media and then having a class discussion on the Law of Universal Gravitation • Compare the different orbital paths of objects in the solar system (i.e., effects of gravitational forces) by constructing a model of the solar system including the sun, a moon, a planet, a comet and an asteroid etc • Explores the effects on Earth from sunspots, solar flares and other solar activities by having students do a web quest on the above effects (