

## Treasure Coast Science Scope and Sequence 2012-2013

Course: Earth and Space Science

Course Code: 2001310

Quarter:4A

**Topic(s) of Study** History of Astronomy

**Bodies of Knowledge:** Earth and Space, Nature of Science

**Standard(s):** 7: Earth Systems and Pattern,

**Essential Questions:** Why has it always been a struggle for scientists to convince people of new astronomical findings? How has various aspects of Floridians lifestyles been affected by space exploration? How can future space exploration be economically and scientifically justified? How do scientists design an investigation to answer a scientific question and communicate their

[Concept Map\(s\): Click here](#)

[Resources: Click here](#)

[Syllabus: Click here](#)

[CCSS Literacy Standards: Click here](#)

NGSSS	OUTLINE OF CONTENT (CONCEPT/SKILLS)	TARGETS
SC.912.E.5.1 Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe. Cognitive Complexity: High	I Astronomy vs. Astrology A. Early astronomers 1. Greeks 2. Egyptians 3. Chinese 4. Ptolemy a. Geocentric model	<ul style="list-style-type: none"> <li>Differentiate between astronomy and astrology.(I)</li> <li>Assess the methods used by early astronomers to study the stars without the availability of modern tools (I)</li> <li>Hypothesis the units used to calculate distance in space. (I)</li> </ul>
SC.912.E.5.2 Identify patterns in the organization and distribution of matter in the universe and the forces that determine them. Cognitive Complexity: Moderate	B. Modern astronomers 1. Copernicus 2. Heliocentric model 3. Brahe 4. Kepler a. Laws of planetary motion	<ul style="list-style-type: none"> <li>Differentiate between the geocentric and heliocentric models of Ptolemy and Copernicus (I)</li> <li>Connect Galileo’s observations with traditional beliefs and assess his theory’s impact on modern society (I)</li> <li>Assess the impact of Kepler and Newton on modern astronomy and physics (I)</li> </ul>
SC.912.E.5.7 Relate the history of and explain the justification for future space exploration and continuing technology development. Cognitive Complexity: Moderate	5. Galileo a. Observation b. Conflict with church	<ul style="list-style-type: none"> <li>Critique the impact of Brahe, Einstein and Hawking’s work on modern astronomy (I)</li> <li>Rationalize the theories depicting the origin of our solar system and the universe (II)</li> </ul>
SC.912.E.5.8 Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools. Cognitive Complexity: Moderate	6. Newton 7. Einstein 8. Hawking II The Big Bang Theory is a possible explanation of the origin of the universe	<ul style="list-style-type: none"> <li>Investigate the evidence that supports the Big Bang Theory (II)</li> <li>Conclude the universe is expanding based on scientific observations (II)</li> </ul>
SC.912.E.5.9 Analyze the broad effects of space exploration on	A. Red Shift B. Expanding universe	<ul style="list-style-type: none"> <li>Investigate the evidence that supports the existence of dark</li> </ul>

## Treasure Coast Science Scope and Sequence 2012-2013

<p>the economy and culture of Florida Cognitive Complexity: Moderate</p> <p>SC.912.E.5.11 Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations. Cognitive Complexity: High</p> <p>SC.912.P.12.4 Describe how the gravitational force between two objects depends on their masses and the distance between them. Cognitive Complexity: Moderate</p> <p>SC.912.N.4.1 Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. Cognitive Complexity: Moderate</p>	<p>C. Cosmic background radiation D. Ripples in space</p> <p>III Universe Composition A. Dark matter B. Dark energy</p> <p>IV Formation of the Solar System A. The Nebular Hypothesis B. Interstellar clouds C. Formation of the planets</p> <p>V Studying Space form Space A. Space Telescopes     1. Hubble Space Telescope     2. Chandra X-Ray Observatory     3. Compton Gamma Ray Observatory     4. Spitzer Spade Telescope     5. James Webb Space Telescope B. Spacecraft C. Human exploration D. Remote Sensing</p> <p>VI The Space Race A. Cold War B. Sputnik I C. Kennedy</p> <p>VII The Space Program A. Florida B. The Apollo program C. The Space Transportation System (STS) and the Space Shuttle</p>	<p>matter(III)</p> <ul style="list-style-type: none"> <li>• Differentiate between dark energy and dark matter (III)</li> <li>• Explain the universe expansion theory and describe evidence supporting it (IV)</li> <li>• Distinguish various methods of studying space (V)</li> <li>• Determine the benefits of analyzing space from space (V)</li> <li>• Describe methods used by space telescopes and other instruments to study space (V)</li> <li>• Identify some unmanned spacecraft and describe their primary missions</li> <li>• Debate the pros and cons of human space exploration (V)</li> <li>• Recognize common benefits of Remote Sensing Satellites (RSS) (V)</li> <li>• Connect the political events that led to the 'space race' (VI)</li> <li>• Investigate the geophysical factors that enable Florida to be prominent in the space program. (VII)</li> <li>• Differentiate between the space shuttle program and the Apollo program. (VII)</li> <li>• Hypothesize why the constellation program was cancelled and deduce the impact of the cancellation on the economy and the future human space flight ventures. (VII)</li> <li>• Formulate benefits of space programs (VII, IX)</li> <li>• Analyze the impact of the space program on Florida's economy VII, (VIII)</li> <li>• Hypothesize the conditions that a planet would have to possess in order for life, as we know it, to evolve on the planet (X)</li> <li>• Argue recent evidence that encourages scientists to further explore Mars (X)</li> <li>• Theorize why scientists have selected the Mares, Europa and Titan as prospects for life in our solar system (X)</li> </ul>
--	---	--

## Treasure Coast Science Scope and Sequence 2012-2013

	<p>VIII Florida and the Space Program</p> <ul style="list-style-type: none"><li>A. Kennedy Space Center</li><li>B. Economic impact</li><li>C. Weather satellites</li><li>D. Communication satellites</li><li>E. Intelligence satellites</li></ul> <p>IX Benefits of the Space Program</p> <ul style="list-style-type: none"><li>A. Advances in Technology</li><li>B. National defense</li><li>C. Space weather forecasting</li><li>D. Spinoffs</li><li>E. Scientific advances</li><li>F. The future of Florida's Space Program</li></ul> <p>X Search for Life Beyond Earth</p> <ul style="list-style-type: none"><li>A. Conditions likely necessary for life to exist</li><li>B. The Drake Equation</li><li>C. Solar System Extra Solar Systems</li></ul>	<ul style="list-style-type: none"><li>• Identify techniques used to detect extra solar planets (IX, X)</li><li>• Analyze the Drake equation and argue the potential existence of life in the universe (IX, X)</li><li>• Argue the implication of finding other life in the universe to political, theological, and economical beliefs. (X)</li></ul>
--	---	--

## Treasure Coast Science Scope and Sequence 2012-2013

Course: **Anatomy and Physiology Honors**

Course Code: **2000360**

Quarter: **4B**

**Topic(s) of Study:** Urinary System

**Bodies of Knowledge:** Nature of Science and Life Science

**Standard(s):** 1: Practice of Science, 14: Organization and Development of Living Organisms

**Essential Questions:** How does the urinary system filter blood? What diseases are associated with this system? What are the factors that can affect personal and public health? How do scientists design an investigation to answer a scientific question and communicate their findings?

[Concept Map\(s\): Click here](#)

[Resources: Click here](#)

[Click here](#)

[Syllabus: Click here](#)

[CCSS Literacy Standards:](#)

NGSSS	OUTLINE OF CONTENT (CONCEPT/SKILLS)	TARGETS
<p>SC.912.L.14.47: Describe the physiology of urine formation by the kidney. Cognitive Complexity: Moderate</p> <p>SC.912.L.14.48: Describe the anatomy, histology, and physiology of the ureters, the urinary bladder and the urethra. Cognitive Complexity: Moderate</p> <p>SC.912.L.14.6: Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health. Cognitive Complexity: High</p> <p>SC.912.N.1.1: Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:</p> <p>1.pose questions about the natural world, 2.conduct systematic observations, 3.examine books and other sources of information</p>	<p>I Kidney Anatomy</p> <p>A. Location and External Anatomy</p> <p>B. Internal Anatomy</p> <p>C. Blood and Nerve Supply</p> <p>D. Nephrons</p> <p>II Kidney Physiology: Mechanisms of Urine Formation</p> <p>A. Step 1: Glomerular Filtration</p> <p>B. Step 2: Tubular Reabsorption</p> <p>C. Step 3: Tubular Secretion</p> <p>D. Regulation of Urine Concentration and Volume</p> <p>E. Renal Clearance</p> <p>III Urine</p> <p>A. Physical Characteristics</p> <p>B. Chemical Composition</p> <p>IV Ureters</p> <p>V Urinary Bladder</p>	<ul style="list-style-type: none"> <li>• Describe the gross anatomy of the kidney and its coverings. (I)</li> <li>• Trace the blood supply through the kidney. (I)</li> <li>• Describe the anatomy of a nephron. (I)</li> <li>• Describe the forces (pressures) that promote or counteract glomerular filtration. (II)</li> <li>• Compare the intrinsic and extrinsic controls of the glomerular filtration rate. (II)</li> <li>• Describe the mechanisms underlying water and solute reabsorption from the renal tubules into the peritubular capillaries. (II)</li> <li>• Describe how sodium and water reabsorption is regulated in the distal tubule and collecting duct. (II)</li> <li>• Describe the importance of tubular secretion and list several substances that are secreted. (II)</li> <li>• Describe the mechanisms responsible for the medullary osmotic gradient. (II)</li> <li>• Explain formation of dilute versus concentrated urine. (II)</li> <li>• Define renal clearance and explain how this value summarizes the way a substance is handled by the kidney. (II)</li> <li>• Describe the normal physical and chemical properties of urine. (III)</li> </ul>

## Treasure Coast Science Scope and Sequence 2012-2013

<p>to see what is already known,          4.review what is known in light of empirical evidence,          5.plan investigations,          6.use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs),          7.pose answers, explanations, or descriptions of events,          8.generate explanations that explicate or describe natural phenomena (inferences),          9.use appropriate evidence and reasoning to justify these explanations to others,          10.communicate results of scientific investigations, and          11.evaluate the merits of the explanations produced by others. Cognitive Complexity: High</p> <p>HE.912.C.1.4: Analyze how heredity and family history can impact personal health</p>	<p>VI Urethra</p> <p>VII Micturition</p> <p>VIII Developmental Aspects of the Urinary System</p> <p>IX Body Fluids</p> <p style="padding-left: 20px;">A. Body Water Content</p> <p style="padding-left: 20px;">B. Fluid Compartments</p> <p style="padding-left: 20px;">C. Composition of Body Fluids</p> <p style="padding-left: 20px;">D. Fluid Movement Among Compartments</p> <p>X Water Balance and ECF Osmolality</p> <p style="padding-left: 20px;">A. Water Intake= Water Output</p> <p style="padding-left: 20px;">B. Regulation of Water Intake</p> <p style="padding-left: 20px;">C. Regulation of Water Output</p> <p style="padding-left: 20px;">D. Influence of ADH</p> <p style="padding-left: 20px;">E. Disorders of Water Balance</p> <p>XI Electrolyte Balance</p> <p>XII Acid-Base Balance</p> <p>XIII Developmental Aspects of Fluid, Electrolyte, and Acid-Base Balance</p>	<ul style="list-style-type: none"> <li>• List several abnormal urine components, and name the condition characterized by the presence of detectable amounts of each. (III)</li> <li>• Describe the general location, structure, and function of the ureters. (IV)</li> <li>• Describe the general location, structure, and function of the urinary bladder. (V)</li> <li>• Describe the general location, structure, and function of the urethra. (VI)</li> <li>• Compare the course, length, and functions of the male urethra with those of the female. (VI)</li> <li>• Define micturition and describe its neural control. (VII)</li> <li>• Trace the embryonic development of the urinary organs. (VIII)</li> <li>• List several changes in urinary system anatomy and physiology that occur with age. (VIII)</li> <li>• List the factors that determine body water content and describe the effect of each factor. (IX)</li> <li>• Indicate the relative fluid volume and solute composition of the fluid compartments of the body. (IX)</li> <li>• Contrast the overall osmotic effects of electrolytes and nonelectrolytes. (IX)</li> <li>• Describe factors that determine fluid shifts in the body. (IX)</li> <li>• List the routes by which water enters and leaves the body. (X)</li> <li>• Describe feedback mechanisms that regulate water intake and hormonal controls of water output in urine. (X)</li> <li>• Explain the importance of obligatory water losses. (X)</li> <li>• Describe possible causes and consequences of dehydration, hypotonic hydration, and edema. (X)</li> <li>• Indicate routes of electrolyte entry and</li> </ul>
---	--	--

## Treasure Coast Science Scope and Sequence 2012-2013

		<p>loss from the body. (XI)</p> <ul style="list-style-type: none"><li>• Describe the importance of ionic sodium in fluid and electrolyte balance of the body, and indicate its relationship to normal cardiovascular system functioning. (XI)</li><li>• Describe mechanisms involved in regulating sodium balance, blood volume, and blood pressure. (XI)</li><li>• Explain how potassium, calcium, and anion balances in plasma are regulated. (XI)</li><li>• List important sources of acids in the body. (XII)</li><li>• Name the three major chemical buffer systems of the body and describe how they resist pH changes. (XII)</li><li>• Describe the influence of the respiratory system on acid-base balance. (XII)</li><li>• Describe how the kidneys regulate hydrogen and bicarbonate ion concentrations in the blood. (XII)</li><li>• Distinguish between acidosis and alkalosis resulting from respiratory and metabolic factors. (XII)</li><li>• Describe the importance of respiratory and renal compensations to acid-base balance. (XII)</li><li>• Explain why infants and the aged are at greater risk for fluid and electrolyte imbalances than are young adults. (XIII)</li><li>• Define a scientific problem or question based on the specific body of knowledge correlated to the anatomy and physiology honors science course.</li></ul>
--	--	--

# Treasure Coast Science Scope and Sequence 2012-2013