

## **High School General Science**

### **Guidelines for Human Sexuality Education**

**Based on the understanding that human sexuality education is a right and responsibility of parents, teachers whose curricular material includes human sexuality content are obligated to work together with parents to ensure that parents know what is being taught to their children and how it is being covered.**

**In High School General Science, some curricular areas address human sexuality education. Please keep the parents of your students informed about the timeline of topics relating to human sexuality in your curriculum.**

**Please consult with your principal and/or pastor to determine the local directives on parental collaboration that are aligned with directives outlined in the May 4, 2011 letter from Bishop William Patrick Callahan. A copy of that letter can be found in the front pocket of this curriculum binder.**

**Standard A:** Science Connections that reveal God’s creation

<b>DIOCESAN REQUIREMENTS</b>
<b>CONCEPTS, SKILLS, &amp; CATHOLIC FAITH CONNECTIONS</b>
1. Understand how themes are used to organize and enlarge knowledge (eg. systems, order, organization, interactions, constancy, change, evolution, equilibrium, energy, form & function)
2. Connect and integrate themes to what students know about themselves and the world around them.
3. Make reasonable predictions (hypotheses) that are supported by observations and/or prior knowledge.
4. Evaluate how past theories have influenced present ones and how present theories may develop future ones.

<b>LOCAL LEVEL SCHOOL ELEMENTS</b>					
Text/Unit Alignment	Quarter / Date Taught				
	1	2	3	4	Assessment

<b>RELIGIOUS RESOURCES</b>	<b>COMMON CORE STANDARDS</b>
<p><b>DRC: Social Teaching I Principles of Catholic Social Teaching B.</b> God is the source of civil authority  <b>CCC: 159</b> The same God who reveals mysteries and infuses faith bestows reason  <b>CCC: 2294</b> Science &amp; technology are at the service of the human person</p> <p><b>United States Catholic Conference of Bishops (USCCB)</b>  <a href="http://www.usccb.org/">http://www.usccb.org/</a>                      departments – environmental justice &amp; domestic social development</p> <p>Catholic News Service  <a href="http://www.ncregister.com">http://www.ncregister.com</a>                      news coverage of all things Catholic</p> <p><b><u>ACTIVITY</u></b>                      Research how St. Thomas Aquinas synthesized the work of Aristotle into modern scientific thought.</p>	<p><b>Earth and Space Science</b>                      Core Idea 2: Earth is a complex and dynamic 4.6 billion-year-old system of rock, water, air, and life.                      A. Continental drift, plate tectonics, and earth’s internal heat                      B. Earth’s materials                      C. Earth’s history</p> <p><b>Engineering and Technology</b>                      Core Idea 1: The study of the designed world is the study of designed systems, processes, materials, and products and of the technologies and the scientific principles by which they function.                      A. Products, processes, and systems                      B. Nature of technology                      C. Using tools and materials</p> <p>Core Idea 2: Engineering design is a creative and iterative process for identifying and solving problems in the face of constraints.                      A. Defining and researching technological problems                      B. Generating and evaluating solutions                      C. Optimizing and making tradeoffs</p>

**DRC: Diocesan Religion Curriculum**

**CCC: Catechism of the Catholic Church**

**Standard B:** The Nature of Science as created by God and discovered by man

<b>DIOCESAN REQUIREMENTS</b>	
<b>CONCEPTS, SKILLS, &amp; CATHOLIC FAITH CONNECTIONS</b>	
1.	Understand that science is ongoing and inventive and is marked by both constancy and change.
2.	Show how basic research leads to new discoveries.
3.	Show how applied research leads to inventions, technology, and applications.
4.	Realize that scientific knowledge offers the best possible explanations of the natural world, is developed from observations and inferences, and follows the accepted rules of the scientific method.
5.	Understand that although science can lead to new possibilities, the moral and ethical implications must be evaluated according to God’s law.
6.	List and discuss questions that are not testable in science.
7.	Describe how past cultures have influenced scientific research and discovery throughout history.

<b>LOCAL LEVEL SCHOOL ELEMENTS</b>					
Text Alignment	Quarter / Date Taught				
	1	2	3	4	

**RELIGIOUS RESOURCES**

**DRC: Christian Morality IV Moral Judgment**  
 A. Conscience is an application of the moral law  
 B. The components of moral choice are the object, intention, and circumstances  
 C. The ends do not justify the means  
**CCC: 50** We can know God by His work  
 159 There is no discrepancy between faith and reason  
 2293 – 2294 Science and technology require respect for moral criteria and are meant to benefit all  
 2464 The 8<sup>th</sup> Commandment forbids misrepresenting the truth  
 2467 Man is obligated to be truthful  
*Fides et Ratio* (Faith & Reason) – Pope John Paul II

**ACTIVITIES**  
 Describe how the work of Catholic churchmen laid the groundwork for today’s scientific understanding and/or completed the preliminary work of others.  
 Discuss the difference between what science can do and what it should do.  
 Describe how the Christian view of an orderly and rational universe was indispensable to the development of science. (Introduction)

**COMMON CORE STANDARDS**

**Engineering and Technology**  
 Core Idea 1: The study of the designed world is the study of designed systems, processes, materials, and products and of the technologies and the scientific principles by which they function.  
 A Products, processes, and systems  
 B Nature of technology  
 C Using tools and materials  
 Core Idea 2: Engineering design is a creative and iterative process for identifying and solving problems in the face of constraints.  
 A Defining and researching technological problems  
 B Generating and evaluating solutions  
 C Optimizing and making tradeoffs  
 Core Idea 4: In today’s modern world everyone makes technological decisions that affect or are affected by technology on a daily basis. Consequently, it is essential for all citizens to understand the risks and responsibilities that accompany such decisions.  
 A. Interactions of technology and society  
 B. Interactions of technology and environment  
 C. Analyzing issues involving technology and society

**Standard C:** Science Inquiry that reflects God’s created order

<b>DIOCESAN REQUIREMENTS</b>	
<b>CONCEPTS, SKILLS, &amp; CATHOLIC FAITH CONNECTIONS</b>	
1	Understand and apply the scientific method as a systematic approach.
2	Identify scientific ideas and themes of the past and present, identifying inaccurate models & explanations.
3	Ask questions based on current social issues, scientific literature, and observations of phenomena.
4	Make predictions through hypotheses.
5.	Recognize the best experimental approach to investigate a question (direct observation, controlled, computer modeling).
6.	Design experiments to test hypotheses that use responsible, ethical, and safe procedures.
7.	Show the importance of estimates.
8.	Use scientific tools and units of measurement competently and determine the precision of measurement based on the sample size.
9.	Collect, analyze, and present data through text, tables, and graphs.
10.	Draw conclusions, communicate results, and respectfully critique other’s work.
11.	Understand how the scientific community, through the process of peer review and publication, ensures the reliability of scientific findings.

<b>LOCAL LEVEL SCHOOL ELEMENTS</b>					
<b>Text Alignment</b>	<b>Quarter / Date Taught</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Assessment</b>

<b>RELIGIOUS RESOURCES</b>	<b>COMMON CORE STANDARDS</b>
<p><b>CCC:</b> 50 – 51 God has revealed Himself through Jesus</p> <p><i>Fides et Ratio</i> (Faith &amp; Reason) – Pope John Paul II</p> <p>Diocesan Virtues Program – Fortitude</p> <p><b><u>ACTIVITIES</u></b></p> <p>Discuss the contributions churchmen Robert Grosseteste, St. Albert the Great, and Roger Bacon made to the development of empirical science and the scientific method. (Introduction)</p> <p>Gregor Mendel’s work was forgotten for many years. Describe the importance of the documentation of his experiments and results.</p>	<p><b>Engineering and Technology</b></p> <p>Core Idea 1: The study of the designed world is the study of designed systems, processes, materials, and products and of the technologies and the scientific principles by which they function.</p> <ul style="list-style-type: none"> <li>A Products, processes, and systems</li> <li>B Nature of technology</li> <li>C Using tools and materials</li> </ul> <p>Core Idea 2: Engineering design is a creative and iterative process for identifying and solving problems in the face of constraints.</p> <ul style="list-style-type: none"> <li>A. Defining and researching technological problems</li> <li>B. Generating and evaluating solutions</li> <li>C. Optimizing and making tradeoffs</li> </ul> <p>Core Idea 3: People are surrounded and supported by technological systems. Effectively using and improving these systems is essential for long-term survival and prosperity.</p> <ul style="list-style-type: none"> <li>A. Identifying and modeling technological systems</li> <li>B. Life cycles and maintenance of technological systems</li> <li>C. Control and feedback</li> </ul>

**DRC: Diocesan Religion Curriculum**

**CCC: Catechism of the Catholic Church**

Grade: High School

Subject: Freshman (General/Physical/Integrated) Science

**Standard D: Physical Science as created by God**

DIOCESAN REQUIREMENTS	
CONCEPTS, SKILLS, & CATHOLIC FAITH CONNECTIONS	
1. Describe the structure and properties of atoms, molecules, and chemical bonding.	
2. Explain the ways in which substances react.	
3. Identify physical and chemical properties and changes.	
4. Understand the forms and properties of energy and the conservation of energy.	
5. Recognize the periodic table and the elements	
6. Understand the laws of Boyle, Charles, Pascal, Bernoulli, and Archimedes	
7. Understand the basic principles of force, motion, work, and power.	
8. Explain Newton's laws of motion and gravity.	
9. Use formulas to calculate force, work, power, velocity, and acceleration.	
10. Apply the law of conservation of energy	
11. Describe how waves have energy and can transfer energy	
12. Describe electrical forces and construct electrical circuits	
13. Integrate knowledge of the interactions of matter and energy to explain changes in materials, living things, the earth and stars.	

LOCAL LEVEL SCHOOL ELEMENTS					
Text Alignment	Quarter / Date Taught				
	1	2	3	4	Assessment

**RELIGIOUS RESOURCES**

**ACTIVITIES**  
Explore the life and work of churchment Bacon, Theodoric, Bradwardine, and Buriden.

Conservation of energy – human body = dust to dust;  
  human soul = God to God

Conservation of energy – Isaiah 55:11, God's word does not return void, but does his will

**COMMON CORE STANDARDS**

**Physical Science**

Core Idea 1: macroscopic states and characteristic properties of matter depend on the type, arrangement, and motion of particles at the molecular and atomic scales.  
    A. Atomic structure of matter  
    B. Properties of matter

Core Idea 2: Forces due to fundamental interactions underlie all matter structures and transformations. Balance or imbalance of forces determines stability and change within all systems.  
    A. Fundamental interactions  
    B. Motion & stability  
    C. Transformation of matter

Core Idea 3: Transfers of energy within and between systems never change the total amount of energy, but energy tends to become more dispersed; energy availability regulates what can occur in any process.  
    A. Descriptions of energy  
    B. Energy for life and practical use. The special role of food and fuel  
    C. Relationship between energy and forces

**DRC: Diocesan Religion Curriculum**

**CCC: Catechism of the Catholic Church**

**Standard E:** Earth and Space Science as created by God

<b>DIOCESAN REQUIREMENTS</b>
<b>CONCEPTS, SKILLS, &amp; CATHOLIC FAITH CONNECTIONS</b>
1. Identify internal and external energies and forces such as geochemical energy and gravity.
2. Show how these energy sources have an impact on systems.
3. Describe movement of matter.
4. Describe the theories of origins and evolution of the Universe and Earth and place events on the geologic timetable.
5. Analyze past and projected uses of resources, as well as the limitations and consequences of such use.
6. Explain the design of the solar system.
7. Evaluate and debate the merits of space exploration.

<b>LOCAL LEVEL SCHOOL ELEMENTS</b>					
<b>Text Alignment</b>	<b>Quarter / Date Taught</b>				<b>Assessment</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	

<b>RELIGIOUS RESOURCES</b>	<b>COMMON CORE STANDARDS</b>
<p><a href="http://www.usccb.org">www.usccb.org</a> go to departments Environmental Justice Program</p> <p><b>ACTIVITIES</b> Discuss the role the Jesuits played in the development of astronomy and seismology and the accomplishments of Blessed Nicolaus Steno.</p> <p>Watch video of the Apollo 8 crew reading from the Book of Genesis on Christmas 1968.</p>	<p><b>Earth and Space Science</b> Core Idea 1: Humans are a small part of a vast Universe; planet Earth is part of the Solar System which is a part of the Milky Way galaxy, which is one of hundreds of billions of galaxies in the Universe.</p> <ul style="list-style-type: none"> <li>A. The Universe</li> <li>B. Gravity, energy, and matter in the Universe</li> <li>C. Earth and the Solar System</li> </ul> <p>Core Idea 2: Earth is a complex and dynamic 4.6 billion-year-old system of rock, water, air, and life.</p> <ul style="list-style-type: none"> <li>A. Continental drift, plate tectonics, and earth’s internal heat</li> <li>B. Earth’s materials</li> <li>C. Earth’s history</li> </ul> <p>Core Idea 3: Earth’s surface continually changes from the cycling of water and rock driven by sunlight and gravity.</p> <ul style="list-style-type: none"> <li>A. The roles of water in Earth’s surface processes</li> <li>B. Formation and alteration of rocks and landforms</li> <li>C. Weather and climate</li> <li>D. Biogeology</li> </ul>

**Standard F: Life and Environmental Science as created by God**

<b>DIOCESAN REQUIREMENTS</b>
<b>CONCEPTS, SKILLS, &amp; CATHOLIC FAITH CONNECTIONS</b>
1. State the relationship between cell structure and function, including single vs. multicellular organisms, differentiation, and regulation.
2. Explain heredity at a molecular level, how it relates to cellular and life cycles, and patterns of heredity.
3. Explain how evolution works by natural selection or selective breeding, including how sensory and nervous systems evolve to respond to internal and external stimuli.
4. Explain how evolution results in a diversity of species and how classification reflects those evolutionary relationships.
5. Analyze the interactions between organisms and how changes in living and non-living components of ecosystems impact that balance.
6. Follow the flow of energy and materials within organisms and through living systems including obtaining, transforming, transporting, releasing, and eliminating.

<b>LOCAL LEVEL SCHOOL ELEMENTS</b>					
<b>Text Alignment</b>	<b>Quarter / Date Taught</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Assessment</b>

<b>RELIGIOUS RESOURCES</b>	<b>COMMON CORE STANDARDS</b>
<p><b><u>Evolution: A Catholic Perspective</u></b>                      Article written by James Statson ETWN archive  <a href="http://www.ewtn.com/library/humanity/evolun.txt">www.ewtn.com/library/humanity/evolun.txt</a></p> <p><b><u>ACTIVITIES</u></b>                      Use the Genesis creation account to examine ecosystems, habitats, niches.</p> <p>Ecosystems need all parts like Paul’s image of the Body of Christ. What happens when a species is removed or a new one is introduced?</p> <p>Explore contradictions in society regarding life issues (e.g. abortion &amp; the criminal charge of killing/harming a fetus in the womb/heroic measures to save preemies &amp; destroying embryos for stem cell research)</p>	<p><b>Life Science</b>                      Core Idea 1: Organisms have structures and functions that facilitate their life processes, growth, and reproduction                      A. Structure and function                      B. Growth and development of organisms                      C. Organization for matter and energy flow in organisms                      Core Idea 2: Organisms have mechanisms and processes for passing traits and variations of traits from one generation to the next                      A. Inheritance traits                      B. Variation of traits                      Core Idea 3; Organisms and populations of organisms obtain necessary resources from their environment which includes other organisms and physical factors.                      A. Independent relationships in ecosystems                      B. Flow of matter and energy transfer in ecosystems                      C. Ecosystems dynamics, stability, and resilience                      Core Idea 4: Biological evolution explains the unity and diversity of species.                      A. Evidence of common ancestry and diversity                      B. Genetic Variation within a species                      C. Natural selection and adaptation                      D. Biodiversity and humans</p>

**DRC: Diocesan Religion Curriculum**

**CCC: Catechism of the Catholic Church**

**Standard G:** Science Applications that reflect God’s goodness

<b>DIOCESAN REQUIREMENTS</b>
<b>CONCEPTS, SKILLS, &amp; CATHOLIC FAITH CONNECTIONS</b>
1. Demonstrate an understanding of applications of science to real-life issues.
2. Analyze the impact (cost, benefit, effects) of past and current science and technological innovations on individuals and society.
3. Evaluate data (considering sources of information), validity, and short & long term implications of solutions to a problem and advocate for the most reasonable solution(s)
4. Demonstrate awareness and understanding of current developments in scientific fields.
5. Explore careers in science and technology.

<b>LOCAL LEVEL SCHOOL ELEMENTS</b>					
Text Alignment	Quarter / Date Taught				
	1	2	3	4	Assessment

<b>RELIGIOUS RESOURCES</b>	<b>COMMON CORE STANDARDS</b>
<p><a href="http://www.usccb.org">www.usccb.org</a> click on departments</p> <ul style="list-style-type: none"> <li>• Catholic Campaign for Human Development</li> <li>• Environmental Justice Program</li> <li>• Science and Human Values</li> <li>• Justice, Peace, and Human Development</li> </ul> <p><b><u>ACTIVITIES</u></b> Focus on groups that support Catholicism in careers. (Catholic Medical Association, International Catholic Lawyers Society, and National Catholic Bioethics Center).</p> <p>Invite practicing Catholics in science/healthcare fields to be guest speakers about how their faith influences their work.</p>	<p><b>Engineering and Technology</b> Core Idea 1: The study of the designed world is the study of designed systems, processes, materials, and products and of the technologies and the scientific principles by which they function.</p> <ul style="list-style-type: none"> <li>A. Products, processes, and systems</li> <li>B. Nature of technology</li> <li>C. Using tools and materials</li> </ul> <p>Core Idea 3: People are surrounded and supported by technological systems. Effectively using and improving these systems is essential for long-term survival and prosperity.</p> <ul style="list-style-type: none"> <li>A. Identifying and modeling technological systems</li> <li>B. Life cycles and maintenance of technological systems</li> <li>C. Control and feedback</li> </ul> <p>Core Idea 4: In today’s modern world everyone makes technological decisions that affect or are affected by technology on a daily basis. Consequently, it is essential for all citizens to understand the risks and responsibilities that accompany such decisions.</p> <ul style="list-style-type: none"> <li>A. Interactions of technology and society</li> <li>B. Interactions of technology and environment</li> <li>C. Analyzing issues involving technology and society</li> </ul>

**DRC: Diocesan Religion Curriculum**

**CCC: Catechism of the Catholic Church**



**Standard H: Personal, Social, and Moral Aspects of Science**

<b>DIOCESAN REQUIREMENTS</b>
<b>CONCEPTS, SKILLS, &amp; CATHOLIC FAITH CONNECTIONS</b>
1. Show how science influences personal and social perspectives.
2. Show how non-scientific perspectives (social values, ethics, beliefs, and timeframes) influence policy decisions related to science.
3. Investigate current proposals or plans in resource management and evaluate the costs, benefits, risks, and consequences to the environment and local communities.
4. Propose and evaluate (using models and/or explanations) scientific and technological solutions to a problem.
5. Recognize and explore moral implications and issues in scientific inquiry and technology.
6. Promote God’s commandments as expressed through Catholic virtues and moral teaching – especially respect for life, the sanctity of human life, and stewardship.

<b>LOCAL LEVEL SCHOOL ELEMENTS</b>					
<b>Text Alignment</b>	<b>Quarter / Date Taught</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Assessment</b>

<b>RELIGIOUS RESOURCES</b>
<p><a href="http://www.usccb.org">www.usccb.org</a> click on departments pick appropriate department</p> <p><b>ACTIVITIES</b> Evaluate the influence of the media on scientific issues.</p> <p>Put together a personal action plan to think globally and cat locally. Consider what change you can effect personally.</p> <p>Differentiate between popular opinion and Church teaching. (“What is right is not always popular; what is popular is not always right.”) Evaluate arguments, and defend Church teaching.</p>

<b>COMMON CORE STANDARDS</b>
<p><b>Earth and Space Science</b> Core Idea 4: Human activities are constrained by and, in turn, affect all other processes at Earth’s surface. A. Natural hazards B. Natural resources C. Human impact on the Earth D. Global climate change</p> <p><b>Engineering and Technology</b> Core Idea 2: Engineering design is a creative and iterative process for identifying and solving problems in the face of constraints. A. Defining and researching technological problems B. Generating and evaluating solutions C. Optimizing and making tradeoffs Core Idea 4: In today’s modern world everyone makes technological decisions that affect or are affected by technology on a daily basis. Consequently, it is essential for all citizens to understand the risks and responsibilities that accompany such decisions. A. Interactions of technology and society B. Interactions of technology and environment C. Analyzing issues involving technology and society</p>

**DRC: Diocesan Religion Curriculum**

**CCC: Catechism of the Catholic Church**