Diocese of Venice
## Standards for Engineering Design

Kindergarten-12th Grade

Basic Principles Underlying All Standards to be Used for the Planning of Curriculum for the Diocese of Venice

Basic principles which inform all Catholic education in the Schools of the Diocese of Venice are:

- All knowledge, in some way, reflects God's Truth, Beauty and Goodness.
- Curriculum and instruction enable deeper incorporation of the children into the Church, the formation of community within the school; and respect for the uniqueness and dignity of each person as created in the image of God.
- Education fosters growth in Christian virtue and contributes to development and formation of the whole person in light of his/her ultimate end and the good of the society of which he/she is a member.
- Each subject is to be examined in the context of the Catholic faith and is to be illuminated by Gospel values.
- Learning and formation occur in the Catholic school without separation as does the development of each student on both the natural and supernatural levels.
- Curriculum and instruction seeks to promote a synthesis of faith, life and culture and to form students as disciples of Jesus.
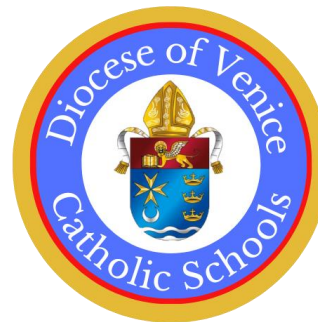
Gifts of CHRIST© at the Diocese of Venice Catholic Schools

The *Gifts of C.H.R.I.S.T.*© are dispositions made up of 4 Catholic virtues (humility, prudence, fortitude, and affability) and the three transcendentals (truth, beauty, and goodness) of the Catholic faith. CHRIST in the *Gifts of C.H.R.I.S.T.*© stands for **C**atholic **H**abits and **R**esponses **i**n **S**chool and on **T**eams. Through curricular and extracurricular learning experiences at a Diocese of Venice Catholic school, PK-12th grade students will learn about the 7 *Gifts of C.H.R.I.S.T.*© and how to consciously think, behave, and respond to challenging situations using the moral and ethical values and virtues of the Catholic faith.

	GOC.T		**Truth**	
		GOC.T.1	I will seek to understand the truth in all situations.	
		GOC.T.2	I will be truthful in the way I act, and respond, and accept truth around me.	
	GOC.B		**Beauty**	
		GOC.B.1	I will seek beauty in all things and in all situations.	
		GOC.B.2	I will find the beauty of God's creation and wonders around me.	
	GOC.G		**Goodness**	
		GOC.G.1	I will exhibit goodness as God's example during my daily life.	
		GOC.G.2	I will seek goodness in learning situations and remember to see God's likeness and goodness even in my opponents.	
	GOC.A		**Affability**	
		GOC.A.1	I can be kind and treat others the way I would want to be treated.	
		GOC.A.2	I can treat others with respect, and I can be approachable and friendly.	
	GOC.H		**Humility**	
		GOC.H.1	I embrace the wisdom and knowledge that my mentors and teachers have to offer, and I understand that I can learn from their knowledge and experiences.	
		GOC.H.2	I am humbled with the knowledge and talents I have, and I understand that I can always learn more.	
	GOC.P		**Prudence**	
		GOC.P.1	I embrace learning from others, and I understand the importance of sharing my knowledge and talents by teaching others as well.	
		GOC.P.2	I can be prudent in making ethical decisions by using my Catholic faith and values as a moral compass.	
	COG.F		**Fortitude**	
		COG.F.1	I can do all things through Christ who strengthens me.	
		COG.F.2	I will seek courage in difficult situations in pursuit of what is true, beautiful, and good.	

EDS.K2: *K-2 Engineering Design Standards*			
	EDS.K2.ED: *Engineering Design*		
		EDS.K2.ED.1	Explore the differences and similarities and interactions among engeers, scientists and mathematicians
		EDS.K2.ED.2	Discuss the history and importance of engineering innovation on the United States economy and quality of life
		EDS.K2.ED.3	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new object or tool.
		EDS.K2.ED.4	Understand the engineering design cycle as: ask, imagine, plan, create, test, and improve.
		EDS.K2.ED.5	Identify and define an engineering problem
		EDS.K2.ED.6	Apply prior knowledge to develop new ideas, products, and processes
		EDS.K2.ED.7	Apply knowledge of science and mathematics and the technology used as tools to help solve engineering problems
		EDS.K2.ED.8	Identify and create alternative solutions to a problem
	EDS.K2.CC: *Communication and Collaboration*		
		EDS.K2.CC.1	Develop a plan and timeline for completion of a project
		EDS.K2.CC.2	Student applies critical thinking skills to solve a problem, guide research, and evaluate projects using digital tools and resources
		EDS.K2.CC.3	Communicate design and solutions by visually by sketching and creating technical drawings and models
		EDS.K2.CC.4	Evaluate and modify steps to accomplish a task

	EDS.K2.CC.5	Work in teams and share responsibilities, acknowledging, encouraging, and valuing contributions of all team members
EDS.K2.IC: *Innovation and Creation*		
	EDS.K2.IC.1	Create and execute steps to accomplish a task
	EDS.K2.IC.2	Maintain an engineering notebook that chronicles work such as ideas, concepts, inventions, sketches and experiments
	EDS.K2.IC.3	Test and evaluate proposed and planned designs and compare and contrast the outcomes
	EDS.K2.IC.4	Student uses creative thinking and innovative processes to construct knowledge and develop digital products
	EDS.K2.IC.5	Create original products using a variety of resources
	EDS.K2.IC.6	Explore virtual environments, simulations, models and programming languages to enhance learning
	EDS.K2.IC.7	Students exhibit traits of a good digital citizen by practicing safe, responsible, legal and ethical behavior while using digital tools and resources
EDS.35: *3-5 Engineering Design Standards*		
EDS.35.ED: *Engineering Design*		
	EDS.35.ED.1	Students explore the differences and similarities and interactions among engineers, scientists and mathematicians
	EDS.35.ED.2	Discuss the history and importance of engineering innovation on the United States economy and quality of life
	EDS.35.ED.3	Describe how technology has evolved in the field of engineering and consider how it will continue to be a useful tool in solving engineering problems

	EDS.35.ED.4	Demonstrate safe practices during engineering and laboratory activities	
	EDS.35.ED.5	Students understand the engineering design cycle as: ask, imagine, plan, create, test, and improve.	
	EDS.35.ED.6	Identify and define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost	
	EDS.35.ED.7	Establish and evaluate constraints pertaining to a problem	
	EDS.35.ED.8	Determine the design parameters associated with an engineering problem	
	EDS.35.ED.9	Identify, generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem	
	EDS.35.CC: *Communication and Collaboration*		
	EDS.35.CC.1	Communicate design and solutions by visually by sketching and creating technical drawings and models	
	EDS.35.CC.2	Formulate goals, objectives, and requirements to solve an engineering problem	
	EDS.35.CC.3	Develop a plan and timeline for completion of a project	
	EDS.35.CC.4	Work in teams and share responsibilities, acknowledging, encouraging, and value contributions of all team members	
	EDS.35.CC.5	Make informed choices in the use and conservation of resources, recycling materials, and the safe and legal disposal of materials	
	EDS.35.CC.6	Integrate advanced mathematics and science skills as necessary to develop solutions to an engineering design problem	

	EDS.35.CC.7	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
	EDS.35.CC.8	Analyze trends and forecast possibilities, developing steps for the creation of an innovative process or product
	EDS.35.CC.9	Predict performance, failure modes, and reliability of a design solution
EDS.35.IC: *Innovation and Creation*		
	EDS.35.IC.1	Student uses creative thinking and innovative processes to construct knowledge and develop digital products
	EDS.35.IC.2	Create original products using a variety of resources
	EDS.35.IC.3	Use virtual environments to explore systems and issues
	EDS.35.IC.4	Student conducts research and evaluates projects using digital tools and resources
	EDS.35.IC.5	Evaluate technology tools applicable for problem solving
	EDS.35.IC.6	Evaluate student-centered products through self and peer review for relevance to the assignment or task
	EDS.35.IC.7	Maintain an engineering notebook that chronicles work such as ideas, concepts, inventions, sketches and experiments
	EDS.35.IC.8	Prepare a project report that clearly documents the design, decisions and activities during each phase of the engineering design process
	EDS.35.IC.9	Students exhibit traits of a good digital citizen by practicing safe, responsible, legal and ethical behavior while using digital tools and resources
EDS.MS: *Middle School Engineering Design Standards*		
EDS.MS.ED:		

	Engineering Design	
	EDS.MS.ED.1	Demonstrate safe practices during engineering and laboratory activities
	EDS.MS.ED.2	Students understand the engineering design cycle as: ask, imagine, plan, create, test, and improve.
	EDS.MS.ED.3	Discuss the history and importance of engineering innovation on the United States economy and quality of life
	EDS.MS.ED.4	Describe how technology has evolved in the field of engineering and consider how it will continue to be a useful tool in solving engineering problems
	EDS.MS.ED.5	Demonstrate safe practices during engineering and laboratory activities
	EDS.MS.ED.6	Students understand the engineering design cycle as: ask, imagine, plan, create, test, and improve.
	EDS.MS.ED.7	Identify and define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost
	EDS.MS.ED.8	Establish and evaluate constraints pertaining to a problem
	EDS.MS.ED.9	Define the criteria and constraints of an engineering design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment
	EDS.MS.ED.10	Identify, generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem
	EDS.MS.ED.11	Identify and define relevant problems and significant questions for investigation

	EDS.MS.ED.12	Plan and manage activities to develop a solution, design a computer program or complete a project
EDS.MS.CC: *Communication and Collaboration*		
	EDS.MS.CC.1	Communicate design and solutions by visually by sketching and creating technical drawings and models
	EDS.MS.CC.2	Develop a plan and timeline for completion of a project
	EDS.MS.CC.3	Work in teams and share responsibilities, acknowledging, encouraging, and value contributions of all team members
	EDS.MS.CC.4	Create a risk assessment for an engineering design project
	EDS.MS.CC.5	Use a budget to determine effective strategies to meet cost constraints
	EDS.MS.CC.6	Transfer current knowledge to the learning of newly encountered technologies
	EDS.MS.CC.7	Identify the inputs, processes, outputs, control and feedback associated with open and closed systems
	EDS.MS.CC.8	Select appropriate mathematical models to develop solutions to engineering design problems
	EDS.MS.CC.9	Integrate advanced mathematics and science skills as necessary to develop solutions to an engineering design problem
	EDS.MS.CC.10	Use conversions between measurement systems to solve real-world problems
	EDS.MS.CC.11	Student makes informed decisions by applying critical-thinking and problem-solving skills
	EDS.MS.CC.12	Make informed choices in the use and conservation of resources, recycling materials, and the safe and legal disposal of materials

	EDS.MS.CC.13	Explore complex systems or issues using models, simulations and new technologies to make predictions, modify input, and review results
	EDS.MS.CC.14	Predict performance, failure modes, and reliability of a design solution
	EDS.MS.CC.15	Test and evaluate proposed and planned designs and compare and contrast the outcomes
	EDS.MS.CC.16	Discuss trends and possible outcomes of prototypes
	EDS.MS.CC.17	Collect and analyze data to identify solutions and make informed decisions
	EDS.MS.CC.18	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criterial for success
	EDS.MS.CC.19	Make informed decisions and support reasoning
	EDS.MS.CC.20	Use multiple processes and diverse perspectives to explore alternative solutions
	EDS.MS.CC.21	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem
EDS.MS.IC: *Innovation and Creation*		
	EDS.MS.IC.1	Student uses creative thinking and innovative processes to construct knowledge, generate new ideas, and create products
	EDS.MS.IC.2	Identify, create, and use files in various formats such as text, raster and vector graphics, video and audio files
	EDS.MS.IC.3	Create original works as a means of personal or group expression

	EDS.MS.IC.4	Maintain an engineering notebook that chronicles work such as ideas, concepts, inventions, sketches and experiments
	EDS.MS.IC.5	Prepare a project report that clearly documents the design, decisions and activities during each phase of the engineering design process
	EDS.MS.IC.6	Organize information for visual display and analysis using appropriate formats for various audiences (graphs, tables, models etc.)
	EDS.MS.IC.7	Discuss the important of patents to protect intellectual property rights
	EDS.MS.IC.8	Students exhibit traits of a good digital citizen by practicing safe, responsible, legal and ethical behavior while using digital tools and resources
	EDS.MS.IC.9	Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation

EDS.HS: *High School Engineering Design Standards*

EDS.HS.ED: *Engineering Design*

	EDS.HS.ED.1	Demonstrate safe practices during engineering and laboratory activities
	EDS.HS.ED.2	Students understand the engineering design cycle as: ask, imagine, plan, create, test, and improve.
	EDS.HS.ED.3	Discuss the history and importance of engineering innovation on the United States economy and quality of life
	EDS.HS.ED.4	Describe how technology has evolved in the field of engineering and consider how it will continue to be a useful tool in solving engineering problems
	EDS.HS.ED.5	Demonstrate safe practices during engineering and laboratory activities

	EDS.HS.ED.6	Students understand the engineering design cycle as: ask, imagine, plan, create, test, and improve.
	EDS.HS.ED.7	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants
	EDS.HS.ED.8	Design a solution to a complex real-world problem by breaking it into smaller, more manageable problems that can be solved through engineering
	EDS.HS.ED.9	Define the criteria and constraints of an engineering design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment
	EDS.HS.ED.10	Identify, generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem
	EDS.HS.ED.11	Identify and define relevant problems and significant questions for investigation
	EDS.HS.ED.12	Use a computer simulation to model the impacts of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem
	EDS.HS.ED.13	Plan and manage activities to develop a solution, design a computer program or complete a project
	EDS.HS.ED.14	Develop a plan and timeline for completion of a project
	EDS.HS.CC: *Communication and Collaboration*	
	EDS.HS.CC.1	Communicate design and solutions by visually by sketching and creating technical drawings and models

	EDS.HS.CC.2	Work in teams and share responsibilities, acknowledging, encouraging, and value contributions of all team members
	EDS.HS.CC.3	Create a risk assessment for an engineering design project
	EDS.HS.CC.4	Use a budget to determine effective strategies to meet cost constraints
	EDS.HS.CC.5	Transfer current knowledge to the learning of newly encountered technologies
	EDS.HS.CC.6	Identify the inputs, processes, outputs, control and feedback associated with open and closed systems
	EDS.HS.CC.7	Select appropriate mathematical models to develop solutions to engineering design problems
	EDS.HS.CC.8	Integrate advanced mathematics and science skills as necessary to develop solutions to an engineering design problem
	EDS.HS.CC.9	Use conversions between measurement systems to solve real-world problems
	EDS.HS.CC.10	Student makes informed decisions by applying critical-thinking and problem-solving skills
	EDS.HS.CC.11	Make informed choices in the use and conservation of resources, recycling materials, and the safe and legal disposal of materials
	EDS.HS.CC.12	Predict performance, failure modes, and reliability of a design solution
	EDS.HS.CC.13	Test and evaluate proposed and planned designs and compare and contrast the outcomes
	EDS.HS.CC.14	Discuss trends and possible outcomes of prototypes
	EDS.HS.CC.15	Collect and analyze data to identify solutions and make informed decisions

	EDS.HS.CC.16	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criterial for success
	EDS.HS.CC.17	Make informed decisions and support reasoning
	EDS.HS.CC.18	Use multiple processes and diverse perspectives to explore alternative solutions
	EDS.HS.CC.19	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem
	EDS.HS.CC.20	Use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints
	EDS.HS.CC.21	Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal
	EDS.HS.CC.22	Explore local and global issues and use collaborative technologies to work with others to investigate solutions
EDS.HS.IC: *Innovation and Creation*		
	EDS.HS.IC.1	Student uses creative thinking and innovative processes to construct knowledge, generate new ideas, and create products
	EDS.HS.IC.2	Identify, create, and use files in various formats such as text, raster and vector graphics, video and audio files
	EDS.HS.IC.3	Create original works as a means of personal or group expression
	EDS.HS.IC.4	Explore complex systems or issues using models, simulations and new technologies to make predictions, modify input, and review results

	EDS.HS.IC.5	Maintain an engineering notebook that chronicles work such as ideas, concepts, inventions, sketches and experiments
	EDS.HS.IC.6	Prepare a project report that clearly documents the design, decisions and activities during each phase of the engineering design process
	EDS.HS.IC.7	Organize information for visual display and analysis using appropriate formats for various audiences (graphs, tables, models etc.)
	EDS.HS.IC.8	Discuss the important of patents to protect intellectual property rights
	EDS.HS.IC.9	Students exhibit traits of a good digital citizen by practicing safe, responsible, legal and ethical behavior while using digital tools and resources
	EDS.HS.IC.10	Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation