Dublin City Schools
STEAM
Graded Course of Study
2022

DCS STEAM Vision

Dublin City Schools is committed to providing purposeful STEAM learning experiences to students throughout their K-12 journey. These experiences will be in the form of integrated, interdisciplinary experiences as well as focused pathways in the areas of STEAM.

We commit to transforming STEAM into more than the integration of Science, Technology, Engineering, and Mathematics with vision to expand ownership to all disciplines and grade levels. By creating a culture of thinking, curiosity and creativity across content, students will engage in interest based learning that will help them develop the attitudes and skills that will support them in a variety of career and life pathways. These learning experiences will support students as lifelong, adaptable learners who can thrive in a quickly changing world.

We believe in STEAM learning for all students and commit to creating equitable access so that our STEAM classrooms are representative of our school populations and communities.

Instructional Agreements:

- We recognize the importance of early access and exposure to STEAM learning.
- We prioritize learning where students will identify and solve open-ended problems and engage in experiential learning.
- We will engage students through a lens of design thinking and promote opportunities for PBL.
- We will provide students with industry connections and experiences.
- We prioritize educating the whole child, in addition to our content. This includes a commitment to employability skills and emotional intelligence.
- We value students seeing themselves in STEAM fields.

STEM Grade 8

Stem 8 Course Goals:
Students will demonstrate an understanding of a design thinking and process in an effort to identify, communicate, and solve real world problems. Students will learn about the history of STEM disciplines, engineering and robotics. Students will be engaged and equipped with critical thinking, problem solving, creative and collaborative skills while ultimately establishing connections between the school, work place, community and the global economy.

Design and Modeling		
Introduction to Engineering		
Strand	**Topic**	**Content Statements**
Information & Communications Technology (OH Tech) The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.	1. Identify and use appropriate digital learning tools and resources to accomplish a defined task.	6-8.ICT.1.a. Develop criteria for selecting digital learning tools and resources to accomplish a defined task. 6-8.ICT.1.b. Select and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task. 6-8.ICT.1.c. Evaluate the use of digital learning tools and resources to support learning and productivity.
	3. Use digital learning tools and resources to construct knowledge.	6-8.ICT.3a Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources. 6-8.ICT.3b Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or

		trends are present. 6-8.ICT.3c Create artifacts using digital learning tools and resources to demonstrate knowledge.
	4. Use digital learning tools and resources to communicate and disseminate information to multiple audiences.	6-8.ICT.4a Use digital learning tools and resources to identify communication needs considering goals, audience and content. 6-8.ICT.4b Select and use a variety of media formats to communicate information to a target audience. 6-8.ICT.4c Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information. 6-8.ICT.4d Evaluate the effectiveness of a digital tool to communicate information with multiple audiences.
Society & Technology (OH Tech) The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.	1. Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.	6-8.ST.1a Advocate and exhibit ethical, legal and responsible practices when utilizing technology. 6-8.ST.1b Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world. 6-8.ST.1c Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies. 6-8.ST.1d Analyze an environmental concern and investigate technology solutions to that problem.
	2. Analyze the impact of communication and collaboration in both digital and physical	6-8.ST.2a Critique specific instances of how technology has impacted access to information, communications and collaboration.

	environments.	6-8.ST.2b Explain the positive and negative impact the use of technology can have on personal, professional and community relationships. 6-8.ST.2c Investigate how social media impacts society and the digital identities of individuals and organizations. 6-8.ST.2d Apply appropriate interactions and digital etiquette in varying contexts, reflecting upon potential impacts in both digital and physical environments.
	3. Explain how technology, society and the individual impact one another.	6-8.ST.3a Discuss and define how issues (e.g., economic, political, scientific and cultural) are influenced by the development and use of technology. 6-8.ST.3b Explain how new technology development is driven by factors such as commercialization, creative/inventive thinking and cultural/historical influence. 6-8.ST.3c Analyze how technological innovations and inventions can have multiple applications, both intended and unintended. 6-8.ST.3d Describe the impact of an individual's wants, values and interests on the development of new technologies. 6-8.ST.3e Manage components of one's digital identity and one's digital footprint. 6-8.ST.3f Evaluate current and past revisions to laws, rules and policies as society responds to technological advancements.

Design and Modeling		
Sketching & Drawing Techniques		
Strand	**Topic**	**Content Statements**
Information & Communications Technology (OH Tech) The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.	2. Use digital learning tools and resources to locate, evaluate and use information.	6-8.ICT.2.a. Use advanced search techniques to locate needed information using digital learning tools and resources. 6-8.ICT.2.b. Use multiple criteria to evaluate the validity of information found with digital learning tools and resources. 6-8.ICT.2.c. Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism.
	3. Use digital learning tools and resources to construct knowledge.	6-8.ICT.3a Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources. 6-8.ICT.3b Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or trends are present. 6-8.ICT.3c Create artifacts using digital learning tools and resources to demonstrate knowledge.
	4. Use digital learning tools and resources to communicate and disseminate information to multiple audiences.	6-8.ICT.4a Use digital learning tools and resources to identify communication needs considering goals, audience and content. 6-8.ICT.4b Select and use a variety of media formats to communicate information to a target audience.

		6-8.ICT.4c Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information. 6-8.ICT.4d Evaluate the effectiveness of a digital tool to communicate information with multiple audiences.
Ohio's Standards for Mathematical Practice	5. Use appropriate tools strategically	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations.
	6. Attend to precision	Mathematically proficient students try to communicate precisely to others. They are careful about specifying units of measure. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.
Ohio's Learning Standards for Mathematics	Geometry: Draw, construct and describe geometrical figures and describe the relationships between them.	7.G.1a Compute actual lengths and areas from a scale drawing and reproduce a scale drawing at a different scale. 7.G.2 Draw (freehand, with [tools], and with technology) geometric figures with given conditions.

Design and Modeling		
Design Process		
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Information & Communications Technology (OH Tech) The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.	1. Identify and use appropriate digital learning tools and resources to accomplish a defined task.	6-8.ICT.1.a. Develop criteria for selecting digital learning tools and resources to accomplish a defined task. 6-8.ICT.1.b. Select and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task. 6-8.ICT.1.c. Evaluate the use of digital learning tools and resources to support learning and productivity.
	3. Use digital learning tools and resources to construct knowledge.	6-8.ICT.3a Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources. 6-8.ICT.3b Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or trends are present. 6-8.ICT.3c Create artifacts using digital learning tools and resources to demonstrate knowledge
Society & Technology (OH Tech) The interconnectedness of technology, self, society and the	1. Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.	6-8.ST.1a Advocate and exhibit ethical, legal and responsible practices when utilizing technology. 6-8.ST.1b Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world. 6-8.ST.1c Review and demonstrate ethical considerations and legal

Design and Modeling		
Design Process		
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natural world, specifically addressing the ethical, legal, political and global impact of technology.		requirements involved in the creation and use of digital technologies. 6-8.ST.1d Analyze an environmental concern and investigate technology solutions to that problem.
Design & Technology (OH Tech) Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.	1. Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.	6-8.DT.1a Explore and document how technology can impact efficiency. 6-8.DT.1b Analyze how tools, materials and processes are used to alter the natural and human-designed worlds. 6-8.DT.1c Define and categorize the requirements of a design as either criteria or constraints. 6-8.DT.1d Explain how optimization is the process of making a product as fully functional and effective as possible. 6-8.DT.1e Describe how trade-offs involve a choice of one quality over another. 6-8.DT.1f Give examples of how trade-offs must occur when optimizing a design in order to maintain design requirements.
	2. Identify a problem and use an engineering design process to solve the problem.	6-8.DT.2a Apply a complete design process to solve an identified individual or community problem: research, develop, test, evaluate and present several possible solutions, and redesign to improve the solution.

Design and Modeling		
Design Process		
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		6-8.DT.2b Describe how invention is a process of turning ideas and imagination into devices and systems. 6-8.DT.2c Explain how innovation is the process of modifying an existing system or system element(s) to improve it. 6-8.DT.2d Consider multiple factors, including criteria and constraints, (e.g., research, cost, time, materials, feedback, safety) to justify decisions when developing products and systems to solve problems. 6-8.DT.2e Identify and explain why effective designs develop from non-linear, flexible application of a design process.
	3. Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking	6-8.DT.3a Collaborate to solve a problem as an interdisciplinary team modeling different roles and functions. 6-8.DT.3b Explain ways that invention and innovation within one field can transfer into other fields of technology. 6-8.DT.3c Evaluate the effectiveness of the group's collaboration during the engineering design process and the contribution of the varying roles. 6-8.DT.3d Give examples of how changes in one part of a system can impact other parts of that system. 6-8.DT.3e Deconstruct a system into its component parts and describe how they interrelate.

Design and Modeling		
Design Process		
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	4. Evaluate designs using functional, aesthetic and creative elements	6-8.DT.4a Examine the progression of a product to identify how the functional, aesthetic and creative elements were applied. 6-8.DT.4b Analyze environments or products that are examples of the application of the principles of universal or inclusive design. 6-8.DT.4c Apply the design principle “form follows function” to develop a product.
Designing for Production		
Strand	**Topic**	**Content Statements**
Information & Communications Technology (OH Tech) The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.	1. Identify and use appropriate digital learning tools and resources to accomplish a defined task.	6-8.ICT.1.a. Develop criteria for selecting digital learning tools and resources to accomplish a defined task. 6-8.ICT.1.b. Select and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task. 6-8.ICT.1.c. Evaluate the use of digital learning tools and resources to support learning and productivity.
	3. Use digital learning tools and resources to construct knowledge.	6-8.ICT.3a Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources. 6-8.ICT.3b Analyze data collected or retrieved from a variety of digital

Design and Modeling		
Design Process		
Strand	**Topic**	**Content Statements**
		learning tools and resources to determine if patterns or trends are present. 6-8.ICT.3c Create artifacts using digital learning tools and resources to demonstrate knowledge
Society & Technology (OH Tech) The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.	1. Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.	6-8.ST.1a Advocate and exhibit ethical, legal and responsible practices when utilizing technology. 6-8.ST.1b Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world. 6-8.ST.1c Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies. 6-8.ST.1d Analyze an environmental concern and investigate technology solutions to that problem.
Design & Technology (OH Tech) Addresses the nature of technology to develop and improve products and systems over time to meet	1. Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.	6-8.DT.1a Explore and document how technology can impact efficiency. 6-8.DT.1b Analyze how tools, materials and processes are used to alter the natural and human-designed worlds. 6-8.DT.1c Define and categorize the requirements of a design as either criteria or constraints.

Design and Modeling		
Design Process		
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human/societal needs and wants through design processes.		6-8.DT.1d Explain how optimization is the process of making a product as fully functional and effective as possible. 6-8.DT.1e Describe how trade-offs involve a choice of one quality over another. 6-8.DT.1f Give examples of how trade-offs must occur when optimizing a design in order to maintain design requirements.
	2. Identify a problem and use an engineering design process to solve the problem.	6-8.DT.2a Apply a complete design process to solve an identified individual or community problem: research, develop, test, evaluate and present several possible solutions, and redesign to improve the solution. 6-8.DT.2b Describe how invention is a process of turning ideas and imagination into devices and systems. 6-8.DT.2c Explain how innovation is the process of modifying an existing system or system element(s) to improve it. 6-8.DT.2d Consider multiple factors, including criteria and constraints, (e.g., research, cost, time, materials, feedback, safety) to justify decisions when developing products and systems to solve problems. 6-8.DT.2e Identify and explain why effective designs develop from non-linear, flexible application of a design process.
	3. Demonstrate that solutions to complex problems require collaboration, interdisciplinary	6-8.DT.3a Collaborate to solve a problem as an interdisciplinary team modeling different roles and functions.

Design and Modeling		
Design Process		
Strand	**Topic**	**Content Statements**
	understanding and systems thinking	6-8.DT.3b Explain ways that invention and innovation within one field can transfer into other fields of technology. 6-8.DT.3c Evaluate the effectiveness of the group's collaboration during the engineering design process and the contribution of the varying roles. 6-8.DT.3d Give examples of how changes in one part of a system can impact other parts of that system. 6-8.DT.3e Deconstruct a system into its component parts and describe how they interrelate.
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Automation & Robotics		
Discovery of Automation & Robotics		
Strand	**Topic**	**Content Statements**
Information & Communications Technology (OH Tech) The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.	1. Identify and use appropriate digital learning tools and resources to accomplish a defined task.	6-8.ICT.1.a. Develop criteria for selecting digital learning tools and resources to accomplish a defined task. 6-8.ICT.1.b. Select and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task. 6-8.ICT.1.c. Evaluate the use of digital learning tools and resources to support learning and productivity.
	2. Use digital learning tools and resources to locate, evaluate and use information.	6-8.ICT.2.a. Use advanced search techniques to locate needed information using digital learning tools and resources. 6-8.ICT.2.b. Use multiple criteria to evaluate the validity of information found with digital learning tools and resources. 6-8.ICT.2.c. Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism.
	3. Use digital learning tools and resources to construct knowledge.	6-8.ICT.3a Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources. 6-8.ICT.3b Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or trends are

		present. 6-8.ICT.3c Create artifacts using digital learning tools and resources to demonstrate knowledge
	4. Use digital learning tools and resources to communicate and disseminate information to multiple audiences.	6-8.ICT.4a Use digital learning tools and resources to identify communication needs considering goals, audience and content. 6-8.ICT.4b Select and use a variety of media formats to communicate information to a target audience. 6-8.ICT.4c Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information. 6-8.ICT.4d Evaluate the effectiveness of a digital tool to communicate information with multiple audiences.
Society & Technology (OH Tech) The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.	1. Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.	6-8.ST.1a Advocate and exhibit ethical, legal and responsible practices when utilizing technology. 6-8.ST.1b Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world. 6-8.ST.1c Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies. 6-8.ST.1d Analyze an environmental concern and investigate technology solutions to that problem.
	2. Analyze the impact of communication and collaboration in both digital and physical environments.	6-8.ST.2a Critique specific instances of how technology has impacted access to information, communications and collaboration. 6-8.ST.2b Explain the positive and negative impact the use of technology can have on personal, professional and community relationships.

		6-8.ST.2c Investigate how social media impacts society and the digital identities of individuals and organizations. 6-8.ST.2d Apply appropriate interactions and digital etiquette in varying contexts, reflecting upon potential impacts in both digital and physical environments.
	3. Explain how technology, society and the individual impact one another.	6-8.ST.3a Discuss and define how issues (e.g., economic, political, scientific and cultural) are influenced by the development and use of technology. 6-8.ST.3b Explain how new technology development is driven by factors such as commercialization, creative/inventive thinking and cultural/historical influence. 6-8.ST.3c Analyze how technological innovations and inventions can have multiple applications, both intended and unintended. 6-8.ST.3d Describe the impact of an individual's wants, values and interests on the development of new technologies. 6-8.ST.3e Manage components of one's digital identity and one's digital footprint. 6-8.ST.3f Evaluate current and past revisions to laws, rules and policies as society responds to technological advancements.

Automation & Robotics		
Mechanical Systems		
Strand	**Topic**	**Content Statements**
Information & Communications Technology (OH Tech) The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.	3. Use digital learning tools and resources to construct knowledge.	6-8.ICT.3a Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources. 6-8.ICT.3b Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or trends are present. 6-8.ICT.3c Create artifacts using digital learning tools and resources to demonstrate knowledge.
Society & Technology (OH Tech) The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.	1. Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.	6-8.ST.1a Advocate and exhibit ethical, legal and responsible practices when utilizing technology. 6-8.ST.1b Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world. 6-8.ST.1c Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies. 6-8.ST.1d Analyze an environmental concern and investigate technology solutions to that problem.
Design &	1. Define and describe	6-8.DT.1a Explore and document how technology can impact efficiency.

Technology (OH Tech) Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.	technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.	6-8.DT.1b Analyze how tools, materials and processes are used to alter the natural and human-designed worlds. 6-8.DT.1c Define and categorize the requirements of a design as either criteria or constraints. 6-8.DT.1d Explain how optimization is the process of making a product as fully functional and effective as possible. 6-8.DT.1e Describe how trade-offs involve a choice of one quality over another. 6-8.DT.1f Give examples of how trade-offs must occur when optimizing a design in order to maintain design requirements.
	2. Identify a problem and use an engineering design process to solve the problem.	6-8.DT.2a Apply a complete design process to solve an identified individual or community problem: research, develop, test, evaluate and present several possible solutions, and redesign to improve the solution. 6-8.DT.2b Describe how invention is a process of turning ideas and imagination into devices and systems. 6-8.DT.2c Explain how innovation is the process of modifying an existing system or system element(s) to improve it. 6-8.DT.2d Consider multiple factors, including criteria and constraints, (e.g., research, cost, time, materials, feedback, safety) to justify decisions when developing products and systems to solve problems. 6-8.DT.2e Identify and explain why effective designs develop from non-linear, flexible application of a design process.
	3. Demonstrate that solutions to complex problems require	6-8.DT.3a Collaborate to solve a problem as an interdisciplinary team modeling different roles and functions.

	collaboration, interdisciplinary understanding and systems thinking	6-8.DT.3b Explain ways that invention and innovation within one field can transfer into other fields of technology. 6-8.DT.3c Evaluate the effectiveness of the group's collaboration during the engineering design process and the contribution of the varying roles. 6-8.DT.3d Give examples of how changes in one part of a system can impact other parts of that system. 6-8.DT.3e Deconstruct a system into its component parts and describe how they interrelate.
	4. Evaluate designs using functional, aesthetic and creative elements	6-8.DT.4a Examine the progression of a product to identify how the functional, aesthetic and creative elements were applied. 6-8.DT.4b Analyze environments or products that are examples of the application of the principles of universal or inclusive design. 6-8.DT.4c Apply the design principle "form follows function" to develop a product.

Automation & Robotics		
Automated Systems		
Strand	**Topic**	**Content Statements**
Society & Technology (OH Tech) The interconnectedness	1. Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.	6-8.ST.1a Advocate and exhibit ethical, legal and responsible practices when utilizing technology. 6-8.ST.1b Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world.

of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.		6-8.ST.1c Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies. 6-8.ST.1d Analyze an environmental concern and investigate technology solutions to that problem.
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		6-8.ST.3e Manage components of one's digital identity and one's digital footprint. 6-8.ST.3f Evaluate current and past revisions to laws, rules and policies as society responds to technological advancements.
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	4. Use digital learning tools and resources to communicate and disseminate information to multiple audiences.	6-8.ICT.4a Use digital learning tools and resources to identify communication needs considering goals, audience and content. 6-8.ICT.4b Select and use a variety of media formats to communicate information to a target audience. 6-8.ICT.4c Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information. 6-8.ICT.4d Evaluate the effectiveness of a digital tool to communicate information with multiple audiences.
Design & Technology (OH Tech) Addresses the nature of technology to develop and improve products and systems over	1. Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.	6-8.DT.1a Explore and document how technology can impact efficiency. 6-8.DT.1b Analyze how tools, materials and processes are used to alter the natural and human-designed worlds. 6-8.DT.1c Define and categorize the requirements of a design as either criteria or constraints.

time to meet human/societal needs and wants through design processes.		6-8.DT.1d Explain how optimization is the process of making a product as fully functional and effective as possible. 6-8.DT.1e Describe how trade-offs involve a choice of one quality over another. 6-8.DT.1f Give examples of how trade-offs must occur when optimizing a design in order to maintain design requirements.
	2. Identify a problem and use an engineering design process to solve the problem.	6-8.DT.2a Apply a complete design process to solve an identified individual or community problem: research, develop, test, evaluate and present several possible solutions, and redesign to improve the solution. 6-8.DT.2b Describe how invention is a process of turning ideas and imagination into devices and systems. 6-8.DT.2c Explain how innovation is the process of modifying an existing system or system element(s) to improve it. 6-8.DT.2d Consider multiple factors, including criteria and constraints, (e.g., research, cost, time, materials, feedback, safety) to justify decisions when developing products and systems to solve problems. 6-8.DT.2e Identify and explain why effective designs develop from non-linear, flexible application of a design process.
	3. Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking	6-8.DT.3a Collaborate to solve a problem as an interdisciplinary team modeling different roles and functions. 6-8.DT.3b Explain ways that invention and innovation within one field can transfer into other fields of technology. 6-8.DT.3c Evaluate the effectiveness of the group’s collaboration during the engineering design process and the contribution of the varying roles.

		6-8.DT.3d Give examples of how changes in one part of a system can impact other parts of that system. 6-8.DT.3e Deconstruct a system into its component parts and describe how they interrelate.
	4. Evaluate designs using functional, aesthetic and creative elements	6-8.DT.4a Examine the progression of a product to identify how the functional, aesthetic and creative elements were applied. 6-8.DT.4b Analyze environments or products that are examples of the application of the principles of universal or inclusive design. 6-8.DT.4c Apply the design principle “form follows function” to develop a product.
Computing Systems (OH Comp Sci)	Troubleshooting	CS.T.8.a Use a systematic process to identify and evaluate the source of a routine computing problem. Select the best solution to solve the computing problem and communicate the solution to others.
Data and Analysis (OH Comp Sci)	Data Collection and Storage	DA.DCS.8.a Interpret digital data collection tools to manage information effectively. DA.DCS.8.b Identify data storage systems to define how data is stored and accessed. DA.DCS.8.c Create a logical file structure to organize data in different storage systems to support individual and collaborative work.
	Visualization and Communication	DA.VC.8.a Evaluate data to construct a model or representation. DA.VC.8.b Create a spreadsheet utilizing formulas, functions and graphs to represent and analyze data.
Algorithmic Thinking and	Algorithms	ATP.A.8.a Create multiple pseudocode to solve a multi-step process and justify the most efficient solution.

Programming (OH Comp Sci)	Variables and Data Representation	ATP.VDR.8.a Analyze test cases and determine the range of valid solutions. ATP.VDR.8.b Use a data structure to represent a collection.
	Control Structures	ATP.CS.8.a Use and apply decisions and loops in a program to solve a problem.
	Modularity	ATP.M.8.a Decompose problems and subproblems into parts to facilitate the design, implementation and review of complex programs.
	Program Development	ATP.PD.8.a Write code that utilizes algorithms, variables and control structures to solve problems or as a creative expression. ATP.PD.8.b Systematically test and refine programs using a range of test cases. ATP.PD.8.c Use procedures that utilize parameters to pass values.