



PASSAIC COUNTY TECHNICAL INSTITUTE
45 Reinhardt Road
Wayne, NJ

Academic Curriculum Unit Planner

Design Thinking

Course # S7140

October 2018



PASSAIC COUNTY TECHNICAL INSTITUTE
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Academic Curriculum Unit Planner

Content Area:	Design Thinking	Grade(s)	9
Unit Plan Title:	Intro to Technology		
NJSLS Standard(s) Addressed in this unit			
<p>NJCCCS Tech 8.1.12.C.1 - Develop an innovative solution to a real-world problem or issue in collaboration with peers and experts, and present ideas or feedback through social media or in an online community.</p> <p>NJCCCS Tech 8.1.12.F.1 - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.</p> <p>NJCCCS 8.2.12.A.2 - Analyze current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.</p> <p>NJCCCS 8.2.12.B.4 - Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.</p> <p><u>Career Ready:</u></p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP4. Communicate clearly and effectively and with reason.</p> <p>CRP5. Consider the environmental, social and economic impacts of decisions.</p> <p>CRP6. Demonstrate creativity and innovation.</p> <p>CRP7. Employ valid and reliable research strategies.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>			



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Essential Questions (3-5)

What is technology?
In what ways does society impact the evolution of technology and technology impact society?
Why is innovation important to our society?
How are problems solved?
When a design doesn't meet expectations, how do you determine what needs to be improved?
Why must you determine the constraints and limitations that effect your design?

Anchor Text

Informational Texts (3-5)

Informational resources to be used to drive the point of technology evolution. Some examples: evolution of cellphones (Technology as a product), how commercial food is packaged and processed (Technology as a process), mass transit (Technology as a system).

Short Texts (1-3)

Formative & Summative Assessments

Project based activities that includes creation or an innovation of a current project. Research presentations (Suggestions: oral report, debate, paper, documentary video, etc.) Please include the rubric you will be using for these assessments.

Performance Task(s):

- Oral presentations
- Test and quizzes regarding sub-topics

Other Evidence:

- Contributions towards group projects
- Short daily challenges.



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Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

Canvas/ Google Classrooms, Microsoft Office, Google

Materials:

- Paperclips (different styles)
- Stapler
- Binder clips
- Hole puncher
- Paper puncher
- Other common office supplies
- Craft sticks
- Glue
- Tape

Suggested Time Frame:

2 Weeks



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Academic Curriculum Unit Planner

Content Area:	Design Thinking	Grade(s)	9
Unit Plan Title:	Intro to Designing Thinking & Engineering Design Process		
NJSLS Standard(s) Addressed in this unit			
<p>NJCCCS 8.1.12.A.3 - Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.</p> <p>NJCCCS 8.1.12.C.1 - Develop an innovative solution to a real-world problem or issue in collaboration with peers and experts, and present ideas or feedback through social media or in an online community.</p> <p>NJCCCS 8.2.12.C.5 - Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.</p> <p>NJCCCS 8.2.12.C.7 - Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.^{[L]_{SEP}}</p> <p>NJCCCS 8.1.12.F.1 - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.</p> <p>NJCCCS 8.2.12.A.1 Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation</p> <p><u>Career Ready:</u> CRP2. Apply appropriate academic and technical skills.</p>			



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CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Essential Questions (3-5)

How can the design thinking process be applied to everyday issues?
How do we use empathy to solve human needs?
How do we effectively collaborate?
How can the engineering design process be applied to a design problem?
Why is it important to document project work?
How does data drive the design of a product?

Anchor Text

Informational Texts (3-5)

Short Texts (1-3)

Formative & Summative Assessments

Project based activities that includes creation or an innovation of a current project. Research presentations (Suggestions: oral report, debate, paper, documentary video, etc.) Please include the rubric you will be using for these assessments.

Performance Task(s):

- Oral presentations
- Test and quizzes regarding sub-topics



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Other Evidence:

- Contributions towards group projects
- Short daily challenges.

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

Canvas/ Google Classrooms, Microsoft Office, Google, Autodesk Suite

<https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>

Materials:

- 3D Printer & Filament
- CD's
- Cardboard
- Wooden Dowels
- Duct, Masking and Scotch tape
- Craft sticks
- Hot glue guns
- Glue sticks
- Colored construction paper
- Rubber bands
- Paperclips
- Markers/ Colored Pencils
- Rulers
- X-Acto Knife

Closing Activities:

- Presentations of student solutions and supporting documentation

Suggested Time Frame:

20 weeks



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Academic Curriculum Unit Planner

Content Area:	Design Thinking	Grade(s)	9
Unit Plan Title:	STEM Careers		
NJSLS Standard(s) Addressed in this unit			
<u>Technology</u>			
<p>NJCCCS 8.2.12.C.3 - Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).^[L]_[SEP] 8</p> <p>NJCCCS 8.2.12.D.6 - Synthesize data, analyze trends and draw conclusions regarding the effect of technology on the individual, society, or the environment and publish conclusions.</p>			
<u>Career Ready:</u>			
<p>CRP4. Communicate clearly and effectively and with reason</p> <p>CRP10. Plan education and career paths aligned to personal goals.</p>			
Essential Questions (3-5)			
<p>What factors and special skills need to be considered when selecting and preparing for employment of STEM career paths for future success?</p> <p>What positive and negative work habits impact success?</p> <p>How do your personal qualities affect your success on the job?</p>			
Anchor Text			
Informational Texts (3-5)			
Short Texts (1-3)			



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Formative & Summative Assessments

Project based activities that includes creation or an innovation of a current project. Research presentations (Suggestions: oral report, debate, paper, documentary video, etc.) Please include the rubric you will be using for these assessments.

Performance Task(s):

- Oral presentations
- Test and quizzes regarding sub-topics
- Daily activity results and documentation

Other Evidence:

- Contributions towards group projects
- Short daily challenges.
- Ability to communicate effectively and appropriately with professionals in multiple STEM fields

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

Canvas/ Google Classrooms, Microsoft Office, Google, Autodesk Suite

Materials:

- 3D Printer
- 3D Printer Filament
- Cardboard
- Wooden Dowels
- Duct tape
- Scotch tape
- Masking tape
- Craft sticks
- Hot glue



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Academic Curriculum Unit Planner

- Hot glue guns
- Glue sticks
- Colored construction paper
- Rubber bands
- Paperclips
- Markers/ Colored Pencils
- Rulers
- X-Acto Knife
- Foam board

Students interact with current STEM professionals and gain knowledge about evolving workplace

Closing Activities:

- Presentations of student solutions and supporting documentation

Suggested Time Frame:

2 weeks



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Content Area:	Design Thinking	Grade(s)	9
Unit Plan Title:	Sustainability Design		
NJSLS Standard(s) Addressed in this unit			
<p>NJCCCS Technology 8.2.12.B.2 - Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation and maintenance of a chosen product</p> <p>NJCCCS Technology 8.2.12.B.4 - Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.</p> <p>NJCCCS 8.2.12.D.1 - Design and create a prototype to solve a real-world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review</p> <p>NGSS HS-LS2-1 - Ecosystems: Interactions, Energy, and Dynamics Students who demonstrate understanding can: Use mathematical and/or computational representations to support explanations of factors that affect the carrying capacity of ecosystems at different scales.</p> <p>NJCCCS 9.3. HL-BRD.6 - Summarize and explain the larger ethical, moral and legal issues related to biotechnology research, product development and use in society.</p> <p>Career Ready: CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions.</p>			



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CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Essential Questions (3-5)

What impact can energy-efficient technology have on our planet?
What are positive/negative effects of biotechnology?
How can materials we use be effective or ineffective for sustainable design?

Anchor Text

Informational Texts (3-5)

Short Texts (1-3)

Formative & Summative Assessments

Project based activities that includes creation or an innovation of a current project. Research presentations (Suggestions: oral report, debate, paper, documentary video, etc.) Please include the rubric you will be using for these assessments.

Performance Task(s):

- Oral presentations
- Test and quizzes regarding sub-topics
- Daily activity results and documentation
- Major alternative energy project results and documentation

Other Evidence:

- Contributions towards group projects
- Short daily challenges.



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- Oral presentations and discussions
- Ability to communicate effectively and appropriately with professionals in multiple STEM fields

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

Canvas/ Google Classrooms, Microsoft Office, Google, Autodesk Suite

https://www.teachengineering.org/curricularunits/view/cub_housing_curricularunit

Materials:

- 3D Printer
- 3D Printer Filament
- Cardboard
- Wooden Dowels
- Duct tape
- Scotch tape
- Masking tape
- Craft sticks
- Hot glue
- Hot glue guns
- Glue sticks
- Colored construction paper
- Rubber bands
- Paperclips
- Markers/ Colored Pencils
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Alternative Energy Challenge (Solar, Wind, and Hydro)

- Introduce science of solar & wind power generation and associated electronics.
- Introduce challenge constraints
- Students brainstorm ideas
- Design, plan, build prototypes

Suggested Time Frame: 12 weeks