

# **Pemberton Township School District**

## **Engineering IV Senior Project**

### **Standards & Indicators:**

#### **Technology Standards (2014):**

- 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.
- 8.2.12.A.2 Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
- 8.2.12.A.3 Research and present information on an existing technological product that has been repurposed for a different function.
- 8.2.12.B.1 Research and analyze the impact of the design constraints (specifications and limits) for a product or technology driven by a cultural, social, economic or political need and publish for review.
- 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.
- 8.2.12.B.3 Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
- 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.
- 8.2.12.B.5 Research the historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product, and present the competing viewpoints to peers for review.
- 8.2.12.C.1 Explain how open source technologies follow the design process.
- 8.2.12.C.2 Analyze a product and how it has changed or might change over time to meet human needs and wants.
- 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).
- 8.2.12.C.4 Explain and identify interdependent systems and their functions.
- 8.2.12.C.5 Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
- 8.2.12.C.6 Research an existing product, reverse engineer and redesign it to improve form and function.
- 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.
- 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.
- 8.2.12.D.2 Write a feasibility study of a product to include: economic, market, technical, financial, and management factors, and provide recommendations for implementation.
- 8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 8.2.12.D.5 Explain how material processing impacts the quality of engineered and fabricated products.
- 8.2.12.D.6 Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the

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individual, society, or the environment and publish conclusions.

8.2.12.E.3 Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).

### **Career Readiness and Practice Standards:**

CRP1. Act as a responsible and contributing citizen and employee.

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.

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.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

### **Differentiation**

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
<ul style="list-style-type: none"> <li>On Grade Level Activities plus Additional Projects Leadership Roles on Project Teams</li> <li>Mentoring Other Students</li> </ul>	<ul style="list-style-type: none"> <li>Projects</li> <li>Engineering Logbooks</li> <li>Presentations</li> <li>Project Meeting Minutes</li> <li>Team Meetings with Project Manager</li> </ul>	<ul style="list-style-type: none"> <li>On Grade Level Activities plus Projects based on student's abilities</li> <li>Extra time</li> <li>One on one coaching opportunities during study halls and after school tutoring</li> <li>Work with a student mentor</li> </ul>	<ul style="list-style-type: none"> <li>Projects</li> <li>Engineering Logbooks</li> <li>Presentations</li> <li>Project Meeting Minutes</li> <li>Team Meetings with Project Manager</li> <li>Extra time</li> <li>One on one coaching opportunities during study halls and after school tutoring</li> <li>Work with a student mentor</li> <li>IEP/504 accommodations will be implemented</li> <li>No penalization for spelling and/or grammar mistakes</li> <li>Allow the use of technology on assignments</li> <li>Allow for collaboration in small groups for assignments</li> </ul>