Pequannock Township School District Curriculum Syllabus

Prototypes

Course Description:

Prototypes with Inventor is a class designed to educate students about the cutting edge world of prototyping using modern technology. Rapid prototyping methods are ever advancing and changing so this course offers understanding with two of the most popular rapid prototyping methods, 3D printing and laser cutting. By educating students about how to use these technological tools the students will be able to expedite the prototyping phase of the design process and focus more on how to critically think and solve problems.

Course Standards:

Practice 2. Collaborating Around Computing

2 1. Cultivate working relationships with individuals possessing diverse perspectives, skills, and personalities.

2 2. Create team norms, expectations, and equitable workloads to increase efficiency and effectiveness.

2 3. Solicit and incorporate feedback from, and provide constructive feedback to, team members and other stakeholders.

Practice 6. Testing and Refining Computational Artifacts

6 1. Systematically test computational artifacts by considering all scenarios and using test cases.

6 2. Identify and fix errors using a systematic process.

6 3. Evaluate and refine a computational artifact multiple times to enhance its performance, reliability, usability, and accessibility.

9.2 Career Awareness, Exploration, and Preparation

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Scope and Sequence

Unit 1 – Foundation of Engineering & Problem Solving Technology Learning Activities	9.3.ST.5 9.3.ST-ET.1 9.3.ST-ET.2 9.3.ST-ET.4 9.3.ST-SM.2 9.3.ST-SM.4 8.2.12.D.1 8.1.12.F.1 CRP2 CRP4 CRP6 CRP8 CRP11 CRP12
Unit 2 – Weights and Measurements & Drawing and Scale	9.3.ST.5 9.3.ST-ET.2 9.3.ST-SM.1 8.1.12.A.1 8.2.12.C.5 8.2.12.D.3 8.1.12.F.1 CRP2 CRP4 CRP6
Unit 3 – Structural Engineering	9.3.ST-ET.1 9.3.ST-ET.2 9.3.ST-ET.4 9.3.ST-SM.2 8.1.12.A.1 8.2.12.B.1 8.2.12.C.7

Unit 4 – Electrical Engineering	9.3.ST-ET.1 9.3.ST-ET.2 9.3.ST-ET.4 9.3.ST- SM.2 9.3.ST-SM.4 8.1.12.A.1 8.2.12.D.1 8.2.12.E.3 CRP2 CRP4 CRP6
Unit 5 – Aerospace Engineering	9.3.ST-ET.1 9.3.ST-ET.2 9.3.ST-ET.4 9.3.ST- SM.2 9.3.ST-SM.4 8.1.12.A.1 8.2.12.C.3 8.2.12.D.1 ETS1.B ETS1.C CRP2 CRP4 CRP6 CRP8 CRP11 CRP12

Assessments

CCSS/NJCCCS/NGSS	Common Core State Standards/NJCCCS/NGSS
9.3.ST-ET.1	Use STEM concepts and processes to solve problems involving design and/or production.
9.3.ST-ET.2	Display and communicate STEM information.
9.3.ST-ET.4	Apply the elements of the design process.

9.3.ST-SM.2	Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.3.ST-SM.4	Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.
8.1.12.A.1	Create a personal digital portfolio.
8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
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.E.3	Use a programming language to solve problems or accomplish a task.
ETS1.B	When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability, and aesthetics and to consider social, cultural and environmental impacts.
ETS1.C	Criteria may need to be broken down into simpler ones that can be approached systemically, and decisions about the priority of certain criteria over others (tradeoffs) may be needed.
CRP4	Communicate clearly and effectively and with reason.
CRP6	Demonstrate creativity and innovation.
CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP12	Work productively in teams while using cultural global competence.

Curriculum Resources

http://www.sciencebuddies.org/engineering-design-process/engineering-design-compare-scientific-method.shtml

Home and School Connection

Instructional Resources:

http://www.state.nj.us/education/cccs/standards/9/

http://tryengineering.org/

Technology Resources:

http://bridgestoprosperity.org/

http://users.encs.concordia.ca/~nrskumar/Index_files/Mech390/Lecture/Lecture%201.pdf