STEM Elective 6 Overview

Content Area: **Engineering**
Course(s): **STEM 6**
Time Period:
Length: **90 Days**
Status: **Published**

Cover

EAST BRUNSWICK PUBLIC SCHOOLS

East Brunswick New Jersey

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Course Adoption: 2/10/1989

Curriculum Adoption: 2/10/1989

Date of Last Revision Adoption: 9/1/2017

Course Overview

COURSE DESCRIPTION

Students will need to meet the challenges of the 21st century. To help accomplish this, students have the opportunity to elect a technology elective in the 6th or 7th grades.

Students electing technology at Hammarskjold School will embark on a new journey as they utilize our state-of-the-art technology laboratory. The lab is outfitted with technology learning units (modules); each with a curriculum designed to integrate technological principles with academic and higher level thinking skills. Each module is a complete introduction to an area of studies that is practical and applicable to real jobs in the real world. The modules encourage students to learn independently as well as in teams and are designed in twelve-day increments.

What is a Module? Modules are complete learning stations (usually taking about ten to twelve days to complete) that include a computer workstation with relevant software and hardware, and a curriculum designed to introduce students to an area of study.

There are eighteen modules of this nature that students will have the opportunity to choose from as they move through the 90-day elective. Each student should be capable of completing four to five modules during their stay in each grade level. The modules include areas in:

Research and Design

Digital Manufacturing

Engineering Structures

DVD Authoring

Digital Audio Production

Computer Animation

Digital Music

Flight Transportation

Geographic Information Systems

Global Positioning System

Virtual Makeover

Digital Photography

Desktop Publishing

Computer Aided Design

Landscape Design

Graphic Design

Vinyl Sign Making

Artificial Intelligence

Students will also reinforce their knowledge of technological principles by completing Technological Learning Activities (TLA's). These (TLA's) will complement the material presented in the learning modules and will provide the students an opportunity to complete teacher directed open ended technological design challenges.

COURSE SCOPE AND SEQUENCE

Sequential Unit Descriptions	Other Pacing Guide References	Proficiency (Summative) Assessments

Unit 1-A – What is Technology? • Grading Rules • Safety guidelines • Define Technology • Steps of the Design Loop • Application of the Design Loop • Name Tag TLA	5 class periods	• Design Loop Quiz • Name Tag Project • Name Tag Presentation • Evaluation of student project as per rubric
Unit 1-B – Cantilever TLA Understand principles of cantilevers Design cantilever within constraints Test cantilever	5 class periods	• Evaluation of student project as per rubric
Unit 2 – Module Rotation Student Orientation/Introduction Technology – What is it? Technology Modules Explanation of modules Rotation through modules Student expectations of each module Teacher expectations of each module Lab/classroom safety Evaluation methods/grading Safety in the lab	12 class periods	• Daily response questions • Evaluation of student projects • Do Now Quiz
See Appendix 1 Unit 3 - Straw Tower TLA Learn building shapes Design straw tower with provided materials within constraints Test straw tower	5 class periods	• Testing and evaluation of student projects as per rubrics

Unit 4 – Module Rotation Student Orientation/Introduction Technology – What is it? Technology Modules Explanation of modules Rotation through modules Student expectations of each module Teacher expectations of each module Lab/classroom safety Evaluation methods/grading Safety in the lab	12 class periods	• Daily response questions • Evaluation of student projects • Do Now Quiz
See Appendix 1 Unit 5 – Flight & Glider TLA Introduction to the physics of flight as they pertain to fixed wind aircraft Design and construct a powered glider Trim, test and observe finished glider	8 class periods	• Flight Quiz • Testing and evaluation of student projects as per rubric
Unit 6 – Module Rotation Student Orientation/Introduction Technology – What is it? Technology Modules Explanation of modules Rotation through modules Student expectations of each module Teacher expectations of each module Lab/classroom safety Evaluation methods/grading	12 class periods	• Daily response questions • Evaluation of student projects • Do Now Quiz

Safety in the lab		
See Appendix 1 Unit 7 – Packaging TLA Learn basics of imperial measurement Practice using imperial measurement Design and construct a 3-d product using 2-dimensional building materials Test and evaluation final package	5 class periods	• Measurement Quiz • Testing and evaluation of student projects as per rubric
Unit 8 – Module Rotation Student Orientation/Introduction Technology – What is it? Technology Modules Explanation of modules Rotation through modules Student expectations of each module Teacher expectations of each module Lab/classroom safety Evaluation methods/grading Safety in the lab	12 class periods	• Daily response questions • Evaluation of student projects • Do Now Quiz
See Appendix 1 Unit 9 – Future Invention TLA Design future product based on given constraints and perceived societal and technological needs. Present and defend proposal to a class of peers.	5 class periods	• Student presentation of project • Evaluation of project based on rubric
Unit 10 – Module Rotation Student Orientation/Introduction	12 class periods	• Daily response questions • Evaluation of

Technology – What is it?

Technology Modules

Explanation of modules

Rotation through modules

Student expectations of each module

Teacher expectations of each module

Lab/classroom safety

Evaluation methods/grading

Safety in the lab

student projects

- Do Now Quiz

See Appendix 1

CONTENT FOCUS AREA AND COURSE NAME

Course Name: STEM Elective 6, #3300

Course Number	School Numbers	Course Level	Grades(s)	Credits	Min.Per Week	Elective/Required	Initial Course Adopted
3300	056	S	6	0.00	210	E	02/10/89

Textbooks and Other Resources

Textbook: Introduction to Technology (Pierce-Karwatka, 3rd Edition, 2005)

Depco Student Activity guides

Depco Media Plus presentation software

Applicable software for each module

Applicable hardware and consumables for each module

Standards

MA.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MA.7.G.A.2	Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
MA.7.RP.A.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
TECH.8.1.8.A.2	Create a document (e.g., newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
TECH.8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
TECH.8.1.8.C.1	Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
TECH.8.1.8.D.3	Demonstrate an understanding of fair use and Creative Commons to intellectual property.
TECH.8.1.8.D.4	Assess the credibility and accuracy of digital content.
TECH.8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
TECH.8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e., telephone for communication - smart phone for mobility needs).
TECH.8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
TECH.8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
TECH.8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
TECH.8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
TECH.8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
TECH.8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
TECH.8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
TECH.8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
TECH.8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals,

	businesses, industries and societies.
TECH.8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
TECH.8.2.8.B.CS2	The effects of technology on the environment.
TECH.8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
TECH.8.2.8.C.2	Explain the need for optimization in a design process.
TECH.8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
TECH.8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
TECH.8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
TECH.8.2.8.C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle.
TECH.8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
TECH.8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
TECH.8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
TECH.8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
TECH.8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.
TECH.8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.
TECH.8.2.8.D.6	Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.
TECH.8.2.8.E.1	Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
TECH.8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
TECH.8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
TECH.8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).

Grading and Evaluation Guidelines

GRADING PROCEDURES

In terms of proficiency level the East Brunswick grades equate to:

A Excellent - Advanced Proficient

B Good Above Average - Proficient

C Fair - Proficient

D Poor - Minimally proficient

F Failing - Partially Proficient

The final course proficiency grade will be based on students' performance throughout the course based on the identified New Jersey Core Content Standards for career and technical education (CPI's up to and including grade eight). Students' individual grades will be based on performance in:

COURSE EVALUATION

Course achievement will be evaluated based on the percent of all pupils who achieve the minimum level of proficiency (final average grade) in the course. Student achievement levels above minimum proficiency will also be reported. Final grades and marking period grades will be analyzed by staff for the total cohort and for sub-groups of students to determine course areas requiring greater support or modification.)

Other Details

71003 Engineering Technology
Engineering Technology courses provide an opportunity to focus on one or more areas of industrial technology. Students apply technological processes to solve real engineering problems; develop the knowledge and skills to design, modify, use, and apply technology; and may also design and build prototypes and working models. Topics covered in the course include the nature of technology, use of technology, and design processes.