

Fundamentals of Engineering Overview

Content Area: **Engineering**
Course(s): **FUND OF ENGIN**
Time Period:
Length: **90 Days**
Status: **Published**

Cover

EAST BRUNSWICK PUBLIC SCHOOLS

East Brunswick New Jersey

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Course Adoption: 1/7/1988

Curriculum Adoption: 1/7/1988

Date of Last Revision Adoption: 9/1/2017

Course Overview

COURSE DESCRIPTION

This course is an introduction to the basics of the graphic design language. Communicating through drawings and sketches generated on the computer are essential to many careers in business and industry. The areas of study covered include the use of freehand, mechanical and computerized instruments in developing drawings. One, two and three-view drawings are used to explain designs graphically as well as the language and terminology associated with each type of drawing. Through the use of TLA's (technology learning activities), the students will learn problem solving and design techniques. The problems will include the use of the design loop, computers and hands-on work. The students will be required to solve a problem and then produce the solution

COURSE SCOPE AND SEQUENCE

Sequential Unit Description	Other Pacing Guide References	Proficiency (Summative) Assessments
Unit 1 - Autodesk Inventor Introduction/Basic CAD Functions		
<ul style="list-style-type: none">• Course Introduction• PC Login/PC Basics• Autodesk Inventor Setup• Line Types/Weights• Basic Toolbar Functions• Type, Font, Size, Placement	2 days	Formative: Teacher Observation of student Progress Teacher Conferencing Summative: Drawing Plates
Unit 2 - Drawing a Titleblock in Autodesk Inventor		
<ul style="list-style-type: none">• Autodesk Inventor Setup• Titleblock• Type, Font, Size, Placement• Line Array• Change Origin• Read Measurements on Drawing	2 days	Formative: Teacher Observation of student Progress Teacher Conferencing Summative: Titleblock
Unit 3- Horizontal/Vertical/Angled Lines		
<ul style="list-style-type: none">• Drawing Tools• Horizontal/Vertical Lines	2 weeks	Formative: Teacher Observation of student Progress Teacher

<ul style="list-style-type: none"> • Lines on an Incline • Erase/Trim Tools • Centering • Scaled drawings 		<p>Conferencing</p> <p>Summative: Drawing Plates</p>
Unit 4 - Circles/Curves		Formative: Teacher
<ul style="list-style-type: none"> • Horizontal/Vertical Lines • Drawing Tools • Circles • Arcs 	2 weeks	<p>Observation of student Progress</p> <p>Teacher Conferencing</p> <p>Summative: Drawing Plates</p>
Unit 5 - Orthographic Sketching		Formative: Teacher
<ul style="list-style-type: none"> • Horizontal/Vertical Lines • Identification/Orientation of Isometric Views. • • Centering • Line types and thicknesses • Circles/Holes, • Countersink/Counterbore 	4 weeks	<p>Observation of student Progress</p> <p>Teacher Conferencing</p> <p>Summative: Orthographic drawing packet Hand Drawings Drawing Plates</p>
Unit 6- Dimensioning Drawings		Formative: Teacher
<ul style="list-style-type: none"> • Placement of dimensions • Placement of dimensioning lines 	3 weeks	<p>Observation of student Progress</p> <p>Teacher Conferencing</p> <p>Summative: Drawing Plates</p>
Unit 7 - Technology Learning Activities		Formative: Teacher
<ul style="list-style-type: none"> • Design Process/Design Challenge • Design Process/Design Loop • Problem Solving • Safety 	6 weeks	<p>Observation of Progress</p> <p>Planning Sketches in CAD Program</p> <p>Trial Run of TLA</p>

- Teamwork
- 3D CAD Sketching
- Managing Resources

Summative:
Project
Evaluation
Questions.
PowerPoint
presentation

CONTENT FOCUS AREA AND COURSE NAME

Course Name: Engineering and Design Technology 1 - #1306

Course Number	School Numbers	Course Level	Grade(s)	Credits	Min. Per Week	Elective/Required	Initial Course Adopted
1306	055	S	8-9	2.50	210	E	01/07/88

PRIMARY CONTENT AREA AND SECONDARY AREAS OF FOCUS

NJCCC Standard	NJCCC Standard	NJCCCS Standard	
1. Visual and Performing Arts	5. Science	S 9. 21st Century Life and Careers	P
2. Health and Physical Education	6. Social Studies		
3. Language Arts Literacy	7. World Languages		
4. Mathematics	S 8. Technology	P	

Standards

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.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.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.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
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.C.2	Explain the need for optimization in a design process.

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.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
TECH.8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
TECH.8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
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.2	Identify the desired and undesired consequences from the use of a product or system.
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.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
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.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
TECH.8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
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.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.B.7	Analyze the historical impact of waste and demonstrate how a product is up cycled, reused or remanufactured into a new product.
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.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.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.

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 and consumer, family and life skills (CPI's up to and including grade twelve). Students' individual grades will be based on performance in five units of instruction: Basic Drafting Techniques, 3D Drawings, Computer Aided Drafting, Structural Engineering, and Engineering Design.

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 where relevant mid-term and final exams, will be analyzed by staff for the total cohort and for sub-groups of students to determine course areas requiring greater support or modification.)

The goal of this course is for a minimum of 95% of the total number of enrolled students to attain at least the minimum proficiency level.

Other Details

21005 Engineering - Comprehensive

Engineering—Comprehensive courses introduce students to and expand their knowledge of major engineering concepts such as modeling, systems, design, optimization, technology-society interaction, and ethics. Particular topics often include applied engineering graphic systems, communicating technical information, engineering design principles, material science, research and development processes, and manufacturing techniques and systems. The courses may also cover the opportunities and challenges in various branches of engineering.

