Mechanical Engineering 1 Overview

Content Area: **Engineering**
Course(s): **MECHANICAL ENGINEERING I**
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 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. 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 - Vectorworks Introduction/Basic CAD Functions • Course Introduction • Mac Login/Mac Basics • Vectorworks Setup • Line Types/Weights • Basic Toolbar Functions • Type, Font, Size, Placement	3 days	Formative: Teacher Observation of student Progress Teacher Conferencing Summative: Drawing Plates
Unit 2 - Drawing a Borderplate in Vectorworks • Vectorworks Setup • Borderplate • Type, Font, Size, Placement • Line Array • Change Origin • Read Measurements on Drawing	2 days	Formative: Teacher Observation of student Progress Teacher Conferencing Summative: Borderplate
Unit 3- Horizontal/Vertical/Angled Lines • Drawing Tools • Lines on an Incline	2 weeks	Formative: Teacher Observation of student Progress Teacher

• Split/Trim Tools • Centering • Scaled drawings • Layers		Conferencing Summative: Drawing Plates
Unit 4 - Circles/Curves • Horizonal/Vertical Lines • Drawing Tools • Circles • Arcs	2 weeks	Formative: Teacher Observation of student Progress Teacher Conferencing Summative: Drawing Plates
Unit 5 - Orthographic Sketching • Horizonal/Vertical Lines • Identification/Orientation of Views • Centering • Line types and thicknesses • Circles/Holes, how to draw in different views. • Countersink/Counterbore	5 weeks	Formative: Teacher Observation of student Progress Teacher Conferencing Summative: Orthographic drawing packet Hand Drawings Drawing Plates
Unit 6- Dimensioning Drawings • Placement of dimensions • Placement of dimensioning lines	2 weeks	Formative: Teacher Observation of student Progress Teacher Conferencing Summative: Drawing Plates
Unit 7 - Technology Learning Activities • Design Process/Design Challenge • Design Process/Design Loop • Problem Solving • Safety	6 weeks	Formative: Teacher Observation of Progress Planning Sketches in CAD Program Trial Run of TLA

• Teamwork • Sketching • Managing Resources	Summative: Project Evaluation Questions. PowerPoint presentation

CONTENT FOCUS AREA AND COURSE NAME

Course Name: Engineering and Design Technology 1 - #1308 and #2301

Course Number	School Numbers	Course Level	Grade(s)	Credits	Min. Per Week	Elective/Required	Initial Course Adopted
1308	050	S	10-12	2.50	210	E	01/07/88
2301	055	S	8-9	2.50	210	E	01/07/88

Textbooks and Other Resources

Standards

TECH.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.
TECH.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.
TECH.8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
TECH.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.
TECH.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.
TECH.8.2.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
TECH.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.

TECH.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.
TECH.8.2.12.C.1	Explain how open source technologies follow the design process.
TECH.8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.
TECH.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).
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.C.6	Research an existing product, reverse engineer and redesign it to improve form and function.
TECH.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.
TECH.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.
TECH.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.
TECH.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.
TECH.8.2.12.D.4	Assess the impacts of emerging technologies on developing countries.
TECH.8.2.12.D.5	Explain how material processing impacts the quality of engineered and fabricated products.
TECH.8.2.12.D.6	Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
TECH.8.2.12.E.2	Analyze the relationships between internal and external computer components.
TECH.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).
TECH.8.2.12.E.4	Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

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.)

Other Details

71006 Engineering Design

Engineering Design courses offer students experience in solving problems by applying a design development process. Often using solid modeling computer design software, students develop, analyze, and test product solutions models and communicate the features of those models.

21007 Engineering Design and Development

Engineering Design and Development courses provide students with the opportunity to apply engineering research principles as they design and construct a solution to an engineering problem. Students typically develop and test solutions using computer simulations or models but eventually create a working prototype as part of the design solution.