

Electronics Engineering 1 Overview

Content Area: **Engineering**
Course(s): **ELECTRONICS ENGINEERING I**
Time Period:
Length: **90 Days**
Status: **Published**

Cover

EAST BRUNSWICK PUBLIC SCHOOLS

East Brunswick New Jersey

Superintendent of Schools

Dr. Victor P. Valeski

BOARD OF EDUCATION

Todd Simmens, President

Vicki Becker, Vice President

Susanna Chiu

Robert Cancro

Liwu Hong

Laurie Lachs

Barbara Reiss

Chad Seyler

Meredith Shaw

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 designed for students who want an introduction to electronics in preparation for further study in the area of information technology, college engineering or technical school programs. Topics covered are basic AC and DC components and circuits, test equipment, analysis techniques, amplifiers, power supplies, time constants and an introduction to computer components.

COURSE SCOPE AND SEQUENCE

Sequential Unit Description:	Other Pacing Guide References	Proficiency (Summative) Assessments
Unit 1: Electronics Foundations <ul style="list-style-type: none">• Defining electrical circuits• Defining Voltage, Current, Resistance and Power• Using breadboard, wire, and basic tools.• Basic electrical components• Soldering	5 weeks	Written Exam Labs.
Unit 2: Energy <ul style="list-style-type: none">• Voltage sources – AC vs. DC• Home Power Grid• Conservation/Alternate sources	2 Weeks	Research project on home power consumption and how alternative sources/more economical appliances could save energy.
Unit 3: Circuit Design and Analysis <ul style="list-style-type: none">• Reading and writing schematics• Calculating total voltages resistances, and current.• Electrical Laws• Transistors• Integrated Circuits• Resistor/Capacitor Circuits	5 Weeks	Practical exam on circuit construction and measuring. Labs.
Unit 4: Consumer Technology	2 Week	Research project

<ul style="list-style-type: none"> • Portable power • TV & Audio signals • Automobile electrical systems 		
Unit 5: Careers <ul style="list-style-type: none"> • Continuing education opportunities • Career possibilities 	1 Week	Class presentation on career possibilities
Unit 6: Group Project <ul style="list-style-type: none"> • Designing PCB layout • Research circuit design • Testing & troubleshooting 	4 Weeks	Class presentation on design process. Project evaluation rubric.

Textbooks and Other Resources

- Power supplies for each pair of students
- DMMs for every four students
- Breadboards, wires, resistors, etc.

Standards

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.

CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.
TECH.8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
TECH.8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
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.A.CS1	The characteristics and scope of technology.
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

COURSE EVALUATION

Each quarter students will be evaluated with tests and programming assignments using a total point basis to determine the quarter average. The semester/course average will be a weighted average of the 2 quarter averages (40% each) and a final exam (20%); in a full year course, each quarter is worth 20% of a student's

final grade and each exam (midterm & final) is worth 10% of the student's final grade.

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

21008 Digital Electronics

Digital Electronics courses teach students how to use applied logic in the development of electronic circuits and devices. Students may use computer simulation software to design and test digital circuitry prior to the actual construction of circuits and devices.