Foundations of Electronics

Course Description:

This foundational course is designed for students interested in careers related to the design, production, analysis, repair, and operation of devices that use electronics. Students will study and apply the fundamentals of electricity and electronic systems through project-based learning activities. Topics include the theory and operation of basic components, circuit connections, and circuit design.

Classroom Procedures:

Entering the Classroom:

- Enter the classroom quietly take out your composition notebook and record the days Learning Target, Essential Question, and Agenda. ***(No food, drinks, or phones)***.
- Gather necessary materials for the days lesson and hang all bags on the back of the chair that you are occupying. ***(Specific materials will be highlighted on the Energy Systems White Board)***.
- Begin work on opening exercise quietly.

Exiting the Classroom:

- Secure all classroom equipment and place in assigned area.
- Ensure that your area is clean and clear before leaving. ***(This includes computer workstations that you were utilizing or other assigned spaces)***.
- Turn-in classroom assignments to appropriate physical or digital drop box.
- Return to your assigned seat until the bell rings and you are dismissed by the instructor.

Disciplinary Actions: *The order and type of consequences depend on the nature and severity of the infraction.*

- Verbal Warning
- Lunch Detention and phone call home. *(Minor Infractions)*.
- Counselor Referral.
- Discipline Referral. (*Major and Chronic Disciplinary Infractions)*.

Course Standards:

Standard 1: Employability Skills

- 1.1: Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.

- 1.2: Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.
- 1.3: Exhibit critical thinking and problem-solving skills to locate, analyze, and apply information in career planning and employment situations.
- 1.4: Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.
- 1.5: Apply appropriate skill sets to be productive in a changing, technological, diverse workplace.
- 1.6: Present a professional image through appearance, behavior, and language.

Standard 2: Understanding Engineering and Electronics

- 2.1: Explain a contemporary definition of engineering and electronics.
- 2.2: Identify education requirements for engineering and electronics occupations.
- 2.3: Match engineering and electronics job titles with qualifications and responsibilities.
- 2.4: Participate in activities related to career interests.
- 2.5: Explain the relationship of engineering and electronic disciplines to a green environment and sustainability.

Standard 3: Safety, Health, and Environmental Standards

- 3.1: Implement workplace and product safety standards.
- 3.2: Interpret safety signs, symbols, and labels.
- 3.3: Demonstrate and incorporate safe laboratory procedures.
- 3.4: Explain the economic impact of safety practices in business and industry.
- 3.5: Use appropriate Personal Protective Equipment (PPE) and follow work area organization procedures.

Standard 4: Tools and Machines

- 4.1: Identify, select, and use appropriate tools and machines for specific tasks.
- 4.2: Demonstrate safe use of tools and machines.
- 4.3: Use precision tools and instruments to measure and convert units.
- 4.4: Utilize computer hardware and software for data documentation.
- 4.5: Apply proper maintenance techniques for tools, machines, and hardware.

Standard 5: History and Development of Electron Theory

- 5.1: Discuss the history of electron theory.
- 5.2: Identify the atom: protons, neutrons, and electrons.
- 5.3: Identify material conductivity and insulators.

Standard 6: Electronic Theories

- 6.1: Define Ohm's law and its components.
- 6.2: Define Kirchhoff's law and its components.
- 6.3: Define Watt's law and its components.
- 6.4: Design and analyze a simple circuit.
- 6.5: Demonstrate the use of metric prefixes and value conversions.

Standard 7: Electronic Components

- 7.1: Identify Resistor Color Code and component polarity.
- 7.2: Identify and describe various resistors, capacitors, transistors, coils, semiconductors, etc.
- 7.3: Discuss circuit design and construction.
- 7.4: Develop and evaluate a prototype device.

Standard 8: Techniques and Processes in Electronics Systems

- 8.1: Explain and demonstrate basic soldering techniques.
- 8.2: Explain procedures for connecting circuit components.
- 8.3: Conduct laboratory experiments utilizing appropriate soldering techniques.
- 8.4: Evaluate prototype produced.

Academic Standards Integration:

- **Science**: Understanding energy forms, Newtonian physics, quantum mechanics, and relativity.
- **Mathematics**: Computation and estimation skills, problem-solving, mathematical connections.
- **ELA/Literacy**: Reading, writing, and discussion skills relevant to technical subjects.

Topics Breakdown and Weekly Schedule:

Week 1-2

- Introduction to Electronics and Engineering
- Overview of Career Opportunities in Electronics

Week 3-4

- Basic Safety Practices and Standards (OSHA, EPA, ISO, etc.)

Week 5-6

- Tools and Equipment: Identification, Usage, and Safety

Week 7-8

- History and Development of Electron Theory

Week 9-10

- Ohm's Law and Simple Circuits

Week 11-12

- Kirchhoff's Law and Complex Circuits

Week 13-14

- Watt's Law and Power Calculations

Week 15-16

- Introduction to Resistors, Capacitors, and Inductors

Week 17-18

- Transistors and Semiconductor Devices

Week 19-20

- Circuit Design and Prototyping

Week 21-22

- Soldering Techniques and Component Connections

Week 23-24

- Project-Based Learning: Designing and Building a Prototype

Week 25-26

- Advanced Topics in Electronics

Week 27-28

- Final Project Work and Evaluation

Week 29-30

- Presentation and Demonstration of Final Projects

Week 31-32

- Course Review and Final Assessments

Assessment Methods:

Major Grades= 40% Minor Grades= 60% Total= 100%

- Classwork/Homework = Minor
- Quizzes = Minor
- Exams = Major
- Papers/Presentations/Debates = Major
- Projects & Engineering Notebook = Major

Late Assignments: Late work/assignments are defined as, "assignments that are submitted after the specific deadline".

- Late assignments may result in scores being reduced by 5% per school day for a 25% maximum reduction (five school days).
- Late work submitted after the fifth school day will **NOT** be accepted.
- Repeated incidents of late work may result in a teacher-student-parent conference to examine and correct the student's work habits through an academic contract.

Resources:

- Textbook: Electricity & Electronics 10th Edition
- Scientific journals and articles
- Online databases and tools
- Guest speakers from the energy industry

Materials:

- 5 Composition Notebooks
- Pens or Pencils
- Wired Headphones with 3.5mm jack
- 2-3" Binder (Engineering Notebook)
- Loose Leaf Paper (College Rule OK)

This syllabus provides a comprehensive overview of the Foundations of Electronics course, integrating practical skills with theoretical knowledge to prepare students for careers in electronics and related fields.

_____ Thomas M. Gonzales, MSCIA

Student Printed Name

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Student Signature and Date

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Parent Printed Name

_____

Parent Signature and Date

Security+, Energy Industry Fundamentals
Energy & Power/Electronic Pathways
Richmond County Technical Career Magnet
gonzath@boe.richmond.k12.ga.us
706-823-5580 ext. 1543