East Early College High School

Faculty of Engineering
Sophomore Class

Course Name: AC/DC Electronics

Mission of School: The mission of East Early College High School is to prepare underrepresented populations for a successful college experience through increasing rigor, developing supportive relationships, and showing the relevance of knowledge to real life experiences. We strive to graduate all incoming freshmen in four years with not only the advanced high school diploma but also with up to 60 hours of college credit.
Vision of Faculty of Engineering: The Faculty of Engineering will endeavor to nurture young engineers for innovation and creativity dedicated to problem solving and lifelong learning for research, entrepreneurship, and professionalism with respective communities.

Instructor:

Name	Email	Office Location & Tutoring Hours
Tawhidul Islam	Tawhidul.islam@houstonisd.org	Room 269, Any day after school by appointment

Course Description:

AC/DC Electronics focuses on the basic electricity principles of alternating current/direct current (AC/DC) circuits. Students will demonstrate knowledge and applications of circuits, electronic measurement, and electronic implementation. Through use of the design process, students will transfer academic skills to component designs in a project-based environment. Students will use a variety of computer hardware and software applications to complete assignments and projects. Additionally, students will explore career opportunities, employer expectations, and educational needs in the electronics industry.

TEKS: AC/DC Electronics

- https://www.txcte.org/course-binder/acdc-electronics

Expectations

- Students should adhere to classroom/campus safety guidelines both on and off campus.
- Students should be willing to take a risk and think outside the box.
- Students should be patient and helpful to teammates.
- Students should manage their time and project calendars.
- Students should respect their teachers and classmates.
- Students should take an active role in their class projects and activities.
- Students should do their best on all assignments and presentations.
- Students should document and justify their work and processes.
- Students should follow all acceptable use policies and adhere to the Code of Conduct.

Program Goals

- Ignite the student's passion for learning
- Create an environment where students can take risk
- Grow students as independent thinkers and researchers
- Promote teamwork, problem solving, and critical thinking
- Provide meaningful learning experiences through: challenges, project-based learning units, competitions, hands-on activities, and real-world applications
- Build the students' expertise in areas related to Science, Technology, Engineering, and Mathematics
- Provide opportunities for students to explore concepts and make connections to other courses
- Improve student writing and communication skills
- Prepare and motivate students to enter a post-secondary STEM related field, through college or technical training
- Get students involved
- Encourage student creativity and innovation

Course Outcome:

The course is designed to provide students with:

- Definition of Voltage, Current, Power, Energy; Conductors, Insulators, Semiconductors and Superconductors; Resistance and Conductance, Temperature Effects on resistance of a material, Ohm's Law, Total resistance of a series circuit; Kirchhoff's Voltage law (KVL); Related Problems.
- Voltage divider rule, Related Problems; Voltage sources and ground, Single subscription and double subscription notation of voltages. Internal resistance of voltage source; Total resistance and conductance of a parallel circuit, Kirchhoff's Current Law (KCL); Current divider rule; Related Problems.
- Voltage sources in series; Voltage sources in parallel; Open and short circuits, related problems; Series-Parallel network; Methods for solving such networks, related problems; Ladder networks, Voltage Divider (loaded and unloaded); Current sources; related problems.
- Source conversion; Current sources in parallel, current sources in series; Related problems; Branch current analysis; Mesh Analysis; Related problems. Super-Mesh Analysis; Related problems. Nodal Analysis; Super-Node Analysis; Related problems.
- Y-Delta and Delta-Y conversions; Related problems; Dependent Current Source, Dependent Voltage Source; Continuation of dependent sources; Related Problems.
- Electric Field; Capacitance; Dielectric strength; leakage current, Various types of capacitors. Transients in Capacitive networks: Charging Phase; Related problems. Transients in Capacitive networks
- 3 phase circuit, Generator, Transformer, Motor.
- De-Morgan's law.
- Universal gates and their applications.

Grading system

Quiz	30%
Project	20%
Assignment & performance	30%
Semester final exam	20%
Total	100%

Resources:

Curriculum and instructional materials will be in the students online Google Classroom. Students will be given a code at the beginning of the year to access the digital classroom.

Just being present in the class is not enough- students must participate in classroom discussions

Reference Book:

Maximum topics will be covered from the textbook. For the rest of the topics, reference books will be followed. Some Class notes will be uploaded on the web. White board will be used for most of the time.

- Robert L. Boylestad, “Introductory Circuit Analysis”, 12th Edition, Prentice Hall Inc.
- Robert P. Ward, “Introduction to Electrical Engineering”, 3rd Edition,Prentice Hall Inc
- Charles K. Alexander & Mathew N.O. Sadiku, “Fundamentals of Electric Circuits”,