



Queen Anne's County High School  
Project Lead The Way  
Digital Electronics  
Course Syllabus  
2022-2023



Teacher: **Mr. Alex Herman** Room Number: **318**  
Department: Career and Technical Education CTE Year in School/Grade: **9, 10, 11, 12**  
Phone: 410-758-0500 ext. **172** Prerequisites: **IED, POE, Algebra 2**  
Email: **Alexander.Herman@qacps.org** Credit: **1**  
**Office Hours:** Upon request, if available, given at 24 hours notice.

**Course Resources:**

Materials/Equipment:

- A. Blue or Black Ink Pen
- B. Laptop
- C. Engineer's Log – Bound Graphing or Composition Book. A supplemental 3 ring binder with graph or ortho paper may be used to take notes.
- D. Eyeglasses or safety glasses worn daily - **a class set is possibly available pending COVID related disinfecting protocols.**

**Course Purpose:**

Digital Electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by discrete voltages or logic levels. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world of electronics.

**Course Objectives - Students will demonstrate:**

- A. An ability to apply knowledge of mathematics, science and engineering.
- B. An ability to design and conduct experiments, as well as to analyze and interpret data.
- C. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- D. An ability to identify, formulate, and solve engineering problems.
- E. An understanding of professional and ethical responsibility.
- F. An ability to communicate effectively.
- G. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.
- H. A recognition of the need for, and an ability to engage in life-long learning.
- I. A knowledge of contemporary issues.
- J. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Course Content:**

- Foundations of digital electronics
- Scientific and engineering notation
- Electronic component identification
- Basic soldering and PCB construction
- Electron theory and circuit theory laws
- Circuit simulation
- Breadboard prototyping
- Component datasheets and troubleshooting
- Combinational logic, analysis and design
- Binary, Octal and Hexadecimal number systems
- Boolean algebra and DeMorgan's Theorem
- AND-OR-INVERT, NAND only, and NOR only logic designs
- Binary adders and two's complement arithmetic
- Combinational logic design with field programmable gate arrays
- Sequential logic analysis and design
- Flip-flops, latches, and their applications
- Asynchronous OR synchronous counter design with small and medium scale integrated circuits
- Sequential logic design with field programmable gate arrays
- Introduction to state machines
- Introduction to microcontrollers
- Software development for an introductory microcontroller
- Real-world interface: introduction to hardware controls
- Process control with a microcontroller

**Lab Safety/Health:**

It is the responsibility of the students to follow the training of safe practices in the technology and engineering education lab. The safety program consists of more than lecturing and posting safety rules and regulations. It includes instruction that actively involves the students in learning and choosing behaviors that promote the safe use of equipment that is used in the technology and engineering education lab. The implementation and promotion of safe practices in the technology and engineering education lab to prevent incidents and injuries to students are the responsibility of everyone. It is the student's responsibility to adhere to all safety rules and regulations, including but not limited to wearing PPE, as well as refraining from eating or drinking.

**Student Achievement:**

Final Exam:	Assessment of Overall Course Knowledge	15%
Formative:	Daily assignments and Engineering Notebook	40%
Summative:	Projects, Quizzes, Tests	45%
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Total:		100%

**Grade Scale:**

90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
0 – 59%	E

**Make Up Work:**

It is the student's responsibility to contact the teacher for missing work due to absence for any reason, including but not limited to illness or sports. The expectation is for the student to come to the teacher for missing assignments upon returning to class, as well as to discuss anything else they have missed. It is also expected that the student has already checked for course material available through the learning management systems used in the course, prior to conferencing with the teacher.

**College Credit:**

College credit is available through Rochester Institute of Technology (RIT). To qualify for application for college credit, students must earn both an 85% or higher in the course, as well as receive a 6 or higher on the end-of-year exam. The cost for each course is \$200 and each course is worth three semester credits. Credits are transferable to other colleges and universities throughout the country, subject to the transfer policy of that institution.

**Expectations for a Successful Learning Environment:**

You can expect me:

- A. To start class on time and release students when appropriate.
- B. To reply to emails within 24 hours on weekdays and 48 hours on weekends.
- C. To respect students, instructors and equipment.
- D. To have a positive attitude each day.

I can expect you:

- A. To come prepared to class on time.
- B. To be attentive and engaged in class and to work assigned.
- C. To spend an adequate amount of time on the assigned work each day, making an effort to solve and understand each assignment.
- D. To make up assigned work after an absence.
- E. To seek help when appropriate.
- F. To respect students, instructors and equipment.
- G. To complete a cleanup of the class and lab before dismissal.
- H. To have a positive attitude each day.

**Consequences for Not Meeting Expectations**

1. Verbal warning
2. Meeting with teacher/Parent Communication
3. Referral/Parent-Student-Teacher Conference
4. Further action escalated to administration

**Technology Policy**

- A. Cell phone use is NOT permitted during class. They should be off/silent and out of sight. Students are never permitted to touch another student's cell phone.
- B. Earbuds, headphones and listening devices are also NOT permitted in class. This includes having them on while not in use.
- C. Laptops and computers are permitted in class but are used for educational purposes only and will be shut down and closed during lessons to promote attention.

Failure to adhere to the technology policy will result in the following procedures.

- A. Student will be asked to put technology away.
- B. Student will be asked to place technology in their numbered slot on the wall and the item may be retrieved with permission at the end of class.
- C. Phone call to guardian.

**EMERGENCY PROCEDURES**

*All emergency procedures (fire drills, weather drills, etc.) have been reviewed with the students as they pertain to evacuation and/or shelter in place situations. Each drill's instructions are specific to the classroom location and crisis situation. If you have any questions or concerns about what your student should do in the case of an emergency, please speak to your student and/or email me directly.*

**Please keep the above for your information.**

**Please detach the final page and return signed to Mr. Herman.**

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**PLTW Digital Electronics  
Course Syllabus and Expectations**

My signature indicates that I have read and understand the Engineering Design and Development Syllabus and Expectations guide and will abide by the guidelines mentioned within.

**Student's Printed Name:** \_\_\_\_\_

**Student's Signature:** \_\_\_\_\_

Guardians Contact Information. Please circle the best way to contact you.

Phone (home or cell) \_\_\_\_\_

E-mail \_\_\_\_\_

**Guardian's Signature:** \_\_\_\_\_

Date: \_\_\_\_\_

Any additional information you would like me to know:

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