PLTW   DIGITAL ELECTRONICS

Mr. English   Technology Education
                                                 Nottingham High School

Course Overview:

       Digital Electronics (DE) is a high school level course that is appropriate for 11th or 12th grade students who are interested in computer design and electronics. DE gives students the opportunity to develop skills and understanding of course concepts through Activity-, Project-, and Problem-Based (APPB) learning. Used in combination with a teaming approach, APPB-learning challenges students to continually hone their interpersonal skills, creative abilities and understanding of the design process. It also allows students to develop strategies to enable and direct their own learning, which is the ultimate goal of education. Students will us state of art electronics equipment including a programmable FPGA board where the students will learn the basics of electronics engineering and a modeling design software package to help them design solutions to solve proposed problems.

       Digital Electronics is one of three foundation courses in the Project Lead The Way® high school pre-engineering program. The course applies and concurrently develops secondary level knowledge and skills in mathematics, science, and technology.

The course of study includes:

Foundations of Digital Electronics
- Scientific and Engineering Notations
- Electronic Component Identification
- Basic Soldering and PCB Construction
- Electron Theory & Circuit Theory Law
- Circuit Simulation
- Breadboard Prototyping
- Component Datasheets & 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 Design.
- 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 Counter Design with Small and Medium Scale Integrated Circuits
- Synchronous Counter Design with Small and Medium Scale Integrated Circuits
- Sequential Logic Design with Field Programmable Gate Array
- Introduction to State Machines.

Please visit my class website: https://nottinghamtech.com/

<u>Introduction to Microcontrollers</u>

       Software Development for a Introductory Microcontroller

       Real-World Interface: Introduction to Hardware Controls

       Process Control with a Microcontroller

<u>What you will need:</u>

On-time to class, regular tardiness will warrant further actions, including but not limited to- detention after school, removal from classroom, and lowering of grade

To dedicate outside of class time to complete all assignments

A willingness to work as a team (Engineers seldom work alone)

Creative ability to think through problems and solve new ones as they arise

<u>Grading</u>:

       Classwork   20%
       Homework   10%
       Participation   10%
       Projects   35%
       Quizzes   10%
       Tests   15%

       All work is due complete and on a timely manner by the due dates supplied at the beginning of each assignment. Work turned in late will be graded accordingly; each day late with result with a lowering of grade 5 points per day. Work turned in one week after original due date will result in a zero.

Please visit my class website: **https://nottinghamtech.com/**