WHAT DO STUDENTS LEARN IN TECHNOLOGY EDUCATION?

In a word, it is about INNOVATION! It is about how people think! It is how to apply technology in the solutions of problems facing society. The aim is to solve problems and create opportunities within a realistic context. That context can start with the student's everyday environment and progressively move into more global issues.

Examples of technology problems and learning situations could be the cleaning of a stream that has become polluted, the creation and fabrication of an invention to solve a household problem, or designing and building of a habitat for a unique situation. The thinking process is closely related to that of an engineer, hi-tech worker, designer, or architect.

Students apply their ingenuity with tools, materials, processes, and resources to create solutions and opportunities for themselves and others. The nature of learning goes from the very early years of just "knowing" to more developed applications that might relate to the medical, agricultural, energy and power, information and communication, transportation, manufacturing, and construction technologies. It is a new and dynamic subject in our schools that is as fast moving and as up-to-date as the thinking of technology in our society! It is the future workforce thinking!

Adapted from An Educational Imperative, ITEA 2005.

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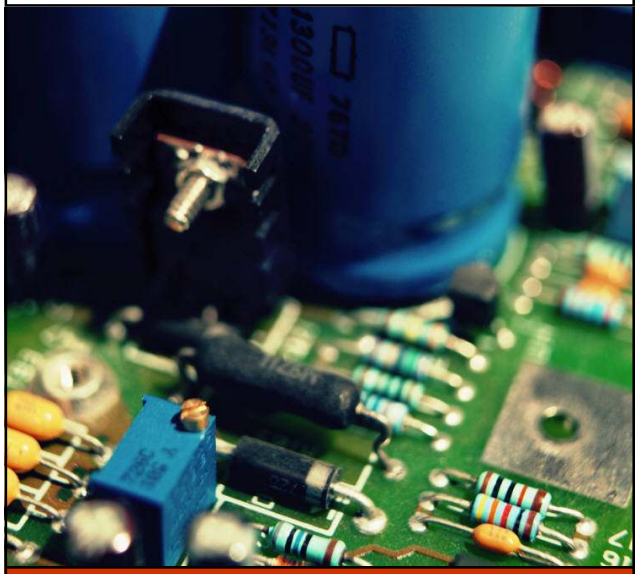
Indiana Department of Education

INDIANA TECHNOLOGY EDUCATION



DIGITAL ELECTRONICS

PROJECT LEAD THE WAY

TECHNOLOGY EDUCATION

ARE STUDENTS READY for the technological and engineered world? This question is more important today than ever before. As most kids play with technology, a central question that occurs is do they know what they can **DO** with it? Technology Education is the answer. Students who study technology apply problem-based learning that integrates (STEM) Science, Technology, Engineering, and Mathematics.

Students learn important skills and concepts needed for the workforce and society. This standards based curriculum can become a springboard for career exploration as well as a basis for determining personal goals for higher education.

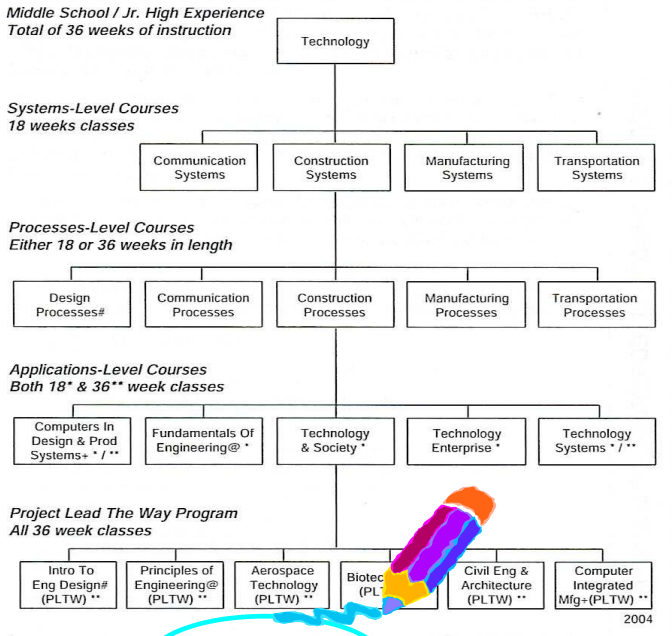
The Curriculum- The Indiana Technology Education curriculum is a **standards-based**, hands-on, minds-on program that applies and integrates academic concepts from Science, Technology Engineering, and Mathematics (STEM). The curriculum is designed for all students.

Digital Electronics #5538

Digital Electronics Technology is a course of study in applied digital logic that encompasses the design and application of electronic circuits and devices found in video games, watches, calculators, digital cameras, and thousands of other devices. Instruction includes the application of engineering and scientific principles as well as the use of Boolean algebra to solve design problems. Using computer software that reflects current industry standards, activities should provide opportunities for students to design, construct, test, and analyze simple and complex digital circuitry.

- Suggested Grade Level: 11-12
- Recommended Prerequisites: Completion of two Project Lead The Way courses
- A two to six credit course over two semesters. Schools on block schedules may adjust the total number of credits to meet the local standard.
- The nature of this course allows for a second year of instruction provided that content and standards address higher levels of knowledge.
- A Core 40 directed elective as part of a technical career area.
- This course qualifies as an Academic Honors Diploma elective.
- Schools involved in Project Lead The Way must use the content standards developed for this pre-engineering program.
- This course is included as a component of the Engineering, Science, and Technologies career cluster and may also be included as part of the Manufacturing and Processing career cluster.

INDIANA TECHNOLOGY EDUCATION CURRICULUM



PLTW titles of **Digital Electronics** and **Engineering Design and Development** appear under the multidisciplinary category of the Indiana Department of Education guidelines.

All Technology Education courses are **Core 40 Directed Electives** as a part of a Career & Technical Area. These courses can be used in creating **4-year course plans and Career Academic Sequences** to support students in earning 8-10 credits for the Core 40 with Technical Honors Diploma.

Students working on an **Academic Honors Diploma** may also apply Technology Education credits toward their electives.

Topics of Study

This course introduces students to applied digital logic, a key element for many careers in engineering and engineering technology. This course explores the smart circuits found in watches, calculators, video games, and computers. Students use industry standard computer software in testing and analyzing digital circuitry. They design circuits to solve problems, export their designs to a printed circuit auto-routing program that generates printed circuit boards, and use appropriate components to build their designs. Students use mathematics and science in solving real-world engineering problems. Topics of study include:

- **Fundamentals** Safety, Basic Electron Theory, Engineering Notation, Resistors, Laws, Capacitance, Analog and Digital Fundamentals, Analog and Digital Waveforms
- **Number Systems** Conversions
- **Gates** Logic Gates and functions
- **Boolean Algebra** Boolean Expressions, Logic Simplifications, Duality of Logic Functions, circuit design
- **Combinational Circuit Design** Paradigm for Combinational Logic Problems, Specific Application MSI Gates, Programmable Logic Devices (PLD)
- **Adding** Binary Addition
- **Flip-Flops** Introduction to Sequential Logic, The R-S Flip-Flop, The Flip-Flop Types, Flip-Flop Triggers, Asynchronous Inputs, Flip-Flop Timing Considerations, Elementary Application of Flip-Flop
- **Sequential Logic** Discrete Asynchronous Counters, integrated Asynchronous Counters, Discrete Synchronous Counters, Integrated Synchronous Counters, PLD Implementations of Counters
- **Families and Specifications** Logic Families, Spec Sheets
- **Microprocessors** Introduction to Microprocessors, Using Outputs, Input Devices, Interfacing with Motors
- **Student Directed Study Topics** Design Paradigm, Examples

Requisite: Concurrent enrollment in college preparatory mathematics