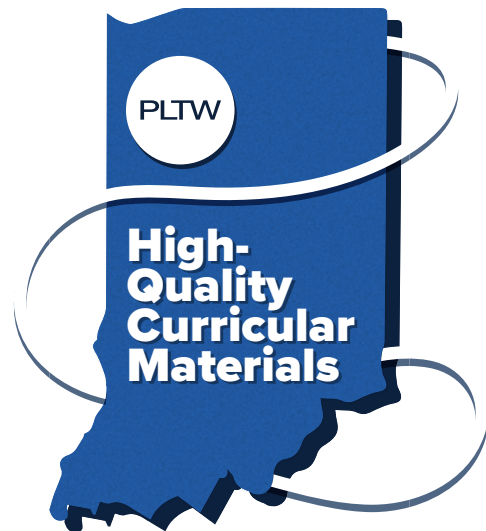
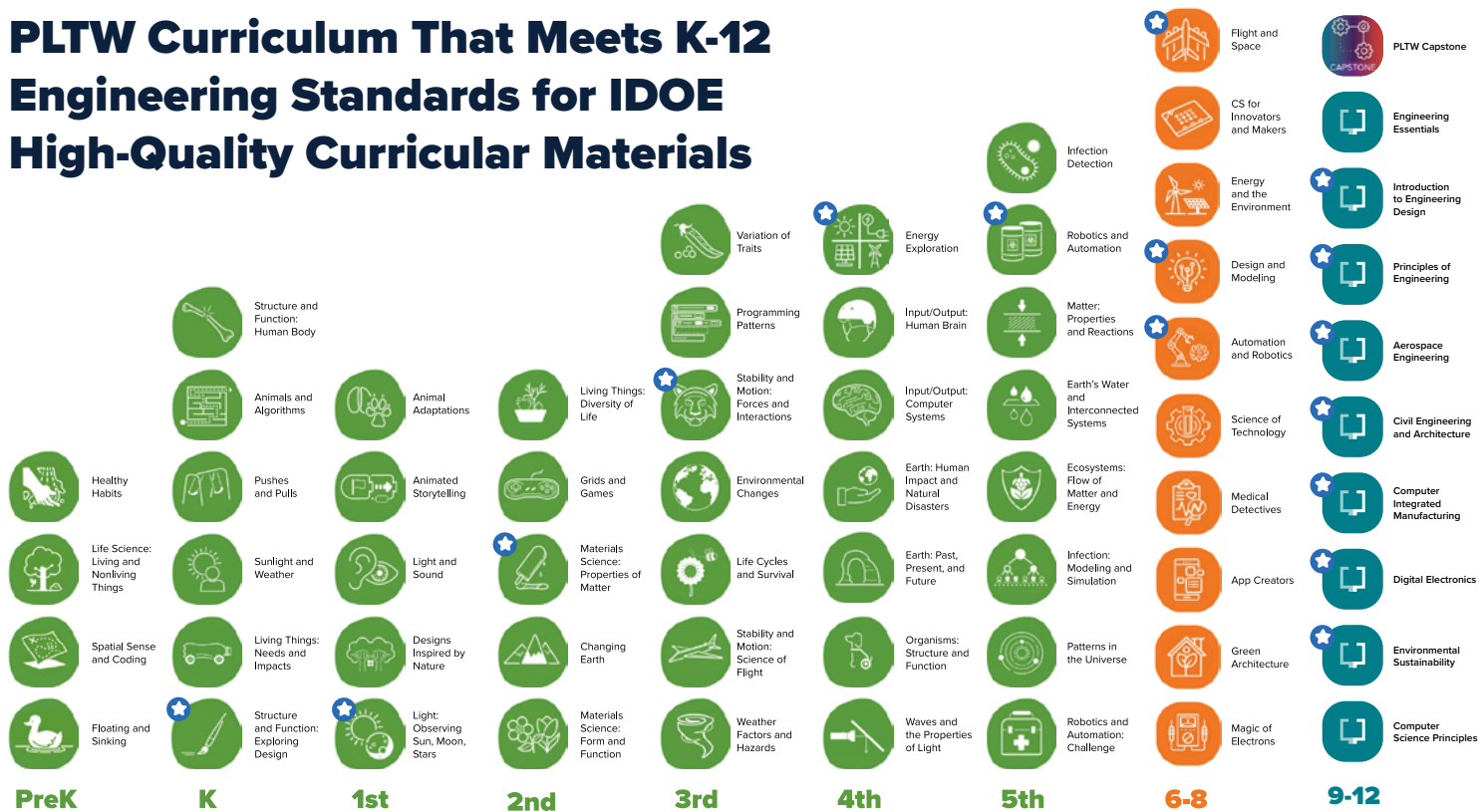



Indiana High-Quality Curricular Materials for K-12 Engineering

The Indiana Dept of Education has created a High-Quality Curricular Materials advisory list for K-12 Engineering, and PLTW is proud to have been selected to that list. Here are the descriptions of the PLTW curriculum that helps you meet the state's engineering standards.



PLTW Curriculum That Meets K-12 Engineering Standards for IDOE High-Quality Curricular Materials



 Modules, Units, and Courses Supporting
2023 Indiana Academic Standards

GRADE K **Structure and Function: Exploring Design**

Students discover the design process and how engineers influence their lives. They explore the elements of structure and function by identifying products around them designed by engineers and asking questions engineers might ask. They are introduced to a design problem through a story in which Angelina wants to design a paintbrush. Students apply their knowledge from the module to design their own paintbrushes.

GRADE 1 **Light: Observing the Sun, Moon, and Stars**

After observing the sun, moon, and stars, students identify and describe patterns in their recorded data. Angelina, Mylo, and Suzi introduce the design problem, which challenges students to create a playground structure designed to protect students from ultraviolet radiation. Students utilize their knowledge of light to design, build, and test structures created to solve this problem. Students then evaluate their designs, share their findings, and explore ideas to improve their structures based on the testing data.

GRADE 2 **Materials Science: Properties of Matter**

In this module, students investigate and classify different kinds of materials by their observable properties, including color and texture, and heat conduction. Students learn about states of matter and properties of materials. They investigate which materials are good insulators and which are good conductors. After building their knowledge and skills throughout the module, students determine the best materials to use as they design a prototype to keep an ice pop frozen for at least 30 minutes.

GRADE 3 **Stability and Motion: Forces and Interactions**

Students explore simple machines such as wheel and axles, levers, the inclined plane, and more. They investigate the effects of balanced and unbalanced forces on the motion of an object. Angelina, Mylo, and Suzi go on a field trip to the zoo and are faced with the design problem of how to rescue a trapped tiger. Students then apply their knowledge of forces and devise a way to rescue a heavy zoo animal while keeping it safe throughout the process.

GRADE 4 **Energy Exploration**

Students engage in explorations of energy-related phenomena. They make observations, pose questions, and make connections as they investigate energy transfers. Throughout the module, students explore connections to careers and to the necessity of energy in real-life as they visit multiple business owners through the Main Street interactive experience. To deepen their understanding of energy, students design an investigation to test what happens when marbles collide on a track. Each business owner presents a problem that needs to be solved. Students select a problem and use the design process to apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

GRADE 5 **Robotics and Automation**

Students explore the ways robots are used in today's world and their impact on society and the environment. Students learn about a variety of robotic components as they build and test mobile robots that may be controlled remotely. Angelina, Mylo, and Suzi are tasked with designing a mobile robot that can remove hazardous materials from a disaster site. Students are then challenged to design, model, and test a mobile robot that solves this design problem.

GRADES**6-8**

Design and Modeling

Students discover the design process and develop an understanding of the influence of creativity and innovation in their lives. They are then challenged and empowered to use and apply what they've learned throughout the unit to design a therapeutic toy for a child who has cerebral palsy.

Flight and Space

The exciting world of aerospace comes alive through the Flight and Space (FS) unit. Students become engineers as they design, prototype, and test models to learn about the science of flight and what it takes to travel and live in space. They solve real-world aviation and space challenges and plan a mission to Mars.

Automation and Robotics

Students are given the opportunity to combine mechanisms with input and output devices to automate the mechanisms. Construction and programming skills are layered, and projects and the problem provide students the opportunity to connect their learning throughout the lessons in the unit. Students take on the role of interns, and work in teams to identify design requirements and create prototypes to meet the needs of clients. They also explore different aspects of automation and robotics, and experience how solving real-life problems involves the teamwork of mechanical engineers, software developers, and electrical engineers.

**GRADES****9-12**

Aerospace Engineering

Students explore the physics of flight and space through software simulations and hands-on experiences. They bring concepts to life by designing and testing an airfoil, propulsion system, and a rocket. Students learn how these concepts apply to a career in aerospace engineering and other engineering fields.

Civil Engineering and Architecture

Students learn important aspects of building and site design and development, and then they apply what they know to design both a residential building and a commercial facility.



GRADES

9-12

Computer Integrated Manufacturing

Students discover and explore manufacturing processes, product design, robotics, and automation, and then they apply what they have learned to design solutions for real-world manufacturing problems.

Digital Electronics

Students explore the foundations of computing by engaging in circuit design processes to create combinational logic and sequential logic (memory) as electrical engineers do in industry.

Environmental Sustainability

Students investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply, and renewable energy.

Introduction to Engineering Design

Students dig deep into the engineering design process, applying math, science, and engineering technology to hands-on projects like designing a new toy or improving an existing product.

Principles of Engineering

Students explore how modern engineers help improve the world through diverse engineering fields, such as product design, mechanical design, infrastructure, and sustainability. Students learn and use some of the cutting edge tools engineers use in robotics, 3D modeling, programming, and prototyping.

We'd love to discuss your specific engineering needs, your current implementation, and how PLTW can further energize your curriculum.

Visit pltw.org/in-high-quality-curricular-materials, or contact our Solution Center - [877.335.7589](tel:877.335.7589) or solutioncenter@pltw.org - to schedule a conversation.

