Project Lead The Way (PLTW)
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Project Lead The Way National Goals

- Increase the number of young people who pursue science, engineering, and engineering technology post-secondary programs of study.
- Provide equitable and inclusive opportunities for all qualified students without regard to gender or ethnic origin.
- Provide clear standards and expectations for student success in the program.
- Reduce the future college attrition rate with four and two-year science, technologists, engineering, and mathematics programs.
- Provide leadership and support that will produce continuous improvement and innovation in the program.
- Contribute to the continuance of America's prosperity.

Quick Facts

- Found in 50 states, District of Columbia, Canada, and Great Britain
- Currently 4000+ registered programs
- PLTW provides professional development plan for teachers, guidance counselors, and administrators.
    - Level 1: Initial 2 week training on college campus for teachers.
    - Online just in time training for teachers through Virtual Academy.
    - Level 2: more in depth 1 week training on college campus for teachers.
    - Master teacher level status for qualified teachers.
    - Regional guidance counselor conferences on affiliate campuses.
    - Information sessions.

Rigor-Relevance-Real World

Rigor:

National Standards Based Curriculum

- National Academy of Sciences
- National Council of Teachers of Mathematics
- International Technology Education Association
- English Language Arts

Nationally Recognized by:

- Rising Above the Gathering Storm report 10/05
- US Dept. of Education
- Indiana Department of Education
- Maryland Department of Education
- NASA
- National Academy of Engineering
- National Fluid Power Association
- American Electronics Association
- National Action Council for Minorities in Engr.
- Southern Regional Education Board
- National Association of State Directors of Career and Technical Education Consortium

Relevance:

- Cross-curricular problems, activities, projects
- STEM Career Cluster Leader
- End of course exam recognized by many universities for awarding of college credit
- Reading, mathematics, and science applications embedded throughout curriculum.

Real World:

- Courses modeled after introductory engineering courses found at the university level.
- Students choose their capstone research project based on personal interest.

National University Affiliate Partnerships

All of the institutions listed offer special consideration to PLTW students. Many in the form of college credit, preferred or automatic admission status. They also provide onsite professional development for PLTW teachers.

Arkansas Tech University
Auburn University, AL
California State Polytechnic University
Duke University, NC
Eastern Michigan University
Florida State University Panama City
Georgia Southern University
Iowa State University
Milwaukee School of Engineering
Missouri University of Science and Technology
New Hampshire Technical Institute
New Mexico State University
Northwestern State University of Louisiana
Oklahoma State University
Old Dominion University, VA
Oregon Institute of Technology
Penn State University
Purdue University, Kokomo, IN
Rochester Institute of Technology, NY
Rowan University, NJ
San Diego State University, CA
San Jose State University, CA
Seattle University, WA
Sinclair Community College, OH
St. Cloud State University, MN
University of Alaska Anchorage
University of Colorado Colorado Springs
University of Illinois
University of Iowa
University of Kentucky
University of Maryland Baltimore County
University of Nebraska
University of New Haven, CT
University of South Carolina
University of Tennessee at Chattanooga
University of Texas at Tyler
Utah Valley University
West Virginia University
Wichita State University, KS
Worcester Polytechnic Institute, MA

According to one young woman, "While many of my classmates struggled with the demand of content and study time on task in college, I had a better idea of the expectations and challenges of the program because of my pre-engineering course work in high school. The teachers in my Project Lead The Way courses were not only very well prepared to instruct, but they also inspired me to succeed. As a female in a male dominated career path this inspiration proved invaluable."

According to one young man majoring in engineering at University of Florida, "I just wanted to say how much PLTW classes help me. We have already talked about Inventor and how many mechanical and civil engineers use it to aid in design. We took a tour of the nuclear dept. and they had a mechanical robot arm like we had in class only 10x's bigger. It was just neat to know that everything we did in class really applies to actual engineers and their research."

Gateway to Technology: Middle School
(9 week units)
Design and Modeling
Automation and Robotics
Energy and Environment
Science of Technology
Magic of Electrons
Flight and Space
Green Architecture (pilot '11-'12)

Pathway to Engineering: High School
Introduction to Engineering
Principles of Engineering
Aerospace Engineering
Biotechnical Engineering
Civil Engineering and Architecture
Computer Integrated Manuf.
Digital Electronics
Engineering Design & Development

What makes Project Lead The Way so unique?

- It is a 501 (c) (3) not-for-profit corporation.
- No cost to join.
- Free curriculum to registered schools.
- Optional National Bid purchasing manual.
- Student Success Model that incorporates school district, colleges/universities, and private sector into

decision making process.

- Professional Development Model
  Teachers: pre-assessment, university based curriculum training, online teacher training
  Counselors: regional training

The Project Lead The Way Gateway to Technology curriculum is a five unit sequence that will prepare students for a successful secondary pre-engineering experience. However, even students who do not intend to pursue further engineering education will benefit from the knowledge, team building strategies, and problem solving abilities taught in these units.

Design and Modeling Unit (DM)
Students learn about the engineering design process and how solid modeling has influenced their lives, learn sketching techniques, measurement, and computer modeling. Using design briefs and working in teams, students create models and documentation to solve problems. They learn how to use sketching as a means to communicate their ideas as well as the geometry that is used in parametric modeling, assembly, and motion constraints.

Automation and Robotics Unit (AR)
Students discover the history and development of automation and robotics. They learn about structures, energy transfer, machine automation, and computer control systems. Students acquire knowledge and skills in engineering problem solving and explore requirements for careers in engineering.

Energy and Environment Unit (EE)
Students investigate the importance of energy in our lives and the impact that using energy has on the environment.

Magic of Electrons Unit (ME)
Through hands-on projects, students explore the science of electricity, the movement of atoms, circuit design, and sensing devices. Students acquire knowledge and skills in basic circuitry design and investigate the impact of electricity on our lives.

Science of Technology Unit (ST)
This unit traces how science has affected technology throughout history. Students learn about the mechanics of motion, the conversion of energy, and the use of science to improve communication.

Flight and Space Unit (FS)
This unit has been developed with NASA and explores the technology of aeronautics, propulsion, and rocketry. Students see the connections between hands-on projects and academic subjects such as math and science.

Green Architecture Unit (GA)
Currently being piloted by a group of our master teachers

The Project Lead The Way high school curriculum is a rigorous sequence of courses that, when combined with college preparatory mathematics and science will prepare students for a successful post-secondary experience. However, even students who do not intend to pursue further formal education will benefit from the knowledge, team building strategies, and problem solving abilities taught in these courses.

Introduction to Engineering (IED)-required
This course introduces students to the engineering design process. They develop their engineering portfolio that will follow them through all the courses. Working in teams they learn how to use sketching as a means to communicate their ideas as well as the geometry that is used in parametric modeling, assembly, and motion constraints. They explore the production and marketing of products.

Principles of Engineering (POE) -required
This course covers the different types of engineering, the communication and documentation that are used by engineers. Mechanisms, thermodynamics, fluid systems, electrical systems and control systems are also covered. Using the appropriate formulas students make static and strength calculations for various materials before testing them. They explore the fields of reliability engineering and kinematics. They learn and apply proper program management strategies through various team projects.

Aerospace Engineering (AE)
This course exposes students to the world of aeronautics, flight, and engineering. Students working in teams are engaged in engineering design problems related to aerospace information systems, astronautics, rocketry, propulsion, the physics of space science, space life sciences, the biology of space science, principles of aeronautics, structures and materials, and systems engineering.

Biotechnical Engineering (BE)
This course involves the exploration of biomedical engineering, bio-molecular genetics, bioprocess engineering, agricultural and environmental engineering. Through engineering design projects students learn about biomechanics, genetic engineering, cardiovascular engineering, agricultural biotech, tissue engineering, biomedical devices, forensics, and bio-ethics. They apply biological and engineering concepts to design materials and processes that directly measure, repair, improve, and extend living systems.

Civil Engineering and Arch (CEA)
This course involves several smaller projects and one long-term project that develops a local property site. As students learn the various aspects of civil engineering and architecture, they apply what they learn to the design and development of this property. It is structured to enable all students to have a variety of experiences that provide an overview of both fields. Students work in teams, exploring hands-on projects and activities to learn the characteristics of civil engineering and architecture.

Computer Integrated Manuf. (CIM)
This course involves the application of 3D computer modeling in the manufacturing and industrial engineering fields. Students learn the programming codes for computer numerical control by writing a program, inputting it into the computer milling software and simulating the creation of the part. Students design a product using the 3D computer modeling software, translate it into the CNC code, and mill it. Robotics is learned by programming various standalone routines and handshaking them with the CNC mill.

Digital Electronics (DE)

This course covers the fundamentals of analog and digital electronics. Students learn about the different number systems used in the design of digital circuitry. They design circuits to solve open ended problems, assemble their solutions, and troubleshoot them as necessary. Simplification of Boolean expressions, application of truth tables, and kmapping techniques are also covered. Students then use combinational logic, integrated circuits, and microprocessors to solve open ended problems.

Capstone Research Course

Engineering Design & Development (EDD)

This course is the capstone research and development course. Students working as individuals or on teams draw from all their previous experiences in the other engineering courses. They select a problem, design a solution, conduct patent research, build a prototype, conduct testing of the prototype, evaluate the test results, and present their conclusions to an engineering panel. The project is a yearlong course that involves guided independent research by the teacher and engineering/industry mentors. Many students go on to register their solutions with the United States Patent Office.

Business, Industry, and Post Secondary Partnership Roles

- **School Partnership Team:** become a member of a school's PLTW School Partnership Team (advisory board); each PLTW school site must have a business representative (along with other sectors) from the field of engineering in order to institute PLTW.
- **Classroom Speakers:** send your experts into the classroom to inspire the next generation of scientists, technologists, engineers, and mathematicians.
- **Job Shadowing:** bring students to your work site to expose them to the wide variety of engineering and engineering technology career options.
- **Paid and Unpaid Internships:** take job shadowing to the next step and provide job opportunities for young prospective engineers and scientists.
- **Mentorships:** spend time with students on a regular basis by providing your expertise on engineering-related, after-school activities.
- **Resources:** make a financial donation to a school or provide in-kind donations (equipment, materials, or other supplies) so that schools can more easily keep up with the latest technologies.
- **Class Projects:** assist a class or individual student with the creation of a project to help the school or community.
- **Scholarships:** funding for post-secondary educational opportunities can make a real difference for the next generation of engineers.
- **Articulations:** post secondary institutions can offer articulation agreements with PLTW schools. Areas to consider are course credit, automatic admission to engineering programs, and adapted admission requirements.

"For as long as I have been involved in the business world, I have been frustrated by the fact that the number of engineering graduates in the U.S. has not kept pace with demand. Project Lead The Way addresses that need at its very foundation by creating effective curricula, by training teachers to present the technical material effectively, and by providing the resources required to support classroom activities."

Frank Zaffino, former Vice President of Manufacturing, Eastman Kodak Co.

"PLTW delivers what K-12 education systems need-students prepared to succeed in the workplace and in postsecondary education."

Dr. Sueellen Reed, former Indiana State Superintendent for Education

"The curriculum is not boring, it's rigorous and rewarding. I love teaching this class. In 20 years of teaching, I've never been involved with anything more rewarding."

William Ruff, MN PLTW teacher, physics, chemistry, and computer science

"PLTW gave me a head start in calculus, physics, problem solving, designing, molding, and so much more. I learned skills in the program I still use today and I learned a lot about myself and how I could be successful."

Brooke Costello, PLTW alumna,
Plastics Engineer with degree from University of Massachusetts