A New Paradigm for Preparing a STEM Workforce

• PLTW has a proven track record of success in promoting courses in STEM subjects for middle and high school students.

• What is the role of a community college?

• Why should a community college engage with PLTW?

• PLTW, a new paradigm for recruiting students into Career and Technical Education programs.
Project Lead the Way
Community College Program Progression

• **Why a new paradigm?**
  – Traditional methods of recruiting students in decline
  – High School CTE classes in decline
  – Little interest in CC CTE programs at HS Career Fairs
  – Result = CC CTE programs contracting/dying and “The Graying of the Technical Student”

• **What is working?**
  – Robotics
  – PLTW
Who We Are

Our mission is simple:

**Prepare students for the global economy**

[Image: World-Class Curriculum, High-Quality Professional Development, Engaged Network]

Project Lead The Way is the nation’s leading K-12 STEM program. Our world-class activity-, project-, and problem-based curriculum and high-quality teacher professional development model, combined with an engaged network of educators and corporate partners, help students develop the skills they need to be successful in post-secondary and beyond.
PLTW offers five programs of study for K-12 students.

- **Launch**: Kindergarten through fifth grade
- **Gateway**: Middle school
- **High school**: Biomedical Science, Computer Science, Engineering, Post-secondary, career, and future success
<table>
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<tr>
<th>What PLTW Does</th>
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<tr>
<td><strong>Launch</strong></td>
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<td>Offered in ten-hour modules, engages students in analysis, collaboration, and problem solving by exploring topics such as energy, light and sound, and motion and stability.</td>
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High School
Pathway To Engineering
Introduction to Engineering Design (IED)
3D computer modeling software; study of the design process

Principles of Engineering (POE)
Exploration of technology systems and engineering processes

Digital Electronics (DE)
Use of computer simulation to learn the logic of electronics

Aerospace Engineering (AE)
Aerodynamics, astronautics, space-life sciences, and systems engineering
Biotechnical Engineering (BE)
Biomechanics, genetic engineering, and forensics.

Civil Engineering and Architecture (CEA)
Students collaborate on the development of community-based building projects

Computer Integrated Manufacturing (CIM)
Robotics and automated manufacturing; production of 3-D designs.

Computer Science/Software Engineering (CSSE)
NEW! Pilots in Fall 2013

Engineering Design and Development (EDD)
Teams of students, guided by community mentors, research, design, and construct solutions to engineering problems.
High School

Biomedical Sciences
- **Principles of the Biomedical Sciences (PBS)**
  Study of human body systems and health conditions

- **Human Body Systems (HBS)**
  Exploring science in action, students build organs and tissues on a skeletal manikin and play the role of biomedical professionals to solve medical mysteries.

- **Medical Interventions (MI)**
  Investigation of interventions involved in the prevention, diagnosis and treatment of disease.

- **Biomedical Innovation (BI)**
  Students design innovative solutions for the health challenges of the 21st century
PROFESSIONAL DEVELOPMENT

An intensive and comprehensive training program for teachers

- Self-Assessment and Pre-Core Training
- 2-week Core Training that PLTW teachers are required to complete before teaching a PLTW course.
- LMS - CANVAS, Course management, resources, forums for PLTW teachers.
The Facts

- >700,000 students in more than 7,000 schools in all 50 states and D.C.
- Over 20,000 teachers trained
- More than 100 University relationships, including Duke University, University of Minnesota, Purdue, San Diego State University, Milwaukee School of Engineering
- Partnerships with Fortune 100 and 500 companies, and forward-thinking philanthropic organizations, including Chevron, Intel, General Electric, SunPower and Kern Family Foundation
University of California: “A to G” Program Approval

Educator Section

Program Approval for University of California / California State University Requirements current as of July 2009

Introduction to Engineering Design ..... G (interdisciplinary)

Introduction to Design...... F (curriculum is at http://www.pltwcalifornia.org/pdf/ID_Supplemental_Unit.pdf)

Principles of Engineering ..... G (interdisciplinary)

Digital Electronics .... G (math)

Aerospace Engineering ..... G (interdisciplinary)

Civil Engineering/ Architecture...... G (interdisciplinary)

Computer Integrated Manufacturing ...... G (other)

Biotech Engineering ...... G (science-biology)

Engineering Design and Development .......... D, G (interdisciplinary)

Full information is available at the UC site, https://doorways.ucop.edu/list, do a search on "Project Lead the Way"
All PLTW courses are aligned to:

- Common Core State Standards for Mathematics and English Language Arts
- Next Generation Science Standards

All courses use project-based, real-world problems incorporating critical thinking, integrated academics, and group work.

Alignment.pltw.org
PLTW @ El Camino Program Progression

- 2003 Advisors to Hawthorne Engineering Academy
- 2004 Attempt to match PLTW to existing courses
- 2005 Developed 5 college level PLTW courses
- 2006 Joined PLTW Affiliate program
- 2006 Began offering Saturday PLTW courses
- 2007 Began offering weekday PLTW courses
2007 SB-70 “Quickstart” Grant to replicate Hawthorne HS model, a collaborative with L.A. Pierce College

2007 to 2009, sponsored 7 high schools
- Faculty training
- Start-up costs
- Mentor program
- More than 1,000 high school students enrolled in PLTW courses in the South Bay by 2009
PLTW @ ECC Program Progression

• 2008 Engineering Technology Program Approval
  – Two A.S. degree options
  – Two certificate options
• 2008 Eight HS Articulation Agreements
• 2008/2013 Six CTE Collaborative SB-70 Grants
• 2009/2013 Chevron USA and El Segundo partnership
  – Four new high schools
  – Ten new middle schools
  – Chevron engineers mentor and support programs
  – Student Competitions
  – ECC coordinator support
Milestones to Date (funded by Chevron, NGC and SB 70)
- 94 teachers trained
- 12 high schools, 1 ROP, 12 Middle Schools launched
- 40 PTE Programs, 15 GTT Modules and 2BMS programs
- Two A.S. degree and certificate programs
- 26 HS courses articulated to community college courses.
- Diversity of K-12 schools served (Lennox to Palos Verdes)
- 30 scholarships for PLTW grads continuing to El Camino
- More than 2,100 HS students enrolled in PLTW courses in El Camino service area.
- 34% female participation in high school PTE courses.
- 2,000 traditional enrollment in HS PLTW courses
- 850 concurrently enrolled in HS for college credit (30 sections)
- AB-86 Career Pathways Trust, PLTW in four SoCal Projects
APET
Alliance for Pre-Engineering Technology

• A growing number of Community Colleges partnering with PLTW
  – El Camino, El Camino-Compton, Cerritos, L.A. Pierce, Mt. San Jacinto and Riverside offer PLTW courses in the LA area

• Articulation, Dual-Credit between HS and CC gives college credit to 9th grade students.

• Grant partnership opportunities

• University College Credit (Cal Poly Pomona +)

• University admission benefits (SDSU, UCLA, CPP)

• Linkages to Industry (e.g. Chevron, Northrop Grumman)
# El Camino College

## Industry and Technology Division - Engineering Technology - Engineering Technology Option

### First Semester
- **15 units**
  - Engineering Technology 11: Introduction to Engineering Design (3 units)
  - Engineering Technology 10: Principles of Engineering (3 units)
  - Mathematics 80*: Intermediate Algebra for STEM (5 units)
  - English 1A*: Reading and Composition (4 units)

### Second Semester
- **14 units**
  - Engineering Technology 14: Electronics for Engineering Technologists (3 units)
  - Mathematics 1A*: General Chemistry (5 units)
  - Social and Behavioral Sciences: Choose one course from Area 2, A, B, or C (3 units)
  - Math 170*: Trigonometry (3 units)

### Third Semester
- **16 units**
  - Engineering Technology 13: Computer Integrated Manufacturing (3 units)
  - Math 180*: Pre-Calculus (5 units)
  - Contemporary Health: Personal and Community Health Issues (3 units)
  - Communication Studies 1: Effective Speaking (3 units)
  - Manufacturing Technology 70: Basic Robotics (2 units - elective)

### Fourth Semester
- **15 units**
  - Engineering Technology 18: Engineering Design and Development (3 units)
  - Humanities: Choose one course (3 units - general education)
  - Math 190*: Single Variable Calculus and Analytical Geometry (5 units)
  - Physics 2A*: General Physics (4 units)

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*Contains a chart that is available for college credit at some local high schools including California Academy of Math and Science, De Anza High School, El Segundo High School, El Toro High School, Lander Academy, Palisades Peninsula High School, Redondo Union High School and Torrance High School. This program is developed in conjunction with ECC counselors. The schedule is a sample only and does not take the place of a counselor. Courses with an * require placement through the ECC placement assessment or a prerequisite course.

The El Camino Community College District is committed to providing equal opportunity as it relates to discrimination on the basis of ethnicity, identification, national origin, religion, age, sex, race, color, ancestry, sexual orientation, physical or mental disability, or veteran status.
PLTW @ Cerritos College Program Progression

• 2008/2011 CTE I, II, III, IV Collaborative Grants
  – Goal is to replicate El Camino’s PLTW at Cerritos
• Summer 2009 - Principles of Engineering (POE) course approved by the curriculum board and Chancellor’s office
• By 2012, the Certificate of Achievement in Engineering Technology is approved
• By 2014, 7 classes from PLTW are approved by the curriculum committee.
PLTW expansion – CPT grant

• Cerritos College – El Camino College – LA Harbor College – Long Beach City College – Pasadena College
• Plus 2 universities, 31 high schools, 20 middle schools, 12 elementary schools representing 14 USDs
• Plus 17 business partners, 13 community organizations, and 4 Local Investment Boards
• The Advanced Manufacturing and Engineering Technology Linked Learning Consortium is founded and then funded!
• Fiscal year 2014-2015 will see 41 new PLTW classrooms and 109 teachers trained
Professor’s Perspectives on PLTW

- Project-based program assists with the understanding of concepts
- Younger students enjoy projects that require teamwork
- Students seek to take manufacturing courses in order to make their products
- Draws younger students that normally would not take CTE courses and helps renew the population of students in CTE
- Curriculum is very complex and challenging
- Students used to homework/quiz classroom environment can find it difficult to be in a course where knowledge must be applied.
For Additional Information

http://www.pltw.org  The primary PLTW Website
http://pltwcalifornia.org  The PLTWCA website hosted by SDSU

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