

**University of Illinois at Urbana-Champaign**  
**Summer 2009**  
**July 6 - November 27, 2009**  
**College of Education Graduate Course**

**Curriculum and Instruction 499**  
**Issues and Developments in Education:**  
**Project Lead The Way Engineering in the K-12 Classroom**  
**4 graduate semester hours**  
**Section CI 499 IED (Intro to Engineering Design)—CRN 32661**  
**Section CI499 POE (Principles of Engineering)—CRN32383**  
**Section CI499 GTT (Gateway To Technology)—CRN 33401**

**Course Description**

Project Lead The Way (PLTW) is a national program forming partnerships among Public Schools, Higher Education Institutions and the Private Sector to increase the quantity and quality of engineers and engineering technologists graduating from our education system. PLTW has developed a four year sequence of courses which, when combined with college preparatory mathematics and science courses in high school, introduces students to the scope, rigor and discipline of engineering and engineering technology prior to entering college. Introduction at this level will attract more students to engineering, and will allow students, while still in high school, to determine if engineering is the career they desire. Students participating in PLTW courses are better prepared for college engineering programs and more likely to be successful, thus reducing the attrition rate in these college programs, which currently exceeds 50% nationally.

This course builds upon Project Lead The Way teacher training institutes by providing participants the opportunity to explore additional issues related to engineering in the K-12 classroom.

**Prerequisites for Course Participation**

Prerequisites for CI 499IED, CI 499POE, or CI 499GTT include successful completion of either the Introduction to Engineering Design, Principles of Engineering, or Gateway To Technology Summer Training Institutes associated with Project Lead The Way during the summer of 2009 (see <http://www.pltw.uillinois.edu> for more information). Participants must have ready access to the Internet, a valid, working email address, and access to a computer with multimedia capabilities. The coursework for this class extends and builds on the summer institute.

**Course Dates:**

CI 499 IED: 7/06/09-11/27/09  
CI 499 POE: 7/06/09-11/27/09  
CI 499 GTT: 7/06/09 – 11/27/09

(All assignments must be completed by 11/27/09)

**Instructor:**

George Reese Director, Office for Mathematics, Science and Technology Education (MSTE) 505 East Green St., Suite 102, MC-439 Champaign, IL 61820 217.244.7486 <a href="mailto:reese@uiuc.edu">reese@uiuc.edu</a>
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**Hours:** This is a 4-hour graduate credit course, with grade to be listed as a summer 2009 course and posted in late fall on University transcript after successful submission of project as outlined below. Participants must complete all the readings and an action research project that investigates the impact of the PLTW course in their school environment. The project will be based upon the action research readings (see below) and designed through collaboration with the instructors. A typical project paper with adequate background discussion of readings and report on the project will be **20 pages in length**. This course credit will be given in addition to the 80 CPDU professional development contact hour evidence of completion offered for participation in the summer institute alone. During the summer institute, students will develop a calendar for completion of the readings and submission of the final project paper. The absolute final date for a fall project to be completed is November 27th, 2009

**Course Website:** <http://www.mste.uiuc.edu/courses/pltw> (to be activated upon enrollment in the course)

**Course Registration/Tuition:**

-Tuition/fees for the four-hour graduate course total \$1356.00 (\$339 per credit hour).

-Those interested in registering for graduate credit should meet with the instructor during the first two days of the STI institute to discuss course expectations, and may complete online registration then. Registration is now open for those who wish to register prior to the start of the STI session.

-PLTW participants wanting to apply for graduate credit from the College of Education at the University of Illinois at Urbana-Champaign must submit the Academic Outreach, Non-Degree Seeking Students Registration form which is accessible at <https://www-s.continuinged.uiuc.edu/ao/registration/student/index.cfm> Complete new student login and personal information; register by selecting the Summer 2009 term, then Curriculum and Instruction, then the course name and numbers as below and on attached direction sheet.) Participants enrolling for graduate credit will be classified as a *Graduate Non-Degree Seeking Student*.

-To register for Curriculum and Instruction sections, use CRN numbers for the appropriate section:

- CI499 IED section CRN 32661
- CI499 GTT section CRN 33401
- CI499 POE section CRN 32383

-Once a student registers for credit, he or she will receive a NetID and password.

-Tuition invoicing will be posted electronically to your University E-mail account.

-For further information or assistance with graduate course registration options, contact Illinois PLTW Affiliate Director Brenda Pacey for assistance ([bpacey@uillinois.edu](mailto:bpacey@uillinois.edu); 217-244-5217; 807 S. Wright Street, Suite 370, MC-307, Champaign, IL 61820).

**Course Project:**

The course has two major components: readings and a project. The calendar for completion of both will be agreed upon between the instructor and the student.

Sample project idea 1

**Research Question:** Does the PLTW course in DE (or IED, POE, GTT, etc.) impact the performance of students in core content mathematics classes?

**Method:** Find a comparable group of non-PLTW students in the school and compare their course grades and scores on a pre-test and post-test. Include brief interviews with the core math teachers and with a 3 randomly selected PLTW and non-PLTW students. Work with university course instructor to develop a interview questions and a rubric for evaluating the responses.

An **alternative method** could be the following:

Prepare interview questions for a “math history” of 10 students. Compare the experience of these students in their math class with their experience with their PLTW course. What factors impact the amount of effort that students put into problem solving?

**Final project** report will discuss the impact of PLTW on math classes. It should include background on the PLTW course, a discussion of the importance of the question examined for your school, the instruments (surveys, questionnaires, tests), the results of your research, and a brief conclusion with further research ideas. All this will be no less than 20 pages.

Sample project idea 2

**Question:** Does the PLTW course have an impact on student attitudes toward school in general?

**Method:** Choose 15 students at random and examine their attendance records prior to their enrollment in PLTW. Prepare a survey of attitudes to be given at the beginning of the course and again in early November.

**Final project** report will examine if PLTW has had an impact on student attendance and attitude towards school. It should include background on the PLTW course, a discussion of the importance of the question examined for your school, the instruments (surveys, questionnaires, tests), the results of your research, and a brief conclusion with further research ideas. All this will be no less than 20 pages.

Sample project idea 3:

**Question:** How much of the GTT curriculum, fits within the current school science curriculum? How does this compare with the POE?

**Method:** During the implementation of a GTT and POE course, monitor the number of additions to the curriculum. Instructors will work together to develop the rubric for the how to measure the variation from the base curriculum.

**Final project** report will compare the implementation of PLTW in the two classes as compared to the curriculum. How did they differ and why? The report will include background on the courses, the development and implementation of the rubric and a discussion of the results in approximately 20 pages.

**General Course Readings:**

ASEE Engineering K-12 Center. (2004). *Engineering in the K-12 Classroom: An Analysis of Current Practices & Guidelines for the Future*. Washington, DC: The American Society for Engineering Education

National Commission on Mathematics and Science Teaching for the 21st Century. (2000). *Before It's Too Late*. Washington, DC: U.S. Department of Education. (Available from the instructor)

Barton, Paul E. (2002). *Meeting the Need for Scientists, Engineers, and an Educated Citizenry in a Technological Society*. Princeton, NJ: Educational Testing Service.

Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development. (2001). Land of Plenty: Diversity as America's Competitive Edge In Science, Engineering, And Technology. *Leadership and Management in Engineering*, 1(4), 27-30.

Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology. (2005). Rising above the gathering storm: Energizing and employing America for a brighter economic future. Washington, DC: National Academies Press. (Executive Summary only)

Hein, G.L. & Sorby, S.A. (2002). *What's an Engineer? Teaching Teachers about Engineering*. Paper presented at the ASEE Annual Conference.

De Geeter, D., Golder, J.E. & Nordin, T.A. (2002). *Creating Engineers for the Future*. Paper presented at the ASEE Annual Conference.

Anderson-Rowland, M.R., Baker, D.R., Secola, P.M., Smiley, B.A., Evans, D.L. & Middleton, J.A. (2002). *Integrating Engineering Concepts under Current K-12 State and National Standards*. Paper presented at the ASEE Annual Conference.

Rushton, E., Cyr, M., Gravel, L. & Prouty, L. (2002). *Infusing Engineering into Public Schools*. Paper presented at the ASEE Annual Conference.

Bottoms, G., & Uhn, J. (2007). Project Lead The Way Works: A New Type of Career and Technical Program. Atlanta, GA: Southern Regional Education Board. Available at [http://www.pltw.illinois.edu/07V29\\_Research\\_Brief\\_PLTW.pdf](http://www.pltw.illinois.edu/07V29_Research_Brief_PLTW.pdf)

**Action Research Readings:**

Caro-Bruce, C. (2001). Classroom Action Research. Madison Metropolitan School District,. Retrieved, from the World Wide Web: <http://www.madison.k12.wi.us/sod/car/carhomepage.html>

Feldman, A., & Capobianco, B. (2000). Action research in science education (ERIC Digest ED463944). Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education. Available at <http://www.eric.ed.gov/>.

Wiggins, G., & McTighe, J. (1998). Understanding by design. Upper Saddle River, NJ: Merrill Prentice Hall.

**Evaluation**

Evaluation for the course will be based upon completion and submission of a significant final document. Students will synthesize information gained through institute participation, course readings, and additional web sites to produce a thorough discussion related to engineering in the K-12 classroom. Points of discussion include the integration of engineering concepts into curriculum, engineering concepts and state and national standards, women and minorities in engineering, and integration of CTE courses into the core curriculum. Paper and project topics must be pre-approved by a course instructor.

The following calendar will be filled out by the instructor and student during the STI to ensure that readings, responses, and project deadlines are met.

Date	Assignment	Assessment
11/27/09	Action research implementation completed	Action research report submitted

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