

NSEUS
**Research Based Undergraduate
Science Teaching Conference II**
May 2012

**An Ambitious Plan in
Undergraduate Science STEM
Education**




B Burke, B Hoeling, M Page, E Walton
The California State Polytechnic University, Pomona



**Our Cal Poly Pomona STEP
Program**

Congratulations on receiving an award in the Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) in fiscal year 2009.

Your award is one of approximately 22 new STEP awards that will be made by the Division of Undergraduate Education this year. For the September 29, 2009, deadline, STEP reviewed 213 proposals requesting approximately 239 million. Thus, your project is in a select group nationwide.



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Details of this award include:

Project Title: Three Strategies to Improve STEM Graduation Rates

Awarding Agency: National Science Foundation

Amount of Award: \$671,628.00

Cost Sharing Amount: \$282,609.00

Period of Award: June 1, 2010 - May 31, 2013

Foundation Project Number: 001120



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Objectives:

Increase the graduation rate of STEM students by 50% over a five-year period which raises the number of annual STEM graduates from 1,079 (2008) to 1,620, or by 541 more per yr.

Deliver redesigned courses, first year experiences, and apprenticeships to STEM students that, over a five-year period, will increase the retention rate of participating STEM students by 50% and improve their academic performance.

Increase undergraduate participation in research-related activities in the College of Science and College of Engineering to 70%.



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For FTF who enter Cal Poly Pomona in STEM disciplines, only 28.7% persist and graduate as STEM majors within six years. The CSU System average is 25.0%. (Consortium for Student Retention Data Exchange, CSRDE, 2008).



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Three Strategies to Improve STEM Graduation Rates

Based on information and insights from background work and discussions, a three-component project is envisioned:

1. **Course Redevelopment** ...(Chemistry Physics, Calculus)
2. **Enhanced First Year Experiences**
3. **Apprenticeships/Professional Development Opportunities**



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offers a program to increase the number of STEM graduates by employing research-based methods and proven strategies that

Motivate

Nurture

Engage



.all students.

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“I fell in love with chemistry, did exceptionally well in it, and entered college as a chemistry major. But my experience in my first chemistry class in college was so dreadful that I dropped chemistry as a major and never took another chemistry class.”

Elizabeth Bartlett, (Assoc. Prof. of Women’s Studies at University of Minnesota-Duluth)



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Senior Personnel...**20** Faculty

Edward Walton (co-PI), Barbara Burke (co-PI), Winny Dong (co-PI)

- Michael Page & Joe Casalnuovo (CHM course redev)
- Laurie Riggs & Hubertus vonBremen (MATH course redev)
- Peter Siegel & Barbara Hoeling (PHY course redev)
- Tanya Faltens (CHM course redev/Orientation)

- Laurie Starkey, Pamela Sperry, Amber Rosin, Mariappan Jawaharlal (Orientation)
- Jeff Marshall , Francis Flores, Cordelia Ontiveros (Apprenticeship)



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A. Senior Personnel

Name/Title	
Edward Walton (PI)	45
Barbara Burke (co-PI)	45
Winny Dong (co-PI)	45
Michael Page (CHM course redev)	9
Joe Casalnuovo (CHM course redev)	9
Tanya Faltens (CHM course redev/Orientation)	9
Randall Swift (MATH course redev)	9
Hubertus vonBremen (MATH course redev)	9
Joe Berk,(MATH redev/Orientation)	6
Peter Siegel (PHY course redev)	9
Barbara Hoeling (PHY course redev)	9
Mehrdad Haghi (PHY course redev)	3
Jawa Mariappan (PHY course redev)	6
Laurie Starkey (Orientation)	6
Pamela Sperry (Orientation)	6
Amber Rosin (Orientation)	6
Mariappan Jawaharlal (Orientation)	6
Jeff Marshall (Apprenticeship)	24
Francis Flores (Apprenticeship)	0
Cordelia Ontiveros (Apprenticeship)	





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Research Based Undergraduate Science Teaching Conference II

Cal Poly's five-year STEM program is now in its second year. We can share the work, the results, the issues, and plans :

- Course Redesign Efforts
- Design of effective first-year experiences
- Efforts to engage students in their major disciplines early in their college career
- Concerns and Issues that challenge implementation of STEM teaching enhancements
- Plans to enable implementation and sustain reform enhancements


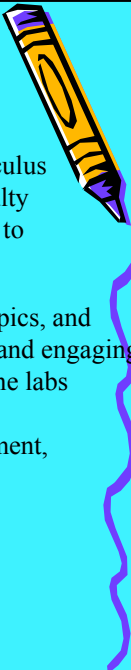
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Enhancing the Teaching and Learning in our Gateway

Calculus team develop simulations and learning problems for the calculus course. We are now looking to share these innovations with other faculty teaching the course . We are working with the Math department chair to arrange a workshop for these instructors.

Physics has piloted a new more thoughtful order of presentation of topics, and some new experiments for the laboratory, which are more interesting and engaging. And, the idea of having the same students together in the lecture and the labs

Chemistry has piloted an online, chemistry preparation/review assignment, and a new lab, along with enhanced teaching strategies.

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Concerns and Issues that challenge implementation of STEM teaching enhancements



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Plans

- Department/Course Action Teams
- Lecture Lab Linking (community)
- Apprenticeship Mini Grants

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