

2012 PSW ASEE Conference Workshops

Thursday April 19, 2012

Workshops are Free to those registered for the Conference

Workshops At a Glance

(workshop descriptions begin in page 4)

Thursday, April 19

Workshop 1A - 8:00 am to 10:00 am

Sustainable and Effective Practices for ABET Assessment, Fred DePiero, Cal Poly - San Luis Obispo, CA.

Workshop 1B - 8:00 am to 10:00 am

SolidWorks Hands-On: 3D Design, Documentation, Simulation, and Sustainability, Dave Alpert, GoEngineer. (note: this is a repeat of workshop 2B at 10 am)

Workshop 2A - 10:00 am to 12:00 am

Facilitating the Transfer of Community College Engineering Students through Model Transfer Curricula, Kate Disney, Mission College, Santa Clara, CA.

Workshop 2B - 10:00 am to 12:00 am

SolidWorks Hands-On: 3D Design, Documentation, Simulation, and Sustainability, Dave Alpert, GoEngineer. (note: this is a repeat of workshop 1B at 8 am)

Workshop 3A - 1:00 pm to 3:00 pm

Personalized Experimentation in Classical Controls with Matlab Real-Time Windows Target and Portable Aeropendulum Kit, Eniko Enikov & Estelle Eke, California State University Sacramento, CA.

Workshop 3B - 1:00 pm to 3:00 pm

From Art to Part: Rapid part realization from CAD to CNC machining to cast metal, plastic or chocolate, Martin Koch, Cal Poly - San Luis Obispo, CA.

Workshop 4A - 3:00 pm to 5:00 pm

Teaching Engineering Design to Middle and High School Students using Rube Goldbergengineering, Odesma Dalrymple, Arizona State University, Polytechnic Campus.

Workshop 4B - 3:00 pm to 5:00 pm

Breaking New Ground From The STEM-Up, Gary Cruz, Great Minds in STEM.

ASEE/PSW-2012 Conference – WORKSHOP REGISTRATION FORM

Workshops are Free to those registered for the Conference.

Please email or fax the information in this form to Jose A. Macedo (jmacedo@calpoly.edu)
Fax: (805) 756-5439. Thank you.

Name: _____

**I will attend the following workshops:
(check one for each time slot)**

8:00 - 10:00 am 1A_____ or 1B_____

10:00 - 12:00 noon 2A_____ or 2B_____

1:00 - 3:00 pm 3A_____ or 3B_____

3:00 - 5:00 pm 4A_____ or 4B_____

To register for the conference, please visit: <http://aseepsw2012.calpoly.edu/registration/>

Workshop 1A - 8:00 am to 10:00 am, Room 192-104

Sustainable and Effective Practices for ABET Assessment, Fred DePiero, Cal Poly - San Luis Obispo, CA.

Centralizing efforts at the college-level has improved our ABET assessment practices. Advantages include a reduced faculty workload, more sustainable processes, and effective sharing of best practices. Our assessment efforts also benefit from partnerships with various units across campus. These partnerships, along with our centralized college-level efforts, provide both direct and indirect measures for use by programs.

A brief overview of assessment methods across the College will also be presented, along with recommendations for an effective style of program improvements. Tradeoffs between centralized and decentralized efforts will be discussed, as will recent processes improvements. Use of web-based tools will also be described.

Learning Objectives for Attendees

- Critique and refine measurable abilities related to ABET's A-K
- Improve methods to evaluate the career accomplishments of alumni
- Identify program improvements that are well-established and sound
- Identify activities that may be appropriate for centralization at the college level
- Suggest university-wide assessment activities that benefit ABET efforts

Who Should Attend

- Faculty developing measures and processes for ABET
- Faculty leading ABET efforts for their program
- College-level administrators leading ABET efforts for multiple programs

Workshop 1B - 8:00 am to 10:00 am, Room 192-329
and
Workshop 2B - 10:00 am to 12:00 am, Room 192-329

SolidWorks Hands-On: 3D Design, Documentation, Simulation, and Sustainability, Dave Alpert, GoEngineer. (note: the same workshop is repeated at 8 am and at 10 am)

Participants will use SolidWorks to complete 3D solids models with multiview drawing. Finite Element Analysis will be performed on a cantilevered beam and ceiling television support to show stress loading and deformation. Material, fabrication, manufacturing location, and use location (North America, Europe, and Asia) will be compared to evaluate a parts environmental impact (Life Cycle Assessment) including: Carbon Footprint – production of greenhouse gasses; Total Energy Consumed; Effect on Air – specifically the contributor to acid rain; and Effect on Water – which results in algae blooms in coastal waters. All faculty will receive a copy of SolidWorks 2011-2012 Student / Faculty Edition (MSRP \$150).

Dave Alpert has over 35 years industry and education experience, currently provides SolidWorks educational sales, support, and faculty training for K-12 schools, community colleges, and universities in California, Hawaii, Idaho, and Utah.

Workshop 2A - 10:00 am to 12:00 am, Room 192-104

Facilitating the Transfer of Community College Engineering Students through Model Transfer Curricula, Kate Disney, Mission College, Santa Clara, CA.

On September 29, 2010, the Student Transfer Achievement Reform Act (SB 1440), was signed into legislation requiring the California Community Colleges (CCC) and California State University (CSU) to collaborate on the creation of Associate in Arts Degree (AA) and Associate in Science (AS) Degree transfer programs. The law requires that upon completion of the associate degree, the student is eligible for transfer with junior standing into the CSU system, and is given priority consideration when applying to a particular program that is similar to the student's community college major. The law prohibits the CSU from requiring a transferring student to repeat courses similar to those taken at the community college that counted toward their associate degree for transfer.

Over the past year, faculty representatives from CCC and CSU have been working together to address the provisions of SB 1440, and have developed Transfer Model Curriculum (TMC) for number of academic majors. In October 2011, three separate meetings of engineering faculty from CCC and CSU resulted in the development of draft TMCs in two engineering tracks – the Mechanical, Civil, and Aerospace Engineering track, and the Electrical and Computer Engineering track. These TMCs are being developed within the infrastructure of the Course Identification Numbering System (C-ID) that involves developing descriptors for courses to simplify student movement within and between segments of higher education in California.

The proposed workshop will be facilitated by CCC and CSU engineering faculty who have been involved in the development of engineering TMCs, and aims to solicit participant feedback on the proposed TMCs. The workshop will also explore how to best implement the provisions of SB 1440, and its implications to students and faculty of community colleges and universities, as well as the future of engineering education in California.

Workshop 3A - 1:00 pm to 3:00 pm, Room 192-104

Personalized Experimentation in Classical Controls with Matlab Real-Time Windows Target and Portable Aeropendulum Kit, Eniko Enikov & Estelle Eke, California State University Sacramento, CA.

This two-hour long workshop will present a portable, "take-home" kit for use in undergraduate courses on control systems design or modeling of electro-mechanical systems.

It is intended for instructors of classical undergraduate courses in control system design who are interested in providing hands-on experimentation opportunities to their students, but have limited resources and infrastructure. The short course presents an alternative to classroom experimentation where students complete the experiments independently during the course of a regular semester. The activities illustrate step-by-step the topics of classical controls class and allow students to test their own controllers using MATLAB and a inexpensive hardware powered by the USB port of their computers.

Course Topics:

- The Aeropendulum plant as portable low-cost lab for control systems design classes
- Matlab Real Time Windows Target Environment and Soft Real Time Version of the
- Simulink GUI
- Demonstration of Student Activities Using the Aeropendulum
- Plant modeling, parameter identification, identification of non-linearities
- Feedback linearization, steady-state error and system types
- Parameter identification using Matlab's pem() prediction-error minimization function
- Closed-loop control experiments: proportional, phase lead, phase lag
- Bang-bang control of a system with dry friction (mechanically balanced pendulum example)
- Results from implementation at CSUS and Univ. of Arizona

Website: www.aeropendulum.arizona.edu

Workshop 3B - 1:00 pm to 3:00 pm, Room 41-103

From Art to Part: Rapid part realization from CAD to CNC machining to cast metal, plastic or chocolate, Martin Koch, Cal Poly - San Luis Obispo, CA.

This workshop will present a solution developed to solve a number of problems faced when teaching hands-on courses to large numbers of students involving the need to produce patterns, molds and castings (in various materials) in a quick, inexpensive and safe manner.

The participants will design, machine, mold and cast both aluminum and plastic parts.

This activity is the successful effort to have 150 students in a 1 unit 3 hour weekly lab with no prerequisites, to design, machine, mold and cast their own part.

Additionally, the same tool set will be used to show how to support specialty projects such as the LunaLight (a solar charged light source for villages without electricity) and the Ergo Knife (a knife support/holding system for those without a thumb), among other projects.

Finally, the use of the tool set for the inexpensive and safe teaching of fundamental CAM will be emphasized.

Course tools:

- MasterCam

- CNC machining of wax patterns for both metal and plastic casting

- Sand molding of foundry molds

- Aluminum and plastic casting

Workshop 4A - 3:00 pm to 5:00 pm, Room 192-104

Teaching Engineering Design to Middle and High School Students using Rube Goldbergengineering,
Odesma Dalrymple, Arizona State University, Polytechnic Campus.

To expose participants to the “Rube Goldbergengineering” program and curriculum for introducing middle and high school students to the engineering design process in the context of designing and building Rube Goldberg machines in local or geographically-distributed teams. Findings from a design-based research study done on the “Rube Goldbergengineering” program will be presented to substantiate its impact on student interest in and knowledge of engineering design and related concepts.

A Rube Goldberg machine is a chain reaction contraption that completes a simple task in an overly complex way. In Rube Goldbergengineering (RG) design program, students are challenged with learning and applying the Boston Museum of Science Engineering is Elementary® engineering design process to design and build a Rube Goldberg machine. In addition, the program embeds students in local or geographically-distributed teams to expose them to other cultures, improve the quality and quantity of their design communication, and simulate a trans-national engineering and manufacturing environment. Machines designed by geographically-distributed teams have the added constraint that their parts must connect together across camp sites using communication technology, resulting in machines that start at one site, progress through a number of complex intermediate steps, and culminate by completing the simple task such as popping a balloon at the final site.

This hands-on workshop will begin with a brief background on Rube Goldberg machines and competitions. The Rube Goldbergengineering curriculum and the results of the research on the impact of the program will be presented, followed by a review of the Boston Museum of Science Engineering is Elementary Engineering Design Process. Participants will be given the opportunity to engage in a Rube Goldberg machine design activity, followed by a time to share their critiques and participate in discussions about how these activities can be adapted for use in middle and high school classrooms or outreach programs. Finally, participants will receive sample curriculum resources for use in their programs.

Workshop 4B - 3:00 pm to 5:00 pm, Room 192-329

Breaking New Ground From The STEM-Up, Gary Cruz, Great Minds in STEM.

Great Minds in STEM (GMiS) is a national organization focused on accelerating the awareness of science, technology, engineering and math (STEM) among the nation's most underserved and underrepresented communities. GMiS seeks to motivate and empower students, parents, and teachers with the knowledge, skills and resources to pursue educational pathways that will lead to a technical career in the STEM workforce.

In an effort to build STEM capacity, Great Minds in STEM developed the STEM-Up™ Initiative. This Initiative is a community-building, culturally responsive mechanism intended to effectively create sustained affinity toward STEM. The ultimate goal of STEM-Up is to transform the attitudes, perceptions and behaviors of students, teachers, administrators and parents regarding the pursuit of math and science as a viable career pathway. This Initiative, as an action strategy, materialized from a set of design principles, grounded in a theory of change. This theory suggests that a catalyst for boosting student interest and achievement around STEM can be created through community engagement. The design principles developed to underpin the theory of change and serve as a practical roadmap for transformation is known as AIMS - Awareness, Inspiration, Motivation, and Skills.

Now, in its third-year of a five-year pilot contract from the U.S. Department of Defense, the STEM-Up Initiative has developed a menu of opportunities that has successfully engaged 18 K-12 schools and hosted over 18,000 students through direct classroom and out-of-school activities. STEM-Up has developed school agendas, hands-on classroom activities for 4th 6th grade students, the Viva Technology Program for middle school and high school students, parent workshops, an educators institute, and teacher ambassadors. This presentation will discuss STEM-Up as a comprehensive best-practice to make math and science a common practice within an underrepresented community.