



## **National Science Foundation**

Directorate for Education and Human Resources (EHR)  
Division of Undergraduate Education (DUE)

### ***STEP 2012: Building a STEP Community of Practice*** **Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP)** **2012 Grantees Meeting**

March 15-16, 2012  
Crystal Gateway Hotel  
Arlington, VA

## **Breakout Sessions Schedule and Descriptions**

For the 2012 meeting, there are a total of 37 breakouts divided over three breakout sessions. Sessions I and III include workshops (designed and led by STEP grantees) and panel discussions, as well as a follow-up meeting with our Thursday morning plenary speaker. Details can be found in the following summaries.

This year, Session II (on Thursday afternoon) will be dedicated to the formation of Special Interest Groups (SIGs). Our hope is that SIGs will foster interactions between grantees with common interests that extend beyond the annual meeting. The goal of each of the SIG breakouts should be to formulate a plan of action for the next year.

We encourage you to read through the topics and summaries carefully before signing up for breakout sessions (i.e., before completing the meeting registration process). We also encourage you to discuss the breakouts with your colleagues so as to optimize the participation of your project team.

Our hope is that meeting participants will come to the breakout sessions ready to participate fully in the discussions and share their own experiences and results, rather than to simply listen to the designated presenters. We also hope that most, if not all, of the sessions will end with a "product" that can be shared with the rest of the STEP community (e.g., a list of challenges, or of best practices).

## Breakout Session I -- Thursday, March 15, 10:45 a.m. – 12:15 p.m.

### **I-01 Building Strong Two-Year/Four-Year Partnerships**

**(Panel)**

**Room: Salon F**

**Panelists:** Joseph Barba – City College of New York, Claire Duggan – Northeastern University, Mark Filowitz – California State University-Fullerton, Diane Rover – Iowa State University

**Moderator:** Iraj Nejad – Mt. San Antonio College

Many STEP projects involve strategies for building partnerships between two-year and four-year schools. This session will consider the challenges involved in establishing meaningful partnerships that serve to attract and retain students in STEM fields and smooth their transition from two-year to four-year schools. Discussions will include identifying the key elements of successful partnerships and the most common roadblocks within partnerships, and will examine how to measure the effectiveness of such partnerships.

### **I-02 Improving Student Success in Foundational Courses in the Sciences**

**(Panel)**

**Room: Salon J**

**Panelists:** Ellene Tratas Contis – Eastern Michigan University, Jane L. Wolfson – Towson University, Lycurgus L. Muldrow - Morehouse College

**Moderator:** Joyce Evans – NSF

This session will consider the challenges and successes associated with introductory science courses. Discussions will focus on strategies for increasing student retention through the use of strategies such as bridge programs, peer mentoring, learning communities, special introductory courses or seminars, pedagogical changes, or curricular revisions.

### **I-03 Using Career Awareness Activities to Recruit and Retain Students**

**(Panel)**

**Room: Rosslyn II**

**Panelists:** John Davis – Alma College, Renata Engel – The Pennsylvania State University, Matthew Green – LeTourneau University

**Moderator:** Dave Matty – Weber State University

Participants in this session will share ways they use (or envision using) career awareness materials to recruit students to and retain students in their program. The session facilitator will share sources of interesting and useful career materials will be shared and examples of novel career awareness activities.

### **I-04 Encouraging Student Participation in Project Activities**

**(Panel)**

**Room: Rosslyn I**

**Panelists:** Lucy Casale – University of Washington, Cynthia Conteh – Miami Dade College – Wolfson, Rakesh Pangasa – Arizona Western College

**Moderator:** Dan Maki – Indiana University

This session will consider the challenges and successes in ensuring student participation in planned enrichment activities that take place outside standard course times. Discussions will include adapting such activities as early research experiences, internships, peer tutoring, open-ended projects, career mentoring, and tutoring to student bodies with large numbers of commuting and/or part time students, or students with complicated schedules and external responsibilities.

### **I-05 Leveraging Your STEP Project**

**(Panel)**

**Room: Salon A**

**Panelists:** Michael Georgiopoulos – University of Central Florida, Dean Livelybrooks – University of Oregon, Warren N. Waggenspack, Jr. – Louisiana State University

**Moderator:** Bevlee Watford – Virginia Tech

This session will focus on institutionalizing components of STEP projects. Discussions will include leveraging the STEP project by connecting to other on-campus structures and programs, utilizing off-campus funding sources, building partnerships with schools and/or industry, and working with administrators to achieve these connections.

### **I-06 Improving Retention and Student Success through Cohort-Building and Social Networking**

**(Workshop)**

**Room: Salon K**

**Presenters:** Anant Kukreti, Latiera Brunson Evans, Kenneth Simonson, and Urmila Ghia – University of Cincinnati

**Moderator:** Ron Buckmire – NSF

This session will discuss strategies for building community among students, and the impact of those strategies on STEM students' retention. Students participate in activities such as: Summer Bridge Program, Orientation in which a Contract of Participation is signed; Advising and Mentoring by project faculty and departmental advisors in efforts to ensure that students are on track with the graduation goals; Supplemental Cooperative Learning Freshmen Calculus, Physics and Chemistry Courses in which students interact in groups of 3-4 to master the course material; student-led Monthly Socials in which the students determine the theme of the social and present it to their peers; Community Engagement Program requirement with an emphasis on STEM related activities for elementary and secondary school students and schools; Industrial Cooperative (Co-Op) Experience for students to apply knowledge gained in the classroom to the practice of engineering; and Graduate School Preparation by way of summer and academic-year Research Experiences for Undergraduates where students conduct research on faculty-led projects with faculty members and their graduate students. Issues of managing and evaluating these activities will also be presented.

### **I-07 Models for Undergraduate Research Involving Community College Students**

**(Workshop)**

**Room: Salon G**

**Presenters:** Paris Svoronos, Melvin Gorelick, and Nidhi Gadura – Queensborough Community College, Hervé Collin, Maria Bautista, and Louise Pagotto – Kapi'olani Community College,

**Moderator:** Eun-Woo Chang – Montgomery College

Despite the potential benefits to students, faculty, and the institution, Undergraduate Research Experiences (UREs) at the community college level are rare for various reasons. These include heavy teaching load of faculty, lack of site instrumentation and other facilities, and various constraints on students (e.g., work and/or family obligations, commuting, weaker background, since they are only freshmen and sophomores). However, conducting research at the community college is possible since simplified, low budgeted projects may be supported via agencies such as the NSF, NIH, Department of Education, etc. Nearby private industries and four-year colleges may also support undergraduate research opportunities by offering internships during the summer, especially when a serious effort for neighboring professional conference participation is involved.

A list of strategies will be provided to attendees to help them start undergraduate research projects at their institutions. Using the resources provided, participants will be asked to brainstorm a format for their new undergraduate research programs or possible changes to existing ones. They will be asked to brainstorm components to their proposed URE programs including:

- Describe focus areas of their URE program;
- Identify key faculty members, courses, competitions or conferences, and expected outcomes;
- Describe how URE supports their STEP goals and how they plan to assess the program.

While brainstorming, important questions may emerge that we (or the group as a whole) can address. The participants can leave the workshop with the outline of a detailed plan for implementing or improving a URE program.

### **I-08 Data Management and Analysis for Large STEP Projects**

**(Workshop)**

**Room: Salon B**

**Presenters:** Mark Urban-Lurain, Daina Briedis, Colleen McDonough, Jon Sticklen, Claudia Vergara, and Tom Wolff – Michigan State University, Renée DeGraaf and Ruth Heckman – Lansing Community College

**Moderator:** Russ Pimmel – Higher Education Services, Inc.

Research and evaluation for large STEP projects entails managing and analyzing large, complex, and often messy datasets. At Michigan State University, our project, EEES: Engaging Early Engineering Students to Expand Numbers of Degree Recipients, focuses on improving retention across the entire College of Engineering. The project impacts thousands of students and faculty across the entire university. We are collecting data on student academic performance, participation in the multiple interventions that our project provides along with surveys and focus groups from students and faculty. Collecting, organizing, managing and analyzing this wide range of data is challenging. This advanced workshop is intended for participants from projects with similar data management and analysis needs. We will provide an overview of some of the challenges from our project and some of the solutions we have explored and implemented. The goal of the workshop is for participants to identify common challenges and successful solutions that can be shared across the STEP community. This workshop is NOT intended to be an introduction to data management.

### **I-09 A Freshman STEP Curriculum: A Project-Based Approach to STEM Student Success**

**(Workshop)**

**Room: Madison**

**Presenter:** Michael Braunstein – Central Washington University

**Moderator:** John Dwyer – St. Catherine University

Workshop participants will learn about and be engaged in the interdisciplinary freshman STEP curriculum that we have developed as one portion of Central Washington University's STEP program. The curriculum engages students in a learning community, provides a foundation for academic success in STEM disciplines, fosters mentoring relationships, and supports student success. It consists of a yearlong sequence of classes focused on a single STEM theme and linked English and freshman advising seminar classes. The goals of the workshop are to provide participants with a framework for developing a dedicated interdisciplinary STEM freshman curriculum at their own institutions by engaging them in some of the key elements of the curriculum we have developed. Participants may also be interested in incorporating elements of our curriculum in their existing curriculum, for instance the STEM themes that we have found effective for interdisciplinary groups of STEM students and/or the writing, information literacy, and small group project-based components of our curriculum. After providing an overview of our curriculum we will engage

participants in a few abbreviated activities that will give them a "student's eye" view of key elements of the curriculum. Finally, we will engage participants in one or two activities that present them with some of the key issues instructors must address in delivering such a curriculum.

### **I-10 The Dynamics of Real-Time Course Correction in the Management of STEP Projects**

**(Workshop)**

**Room: Jackson**

**Presenters:** Rabi Ann Musah, Denise McKeon, Dianne Jester, and Hua Shi – State University of New York at Albany, Thomas Kling and Matthew Salomone – Bridgewater State University

**Moderator:** Myles Boylan – NSF

Despite how well conceived a funded proposal is, unforeseen discrepancies between intended implementation strategies and the reality "on the ground" often arise over the course of the funding period. In these circumstances, it is essential that the issues be addressed and resources redirected as appropriate, in order to achieve project aims. However, it can be challenging, particularly in the early phases of the project, to decide on if, how, where and when to introduce course corrections. In this regard, significant experience has been gained during implementation of the SUNY-Albany and Bridgewater State University NSF-STEP projects.

The goal of the workshop is to encourage participants to make effective use of the STEP meeting to formulate real-time course corrections for the realization of project goals. We encourage multiple members of an institution's STEP management team to attend our workshop, where they will work together in utilizing a conceptual framework to identify lever points where real-time course corrections can and should be made. This framework can guide participants in exploiting the knowledge base and expertise offered at other NSF-STEP conference workshops and posters.

During the workshop, participants will:

- Explore the concept of real-time course correction through examination of illustrative case studies.
- Learn about a Conceptual Framework that provides for making strategic changes that lead to realization of the STEP project goal.
- Reflect on the evolution of their own project and how to apply the Conceptual Framework.
- Begin to develop a personal plan for making real-time course corrections.

### **I-11 Faculty Development for STEM Student Success: Generating a Campus Culture of Best Practice**

**(Workshop)**

**Room: Salon C**

**Presenters:** Susan Shadle, Janet Callahan, and Doug Bullock – Boise State University

**Moderator:** Scott Grissom – Grand Valley State University

A key component of STEM student success lies with the faculty, especially with those teaching courses early in the STEM curriculum. In order to effect sustained changes in STEM student success at Boise State, our project has targeted faculty development as one of its cornerstones. The goals are to impact faculty classroom pedagogy and to elevate the dialogue within STEM departments and colleges so that faculty feel ownership of student success. As part of our STEP project, we have initiated a STEM-focused faculty learning community and we have held an annual "Best Practices for STEM Teaching and Learning" symposium

This interactive session will use case studies to model components of the two strategies we've used to impact pedagogy. Facilitated small-group discussions and report outs will allow participants to generate ideas for impacting faculty teaching practice and campus culture on their own campuses.

## **I-12 Helping STEM Majors Succeed in Mathematics**

**(Workshop)**

**Room: Salon H**

**Presenters:** Thomas Cheatham, Ginger Rowell, Don Nelson, Chris Stephens, and Elaine Tenpenny – Middle Tennessee State University, Allan Mills and Sally Pardue – Tennessee Technological University

**Moderator:** Eileen Lewis – University of California, Berkeley and Canada College

For many students who aspire to be STEM majors, mathematics is a roadblock. Many students do not enter college prepared for mathematics at the level required for most STEM majors. Poor performance in early mathematics courses may lead students to transfer out of STEM or worse drop out of college, leading to a reduced STEM workforce. Numerous STEP projects are working to address different forms of this problem and it may be worthwhile to have a discussion of best practices. Many of us have different flavors of “math bridge programs.” Others are concerned about how to properly place new students into the most appropriate mathematics class. Other STEP programs are using curricular interventions such as peer-led team-learning to improve learning. What are the best practices for a math bridge program? What data do we use to most accurately place a new student into the “right” math course? What curricular interventions hold the most promise for improving learning in mathematics classes? How do these ideas work for entering students with low math ACT sub-scores? For minority students? Two STEP projects in Tennessee are working on these problems using quite different approaches. In 15 minutes each, the Tennessee programs will share an overview of their interventions and we will ask STEP participants to share their best practices and have a general discussion of what works and what does not.

## **I-13 Role of Metacognition in Student Development: Follow-Up Session with Plenary Speaker, Sandra McGuire**

**(Open Discussion)**

**Room: Jefferson**

**Session Leader:** Sandra McGuire – Louisiana State University

**Moderator:** Suzanne Westbrook – NSF

Dr. McGuire is Professor of Chemistry and Assistant Vice-Chancellor for Learning, Teaching and Retention at Louisiana State. The abstract of her plenary talk can be found in the meeting agenda.

## Breakout Session II -- Thursday, March 15, 2:00 p.m. – 3:30 p.m.

Session II will focus on the formation of long-term Special Interest Groups. Given the limits of time and space, we have identified a number of potential SIGs for the coming year. We envision SIGs as being fairly fluid; new ones may emerge and older ones disappear as grantees' interests change. Nevertheless, our hope is that SIGs will foster community by encouraging grantees to continue discussions throughout the year.

### **II-01 Type 2 Round-table**

**(Roundtable; SIG)**

**Room: Salon G**

**Session Leaders:** Chandra Muller – University of Texas, David Feldon – University of Virginia

**Moderator:** Connie Della-Piana – NSF

### **II-02 Two-Year/ Four-Year Partnerships**

**(SIG)**

**Room: Rosslyn II**

**Session Leaders:** James Dorsey – University of Washington, Carolyn Vallas – University of Virginia

**Moderator:** Russ Pimmel – Higher Education Services, Inc.

### **II-03 Foundational Courses**

**(SIG)**

**Room: Salon F**

**Session Leaders:** Sylvia Orr – Estrella Mountain Community College, Janet Liou-Mark – New York City College of Technology, Ginger Rowell – Middle Tennessee State University

**Moderator:** Dan Maki – Indiana University, Dave Matty – Weber State University

### **II-04 Early UG Research & Internships**

**(SIG)**

**Room: Salon B**

**Session Leaders:** John Davis – Alma College, Joseph Kruger – Lamar University, Rakesh Pangasa – Arizona Western College

**Moderator:** Sue Fitzgerald – NSF

### **II-05 Learning Communities & Bridge Programs**

**(SIG)**

**Room: Salon C**

**Session Leaders:** Richard Kopec – St. Edward's University, Jennifer Sowers – James Madison University, Edmund Tsang – Western Michigan University

**Moderator:** Peter Lea – NSF

### **II-06 Project Sustainability**

**(SIG)**

**Room: Salon H**

**Session Leaders:** Donald Allen – Texas A&M University, Michael Georgiopoulos – University of Central Florida

**Moderator:** Maura Borrego – NSF

### **II-07 Recruiting, Retaining Women and/or Minority Students**

(SIG)

**Room: Salon J**

**Session Leaders:** AE Dreyfuss – New York City College of Technology, Anant Kukreti – University of Cincinnati, Melissa Dagley – University of Central Florida, Hedley Freake – University of Connecticut

**Moderators:** Ron Buckmire – NSF, Beilee Watford – Virginia Tech

### **II-08 Collecting & Organizing Data**

(SIG)

**Room: Salon K**

**Session Leader:** Rahman Tashakkori – Appalachian State University

**Moderator:** Jose Herrera – NSF

### **II-09 Community College Issues**

(SIG)

**Room: Rosslyn I**

**Session Leaders:** Daniel Spencer – Tarleton State University, Paris Svoronos – Queensborough Community College

**Moderators:** Iraj Nejad – Mt. San Antonio College, Eun-Woo Chang – Montgomery College

### **II-10 Issues at Large Universities**

(SIG)

**Room: Salon A**

**Session Leaders:** Mary Anderson-Rowland – Arizona State University, Tamara Fuller – University of Maryland, John Reisel – University of Wisconsin-Milwaukee

**Moderator:** Suzanne Westbrook – NSF

### **II-11 Project Coordinator Network**

(SIG)

**Room: Madison**

**Presenters:** Issata Saccoh – Rutgers University-New Brunswick, Dhushy Sathianathan – California State University-Long Beach

**Moderator:** John Dwyer – St. Catherine University

### **II-12 Project Evaluator Network**

(SIG)

**Room: Jefferson**

**Session Leaders:** Howard Mzumara – Indiana University, Purdue University, Jason Katz – University of South Carolina

**Moderator:** Eileen Lewis – University of California, Berkeley and Canada College



## Breakout Session III -- Friday, March 16, 8:30 a.m. – 10:00 a.m.

### **III-01 Improving Student Success in Foundational Courses in Mathematics**

**(Panel)**

**Room: Salon B**

**Panelists:** Don Allen – Texas A&M University, John Reisel – University of Wisconsin-Milwaukee, Susan Tappero – Cabrillo College

**Moderator:** Dave Matty – Weber State University

This session will consider the challenges, successes, and best practices in preparing students for calculus. Discussions will focus on strategies for identifying at risk students (for example, through calculus readiness tests) and for improving their chances of success through strategies such as bridge programs, peer mentoring, learning communities, or changes to precalculus courses.

### **III-02 Implementing Early Undergraduate Research & Internships**

**(Panel)**

**Room: Salon K**

**Panelists:** Stuart Long – University of Houston, Tim Mousseau – University of South Carolina, Wei R. Chen – University of Central Oklahoma

**Moderator:** Peter Lea – NSF

This session will consider the challenges and successes in designing and implementing early undergraduate research experiences and internships that serve to retain students in STEM fields. Discussions will include preparing students for these experiences, making these experiences meaningful, reaching a broader range of students, and engaging and retaining faculty mentors.

### **III-03 Improving Retention & Success via Cohort-Building and Social Networking**

**(Panel)**

**Room: Salon C**

**Panelists:** Maureen Doyle – Northern Kentucky University, Joseph Martin – Rutgers University-Camden, Catherine Mobley – Clemson University

**Moderator:** Myles Boylan – NSF

This session will focus on strategies for building community among students, and the impact of those strategies on STEM retention. Discussion topics include strategies aimed at critical transition points where attrition or low academic performance is known to be high for certain groups (e.g., entering freshman, community college transfers, transition to upper division core, underrepresented engineering students).

### **III-04 Constructing Environments for Student Success**

**(Panel)**

**Room: Salon F**

**Panelists:** Hedley Freake – University of Connecticut, Mary Anderson-Rowland – Arizona State University, Mandy Raab – Saint Vincent College, Peter Tkacik – UNC Charlotte

**Moderator:** Sue Fitzgerald – NSF

This session will consider the challenges and successes in designing campus environments that lead to improved student retention and success in STEM disciplines. Based on their experiences, participants will work together to identify best practices and strategies for overcoming implementation obstacles.

### **III-05 Strategies for Effective Evaluation**

**(Panel)**

**Room: Salon H**

**Panelists:** David Blair – St. Edward's University, David Feldon – University of Virginia, David Tomasko – The Ohio State University

**Moderator:** Connie Della-Piana – NSF

This session will discuss key issues in the development and implementation of an effective evaluation plan for STEP projects.

### **III-06 Strategies for Sustainability**

**(Panel)**

**Room: Salon I**

**Panelists:** Maureen Scharberg – San Jose State University, Barbara Speziale – Clemson University, Edmund Tsang – Western Michigan University

**Moderator:** Jose Herrera – NSF

This session will discuss approaches that STEP grantees have used to help sustain those project components that have proved successful.

### **III-07 What Counts? Articulation Agreements and Transfer Students**

**(Workshop)**

**Room: Salon G**

**Presenters:** Carolyn Vallas – University of Virginia, Patricia Taylor – Thomas Nelson Community College

**Moderator:** Eileen Lewis – University of California, Berkeley and Canada College

Leaders of the joint effort between the University of Virginia (UVA) and Thomas Nelson Community College (TNCC), now in its fifth year, will discuss transfer-related issues that have surfaced during the course of the grant period, along with modifications that have been discussed and developed in order to accomplish the goals set forth in the submitted proposal. Topics to be discussed during the “What Counts” workshop will include advising, articulation agreements, guaranteed admissions and transfer requirements as well as challenges related to student tracking and institutional credit for student transfers outside of STEP 2-year/4-year partnerships. The cooperative partnership between UVA and TNCC is the first such partnership between these two institutions. Therefore, we will discuss the need for establishing mechanisms to ensure that students are fully and correctly informed about transfer and admission requirements in engineering as well as potential barriers in this process. Attendees from four-year institutions, community colleges, and joint partnerships will have an opportunity to take part in a scenario-driven, organic discussion including Q&A, which will provide advice and guidance for audience members with similar challenges in their STEP projects. This workshop will help attendees to design strong advising mechanisms and deal with tracking challenges as they arise throughout their grant.

### **III-08 Data Collection, Publishing, and Dissemination of Results**

**(Workshop)**

**Room: Salon II**

**Presenters:** Chandra Muller – University of Texas, Eric Grodsky – University of Minnesota

**Moderator:** Maura Borrego – NSF

This workshop will describe principles and pitfalls of data collection to provide evidence for program impact. We will discuss sampling strategies, IRB issues, modes of data collection and ways of increasing rates of student participation in the survey. We will then suggest some of the ways that projects can move from data collection to publication and dissemination of findings.

### **III-09 Strategies for Promoting Faculty Engagement with Early STEM Students**

**(Workshop)**

**Room: Salon III**

**Presenters:** Daina Briedis, Colleen McDonough, Jon Sticklen, Mark Urban-Lurain, Claudia Vergara, and Tom Wolff – Michigan State University, Renée DeGraaf and Ruth Heckman – Lansing Community College,

**Moderator:** Scott Grissom – Grand Valley State University

Attrition of potentially qualified students from STEM programs is a universal problem faced by all institutions. This type of “leaving” has been studied extensively by Seymour and Hewitt, who conclude that these students go elsewhere largely because they feel isolated, disconnected, and adrift. Faculty engagement can make the difference between the students’ remaining in engineering (or STEM, in general) or choosing different, seemingly “friendlier” career paths.

In the College of Engineering (COE) at Michigan State University (MSU), this problem was exacerbated because students didn’t have the opportunity to interact with faculty in their disciplines until the second year of college studies. To help remedy this trend, the COE at MSU has embarked on a five-year program aimed at increasing student retention by ten percentage points. This program, Engaging Early Engineering Students (EEES), is designed to help retain the freshmen intenders (FIs) whether they must improve their academic performance to be accepted into the COE or whether they are students (leavers) who choose to go to another discipline despite being academically qualified for admission. Our retention program is directed at increased faculty connections with entering students, primarily through designated Connector Faculty.

This workshop will briefly relate the key factors and lessons learned in implementing the Connector Faculty program at our institution. A facilitated breakout group format will allow workshop participants to discuss the challenges associated with understanding faculty interactions with early engineering (STEM) students and with encouraging sufficient and enthusiastic faculty involvement in the context of their own institutions. Workshop participants will develop plans and strategies by which to develop student-faculty interactions and enhance student engagement on their campuses regardless of type or size.

### **III-10 Increasing Student Achievement in Mathematics and Science through Peer-Led Team Learning**

**(Workshop)**

**Room: Rosslyn II**

**Presenters:** Jim Becvar and Ann Darnell – University of Texas at El Paso, AE Dreyfuss and Janet Liou-Mark – New York City College of Technology, CUNY

**Moderator:** Dan Maki – Indiana University

Peer-Led Team Learning (PLTL) is a student-centered instructional model for science and mathematics where students actively learn in a small group setting facilitated by an undergraduate peer leader. In a typical workshop, students meet with the leader for one or two hours per week and work in teams to solve carefully structured problems that are designed to foster critical thinking skills, problem-solving abilities, and reinforcement of concepts. These problems, aggregated in learning modules, utilize key course materials, channel student efforts into effective collaboration, and provide demonstrations of applications that are meaningful and relevant to the students. The workshops are either integrated into the course curriculum (mandatory) or are stand-alone sessions (optional) and provide an opportunity for students to discuss their understanding of the concepts in a non-threatening environment. The presenters’ institutions have successful PLTL programs that have been in existence for years. This workshop will provide hands-on experience of what a typical workshop entails. Variations of the PLTL model will be presented and results from several studies shared.

### **III-11 A National Model for Engineering Mathematics Education: Uncorking the Bottleneck at Your Institution**

**(Workshop)**

**Room: Salon A**

**Presenter:** Nathan Klingbeil – Wright State University

**Moderator:** Russ Pimmel – Higher Education Services, Inc.

This workshop will describe a curriculum reform initiative at Wright State University to address the nationwide problem of math-related attrition in engineering. The Wright State model begins with the development of a novel first-year engineering mathematics course, EGR 101 “Introductory Mathematics for Engineering Applications.” Taught by engineering faculty, the course includes lecture, laboratory and recitation components. Using an application-oriented, hands-on approach, the course addresses only the salient math topics actually used in core engineering courses. These include the traditional physics, engineering mechanics, electric circuits and computer programming sequences. The EGR 101 course replaces traditional math prerequisite requirements for the above core courses, so that students can advance in the curriculum without first completing the required calculus sequence. The result has shifted the traditional emphasis on math prerequisite requirements to an emphasis on *engineering motivation* for math, and has had an overwhelming impact on student retention, motivation and success in engineering. As part of our STEP Type 1 and CCLI Phase 3 initiatives, various aspects of the approach are now being piloted by at least two dozen institutions across the country (primarily university, but also at the community college and K-12 levels).

At the conclusion of this session, workshop attendees will be able to:

1. Describe the key elements of the Wright State model for engineering mathematics education.
2. Implement aspects of the Wright State model at their home institutions.
3. Generalize the principles of the Wright State model to disciplines outside of engineering.

In addition to presenting this radical initiative, the workshop will engage the audience in small group discussion regarding learning outcomes 2 and 3. Finally, each participant will be directly engaged in curriculum development by authoring an application-based math problem for his/ her discipline.

### **III-12 A Learning Culture of Success: A Cultural Approach for Increasing Diversity and Inclusion in STEM**

**(Workshop)**

**Room: Salon J**

**Presenters:** Rafael Alvarez – San Diego City College, Theresa Garcia and Eric Pamintuan – San Diego State University, Raga Bakhiet – Southwestern College

**Moderator:** Pamela Brown – NSF

This workshop will showcase the MESA Program and the "cultural approach" that has been successfully piloted at San Diego City College and San Diego State University to increase the success of first-generation and underrepresented students in STEM. Emphasizing academic support and social integration, the MESA Program is a "national model" for student success in math, engineering and science. Through the STEP Partnership of San Diego (SPSD), SPSD partners have enhanced the MESA model to include professional development activities and internship/research opportunities. Furthermore, the "cultural approach", with a common language of success, addresses the many cultural and social capital deficiencies that limit the success of many of our first generation, underrepresented students in STEM. The "culture of success" strategies are consistent with research outcomes on student learning and success by Tinto, Kuh, etc. This session will highlight the MESA Program model and the "culture of success" strategies via a Powerpoint presentation. Tools and resources will be provided to participants who will be engaged in small group discussions to explore opportunities for using the materials in classrooms and in student support programs.