



NSEC 2017 NATIONAL CONFERENCE

Program Guide

June 23-24, 2017

Hotel Monteleone in New Orleans

Center Roles in Improving Undergraduate STEM Education



This material is based upon work supported by the National Science Foundation under Grant No. (1524832). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

NSEC 2017 National Conference

Friday, June 23, 2017

Quick Glance Schedule

7:00 AM

7:00 AM - 8:30 AM

8:30 AM - 9:00 AM

Registration – outside of East/West Ballroom

Breakfast

[Plenary: Welcome](#)

- Noah Finkelstein, Professor of Physics, Co-Director for Center for STEM Learning, University of Colorado Boulder, and Co-director of the Network of STEM Education Centers (NSEC)

- Kacy Redd, Assistant Vice President, STEM Education Policy, APLU

[Plenary: What Do We Know about Centers](#)

Deborah Carlisle, STEM Education Post-Doctoral Research Associate, University of Massachusetts, will discuss what we know about STEM education centers.

9:00 AM - 9:30 AM

Interactive Session with Centers on Centers

9:30 AM - 10:10 AM

Break

10:10 AM - 10:20 AM

Rapid Talks

10:20 AM - 10:50 AM

Roundtables I

10:50 AM - 11:30 AM

Break

11:30 AM - 11:40 AM

Roundtables II

11:40 AM - 12:20 PM

Lunch

12:20 PM - 1:30 PM

Concurrent Sessions I

1:30 PM - 2:10 PM

Networking Break

2:10 PM - 2:25 PM

Concurrent Sessions II

2:25 PM - 3:05 PM

Break

3:05 PM - 3:20 PM

Rapid Talks

3:25 PM - 3:50 PM

Roundtables III

3:50 PM - 4:30 PM

Poster Session and Networking

4:30 PM - 5:30 PM

Research Action Clusters and Significant Interest Groups (SIGs)

5:30 PM - 6:30 PM

Saturday, June 24, 2017

7:00 AM - 8:30 AM

Breakfast + Birds of a Feather

8:30 AM - 9:00 AM

Plenary: Using Data to Make Your Case Effectively

Angela Bell, Associate Vice Chancellor, University System of Georgia, will discuss using data to make compelling arguments for administrators.

9:00 AM - 9:45 AM

Interactive Session with Centers on Telling Your Story

9:50 AM - 10:30 AM

Concurrent Sessions III

10:30 AM - 10:55 AM

Break

10:55 AM - 11:35 AM

Roundtables IV

11:35 AM - 12:20 PM

Wish list for Centers

12:20 PM - 1:20 PM

Lunch

1:20 PM - 2:35 PM

Plenary: The Future of NSEC

2:35 PM - 3:00 PM

Break

3:00 PM - 4:00 PM

Closing Plenary

Edward Ray, President of Oregon State University, will discuss OSU's diversity initiatives and how to engage your president in undergraduate STEM education reform.

SMTI NSEC 2017 National Conference

Friday, June 23, 2017

Detailed Schedule

7:00 AM	Registration - outside of East/West Ballroom
7:00 AM - 8:30 AM	Breakfast in Queen Anne Ballroom
8:30 AM - 9:00 AM	Plenary: Welcome - Noah Finkelstein, Professor of Physics, Co-Director for Center for STEM Learning, University of Colorado Boulder, and Co-director of the Network of STEM Education Centers (NSEC) - Kacy Redd, Assistant Vice President, STEM Education Policy, APLU
9:00 AM - 9:30 AM	Plenary: What Do We Know about Centers Deborah Carlisle, STEM Education Post-Doctoral Research Associate, University of Massachusetts, will discuss what we know about STEM education centers.
9:30 AM - 10:10 AM	Interactive Session with Centers on Centers
10:20 AM - 10:50 AM	Rapid Talks in East/West Ballroom Systemic Transformation of Education through Evidence-based Reform (STEER) - Gerry Meisels, University of South Florida Enabling Faculty to Adopt Deliberative Democracy Pedagogy: a tool to broaden and engage – Handout & Handout2 & Handout3 -- Gwen Shusterman, Portland State University Communities of practice for engaging faculty in STEM course reform - Laura Hahn, University of Illinois at Urbana-Champaign

10:50 AM - 11:30 AM Roundtables I

Roundtable 1	Systemic Transformation of Education through Evidence-based Reform (STEER) - Gerry Meisels, University of South Florida
Roundtable 2	Patience, Persistence, and Perseverance: Creating Lasting and Meaningful Internal and External Partnerships in K-12 STEM Education - Allison Grabert, University of Southern Indiana
Roundtable 3	Fostering diversity, equity and inclusion through teaching orientations for all new engineering instructors - Tershia Ann Pinder-Grover, University of Michigan
Roundtable 4	Re-engaging Teachers in their Craft through Action Research - Michele Guannel and Nastassia Jones, University of the Virgin Islands
Roundtable 5	The Nebraska Collaborative for Food, Energy, & Water Education: Opportunities and Strategic Visioning - Cory Forbes, University of Nebraska-Lincoln
Roundtable 6	Biology Teaching Assistant Project (BioTAP 2.0): A Network to Build a Capacity for Collaborative Research on Biology Graduate Teaching Assistant Teaching Professional Development (GTA TPD) - Gili Marbach-Ad, University of Maryland

Roundtable 7	Creating the Partnering Research and Impact Measurement for Economic Development (PRIMED) Database - Julee Farley and Susan Magliaro, Virginia Tech
Roundtable 8	University-Community Partnerships for Experiential Learning to Increase STEM Retention and Success - Sharon Locke and Jessica Krim, Southern Illinois University Edwardsville
Roundtable 9	Promoting Reasoning In Undergraduate Mathematics (PRIUM) - William Martin, North Dakota State University

11:30 AM - 11:40 AM Break

11:40 AM - 12:20 PM Roundtables II	
Roundtable 1	Communities of practice for engaging faculty in STEM course reform - Laura Hahn, University of Illinois at Urbana-Champaign
Roundtable 2	Action Research Fellowships: Communities of Practice in support of non-tenure track faculty - Julie Risien, Oregon State University
Roundtable 3	Update on the Statewide STEM Networks Inventory Project - Susan G. Magliaro, Virginia Tech
Roundtable 4	STEM Teaching, Engagement & Pedagogy (STEP) Program: Roadmap to the Development and Implementation of a STEM Faculty Development Pilot at an R1 Institution - Suzanne Tapp and Ken Griffith, Texas Tech University
Roundtable 5	Broadening Participation through Student Recognition - Cynthia Lester, Georgia State University Perimeter College
Roundtable 6	Quantitative Biology - Assessing Incorporation of Modeling - Robert Mayes, Georgia Southern University
Roundtable 7	Exploring differences between STEM disciplines regarding values of skills and use of teaching practices: Quantitative and qualitative analyses of faculty and student perspectives - Gili Marbach-Ad, University of Maryland
Roundtable 8	Developing a series of video tutorials for study skills - Cindy Ghent, Towson University
Roundtable 9	Promoting Reasoning In Undergraduate Mathematics (PRIUM) - William Martin, North Dakota State University

12:20 PM - 1:30 PM Lunch in Queen Anne Ballroom

1:30 PM - 2:10 PM	Concurrent Sessions I
Orleans	Professional Development for Mentors of Novice Undergraduate STEM researchers from Under-represented Populations - Donna Llewellyn, Boise State University
Iberville	Collaborative Around Research Experiences for Teachers (CARET) - John Keller, Cal Poly San Luis Obispo; Jessica Dwyer, University of Utah; Willie Burgess, Purdue University; Larry Horvath, San Francisco State University; Bruce Johnson, University of Arizona; Jessica S. Krim, Southern Illinois University Edwardsville; Bryan Rebar, University of Oregon; and Renee Schwartz, Georgia State University
Bonnet Carre	Deliberative Democracy Pedagogy: a tool to broaden and engage - Handout - Handout2 - Handout3 - Gwen Shusterman, Portland State University
Queen Anne Parlor	Enhancing the STEM Pathway: An Integrated Multicampus Research Program - John Rand, University of Hawaii System

2:10 PM - 2:25 PM Networking Break

2:25 PM - 3:05 PM	Concurrent Sessions II
Orleans	From Concept to Culture: Moving from a Targeted Faculty Development Project towards a Campus-wide Reform Ecosystem - Willie Burgess, Purdue University
Iberville	Helping postdoctoral scientists become effective teachers: Towson Teaching Fellows Program - Cindy Ghent, Towson University
Bonnet Carre	Building a STEM Bridge: WISCIENCE Programs to Support STEM-Focused Students from Underrepresented Backgrounds in their Transition to College - Greta Petersen, University of Wisconsin-Madison
Queen Anne Parlor	SPARCT: Results and Sustainability of an Interdisciplinary STEM Faculty Development Program - Laura Frost, Florida Gulf Coast University

3:05 PM - 3:25 PM Break

3:25 PM - 3:50 PM Rapid Talks in East/West Ballroom

- [Academic Investment in Mathematics & Science \(AIMS\)](#) - W. Robert Midden, Bowling Green State University
- Pre-Calculus and Calculus 1 Readiness Workshops - Tom Cheatham, Middle Tennessee State University

3:50 PM - 4:30 PM	Roundtables III
Roundtable 1	Exploring differences between STEM disciplines regarding values of skills and use of teaching practices: Quantitative and qualitative analyses of faculty and student perspectives - Gili Marbach-Ad, University of Maryland
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Roundtable 9	Quantitative Biology - Assessing Incorporation of Modeling - Robert Mayes, Georgia Southern University
4:30 PM - 5:30 PM	Poster Session and Networking
Poster 1	Development of the University of Iowa STEM Collaborative for Outreach and Research in Education - Jamie Tanas, University of Iowa
Poster 2	Strategies for Developing and Sustaining a STEM Center Research Agenda - Sharon Locke, Southern Illinois University Edwardsville
Poster 3	Showcasing approaches to inclusivity and broadening participation in geoscience and STEM - Rory McFadden, Carleton College
Poster 4	SERC and the IINSPIRE-LSAMP Alliance program workshops in support of broadening participation in STEM - Cailin Huyck Orr, SERC at Carleton College
Poster 5	Scientist-STEM Center-School Partnerships Engage Students in Research-Inspired Lessons - Bryan Rebar, University of Oregon
Poster 6	Pilot Phase Analysis of a CURE Implementation in a Large Enrollment Introductory Biology Laboratory Course - Kelly Barry and Jessica Krim, Southern Illinois University Edwardsville

Poster 7	Exploring the Impact of Extracurricular Experiences in General Science Courses - Nastassia N. Jones and Michele Guannel, University of the Virgin Islands
Poster 8	A Case Study Describing The Transformation Process of Faculty Members Adopting Learner-Centered Teaching Methods - Gili Marbach-Ad, University of Maryland
Poster 9	Evolution of interdisciplinary CUREs: all about the independent research project - Martina Ederer and Trish Hartzell, University of Idaho
Poster 10	Promoting the Success of Students with Disabilities in STEM Majors - Christopher Andersen, Ohio University
Poster 11	Promoting Active Learning in an Introductory Chemistry Course: Challenges and Opportunities - David Pugalee and Alisa Wickliff, UNC Charlotte
Poster 12	Making Connections: How a Small Learning and Teaching Center Has a Big Impact - Kristin O'Connell, Carleton College
Poster 13	Center for Science Teaching and Learning: STEM Education and Research across the Teacher Learning Continuum - Pradeep (Max) Dass, Northern Arizona University
Poster 14	Undergraduate STEM Students Learn More, Fail Less, and Have Decreased Achievement Gaps With Active Learning Strategies, Even from Novice Instructors - Shanna Shaked, University of California Los Angeles
Poster 15	Designing Educational Innovations for Sustained Adoption - Charles Henderson, Western Michigan University
Poster 16	The Role of Peer Leaders in STEM Education - Dabney Dixon, Georgia State University
Poster 17	Education in the Food-Energy-Water-Nexus: A Collaborative DBER Network – Cory Forbes, University of Nebraska-Lincoln

5:30 PM - 6:30 PM	Research Action Clusters and Significant Interest Groups (SIGs)
Orleans	GaSTEMC - Zipangani Vokhiwa, Co-PI, Mercer University
Bonnet Carre	The Nebraska Collaborative for Food, Energy, & Water Education: Opportunities and Strategic Visioning - Cory Forbes, University of Nebraska-Lincoln
Iberville	Collaborative Around Research Experiences for Teachers (CARET) - John Keller, Cal Poly San Luis Obispo; Jessica Dwyer, University of Utah; Willie Burgess, Purdue University; Bruce Johnson, University of Arizona; Jessica S. Krim, Southern Illinois University Edwardsville; Bryan Rebar, University of Oregon; and Renee Schwartz, Georgia State University
Queen Anne Parlor	Hawai'i Teaching and Research Action Clusters in STEM (TRACS) - John Rand, University of Hawaii System

Saturday, June 24, 2017

7:00 AM - 8:30 AM Breakfast + Birds of a Feather in Queen Anne Ballroom

8:30 AM - 9:00 AM [Plenary: Using Data to Make Your Case Effectively in East/West Ballroom](#)

- Angela Bell, Associate Vice Chancellor, University System of Georgia, will discuss how to use data to make compelling arguments for administrators.

9:00 AM - 9:45 AM Interactive Session with Centers on Telling Your Story

9:50 AM - 10:30 AM Concurrent Sessions III

Orleans	Linking National and Institutional Efforts to Prepare Future STEM Faculty as Effective Teachers: Lessons Learned from the Center for the Integration of Research, Teaching, and Learning (CIRTL) - Ann E. Austin, Michigan State University; Lucas Hill, University of Wisconsin Madison; Jessica Schein, Michigan State University
Iberville	STEM Education Centers as a Framework to Sustain Systemic Change of Undergraduate STEM Education - Alejandro de la Puente, National Science Foundation
Bonnet Carre	A Unique STEM Initiative: Research Experiences for Secondary Math and Science Teachers (RET) Paired with Classroom Support from Senior Undergraduate Engineering Students - Debora Liberi, University of Cincinnati
Queen Anne Parlor	Establishment and Expansion of the Alabama Alliance for Students with Disabilities in STEM - Overtoun Jenda and Brittany McCullough, Auburn University

10:30 AM - 10:55 AM **Break**

10:55 AM - 11:35 AM Roundtables IV

Roundtable 1	Patience, Persistence, and Perseverance: Creating Lasting and Meaningful Internal and External Partnerships in K-12 STEM Education - Allison Grabert, University of Southern Indiana
Roundtable 2	Re-engaging Teachers in their Craft through Action Research - Michele Guannel and Nastassia Jones, University of the Virgin Islands
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11:35 AM - 12:20 PM	Wish list for Centers in East/West Ballroom
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1:20 PM - 2:35 PM	Plenary: The Future of NSEC in East/West Ballroom
2:35 PM – 3:00 PM	Break
3:00 PM - 4:00 PM	Closing Plenary Edward Ray, President of Oregon State University, will discuss OSU's diversity initiatives and how to engage your president in undergraduate STEM education reform.

The Alfred P. Sloan Foundation (2013-5-12-SLS) and the National Science Foundation (NSF #1524832) helped support this work.

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Thank You!

The NSEC 2017 National Conference could not happen without the leadership of the conference planning committee. We thank them for their invaluable help. We also thank the NSEC Steering Committee, Advisory Board, and our evaluator, Nancy Shapiro, for their guidance.

NSEC 2017 National Conference Planners

- Cynthia Ghent, Associate Professor and Center for STEM Education Acting Director, Towson University
- Angie Hammons, Director Global Learning, Missouri S&T
- Theresa Hopkins, Clinical Associate Professor, University of Tennessee
- Sheila Jones, Senior Executive Director for Innovation and Policy, University System of Georgia
- Laird Kramer, Associate Professor of Physics, Florida International University
- Donna Llewellyn, Executive Director of the Institute for STEM and Diversity Initiatives, and Professor, College of Innovation and Design, Boise State University
- Timothy Scott, Assistant Provost for Undergraduate Studies, Texas A&M University
- Alice Steimle, Instructional Assistant Professor of Curriculum and Instruction, The University of Mississippi

NSEC Steering Committee

- Steven B. Case, Director, Center for STEM Learning & Research Associate Professor, The University of Kansas
- Laird Kramer, Associate Professor of Physics, Florida International University
- Marco Molinaro, Assistant Vice Provost for Educational Effectiveness and Director, Center for Educational Effectiveness, University of California, Davis
- Cailin Huyck Orr, Assistant Director, SERC (Science Education Resource Center), Carleton College
- Martin Storksdieck, Director of Center, Research on Lifelong STEM Learning, Oregon State University

NSEC Advisory Board

- Kenneth G. Furton, Provost, Executive Vice President, and Chief Operating Officer, Florida International University
- Charles Henderson, Professor, Department of Physics and Mallinson Institute for Science Education and Co-Director, Center for Research on Instructional Change in Postsecondary Education, Western Michigan University
- Cathy Manduca, Director, SERC, Carleton College
- Emily Miller, Associate Vice President for Policy, AAU
- Mathew Ouellett, Associate Provost and Director of the Office for Teaching and Learning, Wayne State University
- Susan Renoe, Director of Broader Impacts Network, University of Missouri, Columbia
- Linda Slakey, Senior Fellow, AACU; Senior Advisor, AAU and APLU
- Pratibha Varma-Nelson, Founding Executive Director of SEIRI (STEM Education, Innovation and Research Institute), Indiana University-Purdue University Indianapolis

Evaluator

Nancy Shapiro, Associate Vice-Chancellor for Academic Affairs & Special Assistant to Chancellor, University System of Maryland

NSEC Speaker Bios

Deborah Carlisle, STEM Education Post-Doctoral Research Associate, University of Massachusetts



Deborah Carlisle is a STEM Education Post-Doctoral Research Associate in the Institute for Teaching Excellence and Faculty Development (TEFD) at the University of Massachusetts, Amherst. Deborah's research for the NSEC community currently includes site visits to a wide variety of centers to gain a deeper understanding of the existing structures and functions, allowing for contextualized descriptions of the contrasting areas in which they are all engaged on their local campuses. This research serves to illuminate the roles and needs of these centers, such that a network of centers, NSEC, can effectively support their work. Deborah received her doctorate in Teacher Education and Curriculum Studies, with emphasis in STEM Education, in 2014 from UMass Amherst, and her M.S. in

Biochemistry and Biological Science from the University of New Hampshire. Deborah has both secondary and post-secondary experience as a faculty member in chemistry at Phillips Academy in Andover M.A. and Keene State College, in Keene N.H. Deborah's research publications are in the areas of: STEM education transformation, the development of three-dimensional spatial reasoning skills in chemistry, and promoting the use of technology in STEM classrooms. She is also the co-author of *A Natural Approach to Chemistry*, a successful inquiry-based chemistry program.

Angela Bell, Associate Vice Chancellor, University System of Georgia



Angela Bell is the Associate Vice Chancellor for Research and Policy Analysis of the University System of Georgia. Her division is responsible for meeting the information needs of the University System ranging from overseeing collection of campus data, responding to internal and external data requests, and conducting research and analysis to guide planning, policy, and decision making. A key responsibility is harnessing the system's vast data holdings into actionable information for campus and system leadership. Her research interests include student access to and success in postsecondary education, especially financial aid policy and impacts. Before coming to the USG, Angela worked at the West Virginia Higher Education Policy Commission as the Vice Chancellor of Policy and Planning. She is a Fellow at the Institute of Higher Education at the University of Georgia and serves on the editorial board of the *Journal of Student Financial Aid*. She earned her Ph.D.

in Higher Education Administration and M.Ed. in Language Education at the University of Georgia and her B.A. in Classics at Princeton University.

Noah Finkelstein, Professor, Department of Physics & Co-Director Center for STEM Learning, CU-Boulder; Co-Director Network of STEM Education Centers



Noah Finkelstein is a Professor of Physics at the University of Colorado Boulder and conducts research in physics education, which has resulted in over 120 publications. He serves as a PI of the Physics Education Research (PER) group at Colorado and is also a co-Director of the national-scale Center for STEM Learning on campus, which has become one of eight national demonstration sites for the Association of American Universities' (AAU) STEM Education Initiative. Finkelstein is also co-director of the Network of STEM Education Centers (NSEC), an organization of campus-based centers that serve as catalysts for educational transformation in STEM. He is increasingly involved in education policy. In 2010, he testified before the US Congress on the state of STEM education at the undergraduate and graduate levels. He

currently serves as a Council member for the American Physical Society, a Trustee the Higher Learning Commission, a Technical Advisor to the AAU, and collaborator with the Association of Public and Land-grant Universities' efforts in STEM education. He is a Fellow of the American Physical Society, and a Presidential Teaching Scholar and the inaugural Timmerhaus Teaching Ambassador for the University of Colorado system.

Edward J. Ray, President of Oregon State University



Since becoming Oregon State University's 14th president in 2003, Dr. Edward J. Ray has led a remarkable transformation. During his 13-year tenure, Oregon State has become an internationally recognized public research university and has continued to expand the excellence, scope and impact of its academic, research and outreach services. Under his leadership, OSU completed its first major capital campaign, which raised \$1.14 billion and included contributions from more than 106,000 donors. The Campaign for OSU helped to build or renovate 28 OSU buildings, endow 79 new faculty positions; and create more than 600 new scholarship and fellowship funds for 3,200 students. President Ray came to OSU from Ohio State University, where he had served as executive vice president and provost since 1998 and was a member of the economics faculty for more than 30 years. He received his bachelor's degree in mathematics from Queens College in New York

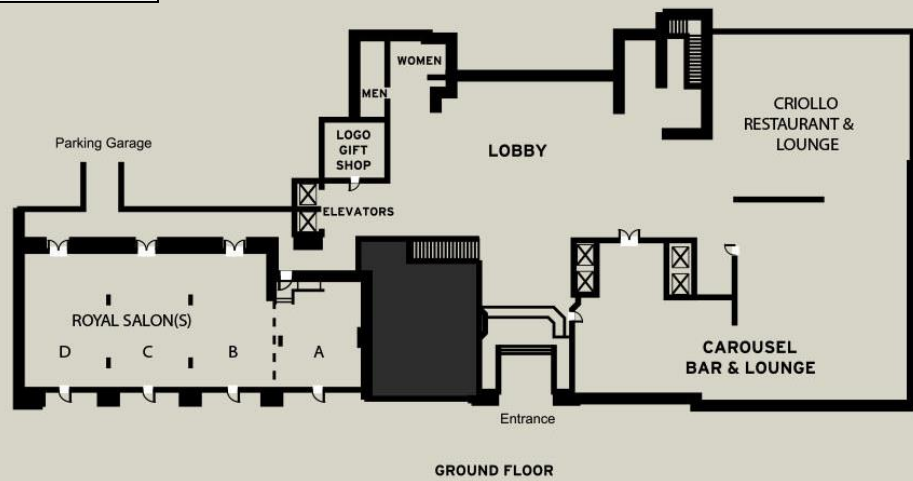
City in 1966 and a master's and Ph.D. in economics from Stanford University in 1969 and 1971, respectively.

Kacy Redd, Assistant Vice President of Science and Mathematics Education Policy, APLU; Co-Director Network of STEM Education Centers

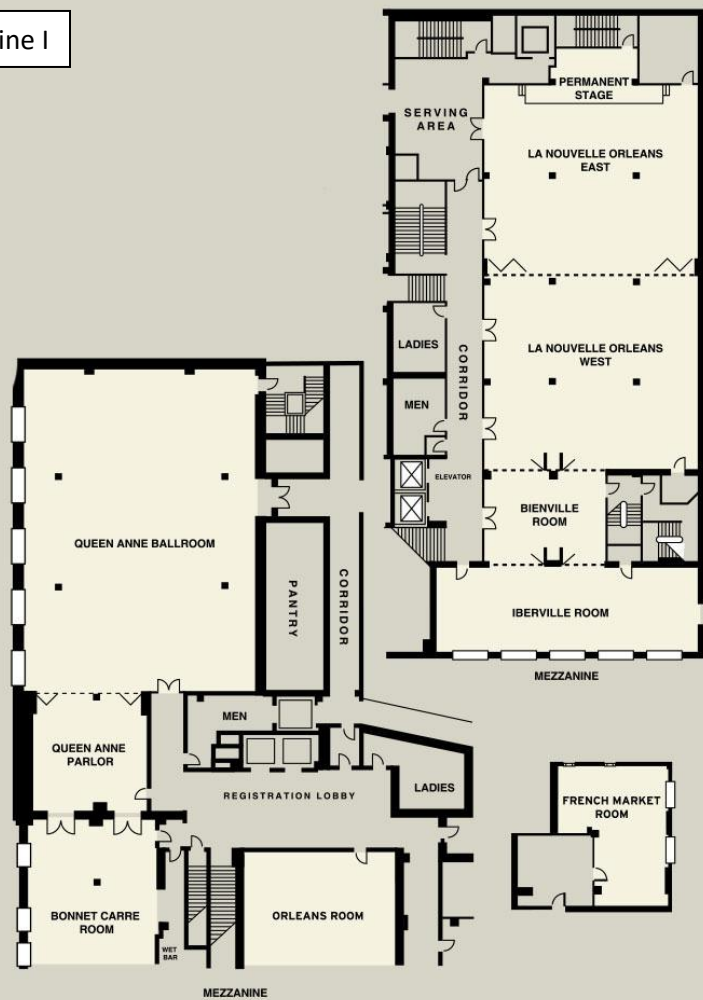


Kacy Redd is the assistant vice president of science and mathematics education policy at the Association of Public and Land-grant Universities (APLU). APLU is a higher education association in Washington, DC, with a membership of 235 public research universities in the US, Canada, and Mexico. She co-directs the Network of STEM Education Centers (NSEC), which currently links 149 STEM Education Centers (SEC) at 126 institutions (from 246 SECs at 182 institutions identified to date). NSEC is funded by the National Science Foundation (NSF #1524832) and has received funding from the Alfred P. Sloan Foundation. Dr. Redd also manages APLU's Science and Mathematics Teaching Imperative (SMTI), a commitment by 132 public research universities to improve science and mathematics teacher preparation. She serves as staff lead for APLU's Research Intensive Committee, a committee of 15 presidents of RU1 institutions, and for the Public Access Working Group, which provides guidance to institutions on making publications and data publicly accessible. Redd received her PhD in neuroscience from Columbia University.

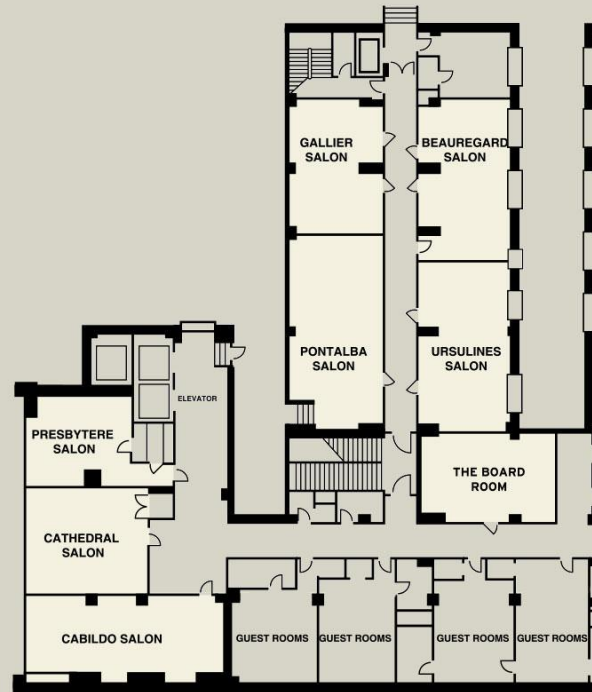
Lobby Level



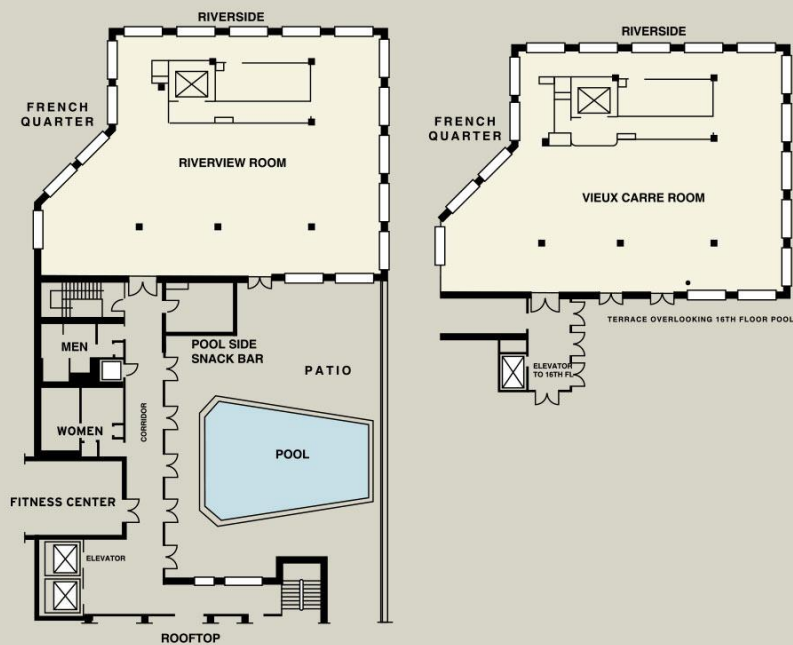
Mezzanine I



Mezzanine II



Rooftop



Systemic Transformation of Education through Evidence-based Reform (STEER)**First Round:** Friday, June 23, 2017 at 10:20 AM**Speakers:** Gerry Meisels, University of South Florida**Additional Authors:**

Abstract: STEER seeks to create a culture that reflects a strong balance between teaching and research, and values both. STEER promotes the adoption of evidence-based teaching practices in all science, technology, engineering and mathematics (STEM) courses, especially in the large-enrollment gateway courses. To facilitate systemic change, the University of South Florida (USF) and Hillsborough Community College (HCC) are partnering to offer professional development for faculty and strengthening coordinated student advising, because the number of STEM community college students transferring to USF exceeds the number who began their studies at USF. STEER's comprehensive approach also addresses other factors that may influence students' academic experiences, such as graduate teaching assistant (GTA) training, student advising, course alignment, institutional policies related to teaching, and physical infrastructure such as classroom configuration. This effort is supported in part by the National Science Foundation, grant number DUE1525574. To learn more visit:

https://serc.carleton.edu/StemEdCenters/prog_descriptions/174212.html

Enabling Faculty to Adopt Deliberative Democracy Pedagogy: a tool to broaden and engage**First Round:** Friday, June 23, 2017 at 10:20 AM**Speakers:** Gwen Shusterman, Portland State University**Additional Authors:**

Abstract: This project has been focused on catalyzing pedagogical innovation in introductory science courses. In particular, structures have been put in place to facilitate the implementation of the model of Deliberative Democracy Pedagogy (DDP). DDP is an active learning strategy, based on deliberative democratic models of citizen engagement in science policymaking. This integrative pedagogical approach, revises the delivery of conventional introductory science content around modules that engage students with current science policy controversies. Teaching teams of faculty and graduate students have attended summer pedagogical workshops, developed curricular modules, implemented the modules and participated in regular Communities of Practice meetings. To learn more visit:

https://serc.carleton.edu/StemEdCenters/prog_descriptions/174269.html - & - [Handout1](#) & [Handout2](#)-[Handout3](#)

Communities of practice for engaging faculty in STEM course reform**First Round:** Friday, June 23, 2017 at 10:20 AM**Speakers:** Laura Hahn, University of Illinois at Urbana-Champaign**Additional Authors:** Geoffrey Herman, Jose Mestre, Matthew West, and Jonathan Tomkin, University of Illinois at Urbana-Champaign

Abstract: At large research-intensive universities, teaching STEM at scale has posed instructional challenges to faculty who are unaccustomed to addressing pedagogy in a collective, sustainable manner. At our institution, through strategic implementation of communities of practice, we are beginning to integrate the qualities of a strong, collaborative research culture into the context of teaching. To learn more visit: https://serc.carleton.edu/StemEdCenters/prog_descriptions/173930.html

Academic Investment in Mathematics & Science (AIMS)**First Round:** Friday, June 23, 2017 at 3:25 PM**Speakers:** W. Robert Midden, Bowling Green State University**Additional Authors:**

Abstract: The Academic Investment in Mathematics & Science (AIMS) is a comprehensive scholarship and support program designed to enhance the success of under-represented minority students and women in earning undergraduate degrees in STEM fields. To learn more visit:

https://serc.carleton.edu/StemEdCenters/prog_descriptions/173909.html

Pre-Calculus and Calculus 1 Readiness Workshops**First Round:** Friday, June 23, 2017 at 3:25 PM**Speakers:** Tom Cheatham, Middle Tennessee State University**Additional Authors:**

Abstract: Students with gaps in their mathematics background are at risk of not succeeding in their upcoming math class. We have begun to do 3-day intensive math workshops the week before the students starts the class to help students fill some of the gaps that may prevent them from succeeding in the course. These workshops have proven to be an inexpensive way to help at-risk students succeed. Students who have previously taken the course, those with poor math ACT scores, students who have not taken math in several years, and others are invited to participate for free. They get to know other students who are in the same boat as they are in and a professor (6 hours per day for 3 days). They fill some gaps and learn that you can study math for a long period of time without dying. Data from the first few semesters is promising. To learn more visit:

https://serc.carleton.edu/StemEdCenters/prog_descriptions/173206.html

RAC pre-proposals are here: <http://www.aplu.org/projects-and-initiatives/stem-education/stem-education-centers-network/Research Action Clusters/2017-Pre-RAC.pdf>

GaSTEMC

Times: Friday, June 23, 2017 at 5:30 pm and Saturday, June 24, 2017 at 7:00 am

Speakers: Zipangani Vokhiwa, Co-PI, Mercer University

RAC Members: Kania Greer, PI, Georgia Southern University; Timothy Burg, Co-PI, University of Georgia; and Zipangani Vokhiwa, Mercer University

Abstract: Improving undergraduate education and STEM education have been buzzwords for the past several years in higher education. However, most institutions cannot agree on what improving undergraduate education looks like or what STEM education looks like and what elements should be included. This proposal seeks to answer these questions from key stakeholders at Universities. The Research Action Cluster, composed of three STEM Centers at the Georgia Southern University, University of Georgia, and Mercer University seeks to survey faculty and administrators to develop a common understanding of what improvement in Undergraduate STEM Education consists of based on the capacity of each University. These centers are representative of many STEM centers in and around the country who seek to provide resources to students and faculty development but who struggle to fit into the University structure. By sharing what is learned in Georgia, it is the goal of this proposal to encourage administrators, and other specialists and stakeholders, to find out what the pulse of undergraduate STEM education at their institutions and to facilitate discussions within Institutions of Higher Education around the nation to develop purposeful and strategic plans to improve undergraduate STEM education that benefits both students and faculty fellows.

The Nebraska Collaborative for Food, Energy, & Water Education: Opportunities and Strategic Visioning

Times: Friday, June 23, 2017 at 5:30 pm and Saturday, June 24, 2017 at 7:00 am

Speakers: Cory Forbes, University of Nebraska-Lincoln

RAC Members: Cory Forbes, University of Nebraska-Lincoln; Leilani Arthurs, University of Nebraska-Lincoln; Hui-Hui Wang, Purdue University; Lynn Bryan, Purdue University; Christine Li, University of Missouri; Troy Sadler, University of Missouri; Hannah Scherer, Virginia Tech; Liesl Baum, Virginia Tech; Nicola Barber, University of Oregon; Eleanor Vandegrift, University of Oregon; Kelly Millenbah, Michigan State University; Joe Krajcik, Michigan State University; Brad Greiman, University of Minnesota; Gillian Roehrig, University of Minnesota

Abstract: This proposal builds upon recent and ongoing efforts to cultivate a national DBER network focused on education grounded in the Food-Energy-Water-Nexus (FEW-Nexus). Through the present proposal, we seek to advance a National Collaborative for Research on Food, Energy, and Water Education (NC-FEW) of transdisciplinary collaborators who span traditional STEM departments, education, and agricultural and natural resource sciences. Building upon early investments in a national NC-FEW planning committee in 2016-2017, we propose to convene an 2-day invited workshop in spring, 2018 that draws upon expertise from an expanded group of faculty representing 7 NSEC-associated

centers and institutions of higher education. The primary deliverable of the workshop is an elaborated blueprint for capacity-building around NC-FEW, including a) growing the participant network and b) enhancing its impact, reflecting both short- and long-term goals of NC-FEW. Requested funds are cost-shared on a 1:1 basis for the proposed activities.

Collaborative Around Research Experiences for Teachers (CARET)

Times: Friday, June 23, 2017 at 5:30 pm and Saturday, June 24, 2017 at 7:00 am

Speakers: John Keller, Cal Poly San Luis Obispo; Jessica Dwyer, University of Utah; Willie Burgess, Purdue University; Bruce Johnson, University of Arizona; Jessica S. Krim, Southern Illinois University Edwardsville; Bryan Rebar, University of Oregon; and Renee Schwartz, Georgia State University

RAC Members: John Keller, Cal Poly San Luis Obispo; Renee Schwartz, Georgia State University; Larry Horvath, Eric Hsu, & Jamie Chan, San Francisco State University; Sanlyn Buxner, Kimberly Sierra-Cajas, Bruce Johnson, & Lisa Elfring, University of Arizona; Bryan Rebar, University of Oregon; Jessica Dwyer, Jordan Gerton, & Holly Godsey, University of Utah; Elisa Stone, Edward Ham, & Laleh Cote, University of California, Berkeley; SoonChun Lee, Mara Alagic, G. Novacek, and S. Lefever, Wichita State University; Willie Burgess, Purdue University; Sharon Locke, Jessica Krim, & Kelly Barry, Southern Illinois University; Kate Hiester & Shari Liss, Ignited; Kaye Storm, Stanford University

Abstract: CARET – the Collaborative Around Research Experiences for Teachers – is a growing collaboration involving roughly a dozen institutions engaged in providing research experiences for undergraduates aspiring to become teachers and/or professional educators currently in K-12 classrooms. We are currently working on a) our conceptual framework and logic model, b) a literature review focused on Undergraduate Research Experiences (UREs), Course Undergraduate Research Experiences (CUREs), and Teacher Research Experiences (TREs), and c) a set of evaluation questions to be shared across our programs. We welcome involvement by partners interested or engaged in URE/CURE/TRE efforts at your home institution.

Hawai'i Teaching and Research Action Clusters in STEM (TRACS)

Times: Friday, June 23, 2017 at 5:30 pm and Saturday, June 24, 2017 at 7:00 am

Speakers: John Rand, University of Hawaii System

RAC Members: John Rand, Tiffany Tsang, Joshua Kaakua, University of Hawai'i System, OSE

Abstract: The goal of the Hawai'i TRACS project is to develop a formal inventory of Undergraduate Research Experiences (URE) throughout the ten-campus University of Hawai'i (UH) System to optimize the undergraduate student learning experience in STEM. The UH System Office of STEM Education (OSE) will lead the Hawai'i TRACS effort and will work with the STEM faculty at each campus to identify, catalog and publish a comprehensive inventory of URE projects. This is an essential step toward better aligning these projects in vertically integrated, multi-institution STEM pathways. For information on the Hawai'i STEM Education Center see: (<http://serc.carleton.edu/StemEdCenters/profiles/141345.html>).

Collaborative Around Research Experiences for Teachers (CARET)**Time:** Friday, June 23, 2017 at 1:30 PM**Location:** Iberville

Speakers: John Keller, Cal Poly San Luis Obispo; Jessica Dwyer, University of Utah; Willie Burgess, Purdue University; Larry Horvath, San Francisco State University; Bruce Johnson, University of Arizona; Jessica S. Krim, Southern Illinois University Edwardsville; Bryan Rebar, University of Oregon; Renee Schwartz, and Georgia State University

Additional Authors: Kelly Barry, Southern Illinois University Edwardsville; Sanlyn Buxner, University of Arizona; Eddy Ham, UC Berkeley; Sharon Locke, Southern Illinois University Edwardsville; Kimberly Sierra-Cajas, University of Arizona; Laleh Coté, SoonChun Lee, Wichita State University; Lawrence Berkeley National Laboratory; and Elisa Stone, UC Berkeley

Abstract: The Collaborative Around Research Experiences for Teachers (CARET) is a consortium of 14 STEM education centers and other organizations invested in providing research opportunities for undergraduates, teacher candidates, and in-service teachers on STEM teaching career trajectories. Initially conceived at the 2013 APLU SMTI Meeting in St. Louis, CARET has received support through a 100Kin10 Meet-up Grant and, more recently, was a recipient of an APLU NSEC Research Action Cluster grant. During this session, we will present our shared work on a) defining a conceptual framework and logic model around research and work experiences for pre-service and in-service teachers, b) conducting a literature review of recent articles relevant to undergraduate research experiences (UREs), course undergraduate research experiences (CUREs), and teacher research experiences (TREs), and c) implementing shared metrics for program evaluation.

Professional Development for Mentors of Novice Undergraduate STEM researchers from Under-represented Populations**Time:** Friday, June 23, 2017 at 1:30 PM**Location:** Orleans

Speakers: Donna Llewellyn, Boise State University

Additional Authors: Catherine Bates, Boise State University

Abstract: The literature is clear that undergraduate research is a high impact practice that helps students, especially those from under-represented populations, succeed in STEM majors. It is also clear that one of the most important factors that lead to positive outcomes is the quality of the student-mentor relationship and the effectiveness of the mentor. In this session we will describe what we are doing to help ensure that our faculty mentors are prepared for working with students from under-represented populations, and the participants will be invited to share what they are doing on their campuses.

Enhancing the STEM Pathway: An Integrated Multicampus Research Program**Time:** Friday, June 23, 2017 at 1:30 PM**Location:** Queen Anne Parlor**Speakers:** John Rand, University of Hawaii System**Additional Authors:**

Abstract: A new initiative that is being developed by the University of Hawaii Office of STEM Education (OSE) called the Teaching and Research Action Clusters in STEM - (TRACS). The project will employ and extend an existing and long-term, multi campus “vertically-integrated” model to improve undergraduate student engagement and retention in STEM pathways from community colleges to four-year STEM campuses. The TRACS initiative enhances the traditional pathway model by integrating undergraduate research experience (URE) into the pathway curriculum. The TRACS initiative attempts to address the following opportunities: Can undergraduate students earn credit conducting undergraduate research across multiple campuses? Will the best-practices of the Engineering-specific VIP model transfer to other STEM disciplines including Physical Sciences, Information and Communication Technology (ICT), and Biological Sciences? What infrastructure, policies, and practices does the University of Hawai’i need to support current and future undergraduate research coordination across the ten campus system?

Deliberative Democracy Pedagogy: a tool to broaden and engage**Time:** Friday, June 23, 2017 at 1:30 PM**Location:** Bonnet Carre**Speakers:** Gwen Shusterman, Portland State University

Additional Authors: Jack Barbera, Portland State University; Erin Shortlidge, Portland State University; Lisa Weasel, Portland State University; and Ellen Skinner, Portland State University

Abstract: The model of Deliberative Democracy Pedagogy (DDP), an active learning strategy, is based on deliberative democratic models of citizen engagement in science policy making. This integrative pedagogical approach, revises the delivery of conventional introductory science content around modules that engage students with current science policy controversies. Essential to this model is the scaffolding of individual and collaborative student experiences with peer-reviewed research, media coverage, and personal and community connections, which is built into the course structure. Through these experiences, students integrate both scientific and social and ethical content in the deliberative learning framework.

https://serc.carleton.edu/StemEdCenters/prog_descriptions/174269.html - & - [Handout1](#) & [Handout2](#)-& [Handout3](#)

From Concept to Culture: Moving from a Targeted Faculty Development Project towards a Campus-wide Reform Ecosystem**Time:** Friday, June 23, 2017 at 2:25 PM**Location:** Orleans**Speakers:** Wilella Burgess, Purdue University**Additional Authors:** Loran Parker, Purdue University

Abstract: Instruction Matters: Purdue Academic Course Transformation (IMPACT) began in 2010 as a grassroots effort to transform large gateway courses to become more student centered. In 2013 IMPACT was recognized as a university priority by the President and changed from a small grassroots effort to a large institutional effort to refocus campus culture on student-centered pedagogy and success; increase student engagement, competence, and learning gains; focus course redesign on research-based pedagogies; and conduct rigorous assessment to inform future courses. Faculty from 10 of Purdue's 11 colleges have participated in IMPACT professional development and redesigned over 200 courses to include student-centered pedagogies. This presentation will describe the growth of IMPACT including reflection on questions such as: • The impact of bottom-up versus top-down approach on faculty perceptions; • Negotiating differences in values, language, culture, and needs among diverse stakeholders; • Identifying and capturing ripple effects of your intervention.

SPARCT: Results and Sustainability of an Interdisciplinary STEM Faculty Development Program**Time:** Friday, June 23, 2017 at 2:25 PM**Location:** Queen Anne Parlor**Speakers:** Laura Frost, Florida Gulf Coast University**Additional Authors:** Jackie Greene, Tanya Huffman, Brian Johnson, and Tanya Kunberger, Florida Gulf Coast University

Abstract: SPARCT (STEM Professional Academy for Reinvigorating the Culture of Teaching), originally funded through NSF-WIDER, provides professional development in evidence-based classroom practices for STEM faculty teaching introductory STEM courses. The expected outcomes for the program include: (1) enhancing scholarship of teaching and learning (SoTL) by SPARCT faculty, (2) improving evidence-based practices targeting the introductory STEM classroom, (3) developing long-term Faculty Learning Communities (FLCs)s in STEM instruction, (4) developing professional peer-observation strategies for the STEM classroom, and (5) enhancing student learning in introductory STEM courses as a result of SPARCT faculty development. This session discusses data and results aligned with the outcomes over the three years of SPARCT. By involving at least 25% of Florida Gulf Coast University's STEM faculty over the three years, SPARCT is creating a community of STEM scholars, reinvigorating interdisciplinary connections, developing learning threads, and increasing the university community's potential to transform the teaching culture.

Helping postdoctoral scientists become effective teachers: Towson Teaching Fellows Program**Time:** Friday, June 23, 2017 at 2:25 PM**Location:** Iberville**Speakers:** Cindy Ghent, Towson University**Additional Authors:**

Abstract: The Towson Teaching Fellows Program is a program that seeks to educate post-doctoral scientists in the pedagogy and application of teaching science at the undergraduate level. The program consists of a series of pedagogy seminars, covering a wide range of topics, including such concepts as metacognition, inquiry learning, and questioning. The Fellows then teach a lecture course. There are debriefing sessions held during their teaching semester to serve as an opportunity for the program personnel to address new issues or concerns that were not covered during the seminar series. The Fellows then teach another semester, giving them time to revise and refine their teaching. This is a spiraling program, with new cohorts being recruited each summer. Currently in its sixth year, this program has produced qualified part time instructors for us while providing real classroom experience to future faculty.

Building a STEM Bridge: WISCIENCE Programs to Support STEM-Focused Students from Underrepresented Backgrounds in their Transition to College**Time:** Friday, June 23, 2017 at 2:25 PM**Location:** Bonnet Carre**Speakers:** Greta Petersen, University of Wisconsin-Madison

Additional Authors: Jerry Whitmore, Jr., University of Wisconsin-Madison; Christopher Trimby, University of Wisconsin-Madison; Dorothea Ledin, University of Wisconsin-Madison; Kevin Niemi, University of Wisconsin-Madison; Jessica TeSlaa, University of Wisconsin-Madison; Amber Robertson Smith, University of Wisconsin-Madison; and Janet Branchaw, University of Wisconsin-Madison

Abstract: The “unwritten” curriculum of college can prove a barrier for students from underrepresented backgrounds (first-generation college, racial and ethnic minorities). To address this, WISCIENCE (the Wisconsin Institute for Science Education and Community Engagement) at the University of Wisconsin-Madison has developed a suite of offerings to support students, especially those interested in science and engineering fields, prior to, during, and after their first year on campus. Our pre-semester immersive “bootcamp”, formal courses, internships, and more, help students navigate a large, complex campus, as well as build a sense of community and discipline-based identity. WISCIENCE leverages cross-campus partnerships to make this possible and operates as an incubator for innovative approaches to STEM (science, technology, education, and mathematics) education.

STEM Education Centers as a Framework to Sustain Systemic Change of Undergraduate STEM Education**Time:** Saturday, June 24, 2017 at 9:50 AM**Location:** Iberville**Speakers:** Alejandro de la Puente, National Science Foundation**Additional Authors:**

Abstract: The need to transform education beyond the development, dissemination and adoption of better and more inspiring teaching practices requires fundamental changes in the practices and cultures of universities. It requires a framework to create and sustain those changes. In this study, we analyze the role that STEM Education Centers (SECs) have in supporting and maintaining institutional change efforts to transform undergraduate STEM education. We study the literature, SECs, those where NSF funding has played a role in institutional change efforts, and a recent effort that has led to the creation of a national SEC network.

Linking National and Institutional Efforts to Prepare Future STEM Faculty as Effective Teachers: Lessons Learned from the Center for the Integration of Research, Teaching, and Learning (CIRTL)**Time:** Saturday, June 24, 2017 at 9:50 AM**Location:** Orleans**Speakers:** Ann E. Austin, Michigan State University; Lucas Hill, University of Wisconsin Madison; Jessica Schein, Michigan State University**Additional Authors:**

Abstract: This session will focus on the Center for the Integration of Research, Teaching, and Learning (CIRTL), which is a National Science Foundation-funded network of 42 research-intensive universities that work collaboratively to improve undergraduate STEM education through the preparation of future faculty who are aware of and committed to using evidence-based teaching practices. Attendees will learn about and discuss: (1) the evidence concerning the impact of CIRTL's teaching-focused professional development opportunities on participating doctoral students' teaching confidence, teaching behaviors, and career interests and aspirations; (2) research-based lessons learned about how institutional leaders (including Teaching and Learning Center directors, STEM Center directors, faculty members, or administrators) can effectively draw on national professional development opportunities, communities, and resources such as provided through CIRTL, to enhance local teaching-related professional development communities (such as provided in Teaching and Learning Centers, Graduate Schools, or STEM Education Centers).

**A Unique STEM Initiative: Research Experiences for Secondary Math and Science Teachers (RET)
Paired with Classroom Support from Senior Undergraduate Engineering Students**

Time: Saturday, June 24, 2017 at 9:50 AM

Location: Bonnet Carre

Speakers: Debora Liberi, University of Cincinnati

Additional Authors: Anant Kukreti, University of Cincinnati

Abstract: This presentation centers on a unique STEM initiative created by pairing of two STEM programs, Research Experiences for Teachers (RET funded by NSF grant # EEC-1404766) and Choose Ohio First Scholarship Program (COFSP funded by OBR-COFSP grant: COF08-23.) RET provides secondary math and science teachers the opportunity to conduct research with engineers and incorporate effective instructional practices in their classrooms. COFSP provides scholarships to senior engineering students who spend 6 hours/week with RET Teachers in the classroom with students. Together, these two programs yield positive results that also meet these goals: 1) promoting STEM outreach and education activities grades 7-12 through undergraduate, 2) providing a rich collaborative environment among University of Cincinnati's (UC) Colleges of Engineering & Applied Science (CEAS), local school districts, and practicing engineers and education specialists and 3) showcasing the best practices in STEM education, with the opportunity to promote STEM careers.

Establishment and Expansion of the Alabama Alliance for Students with Disabilities in STEM

Time: Saturday, June 24, 2017 at 9:50 AM

Location: Queen Anne Parlor

Speakers: Overtoun Jenda and Brittany McCullough, Auburn University

Additional Authors:

Abstract: The Alabama Alliance for Students with Disabilities in STEM (AASD-STEM) is an evidence-based bridge model to prepare and retain students with disabilities at the college level. Funded by a National Science Foundation (NSF) grant, the program functions as an alliance between five Alabama institutions of higher education. The goals of the alliance are to increase the quality and quantity of students with disabilities completing associate, baccalaureate, and graduate degrees in STEM; increase the number of students with disabilities in STEM entering the STEM workforce; and increasing the number of high school students with disabilities entering college. Attendees at this session will be presented with lessons learned regarding recruiting students with disabilities and developing partnerships with both on- and off-campus units to better serve these students, along with evaluation methods and strategies for building and expanding such an alliance.

Systemic Transformation of Education through Evidence-based Reform (STEER)**Only Round:** Friday, June 23, 2017 at 10:50 AM**Speakers:** Gerry Meisels, University of South Florida**Additional Authors:**

Abstract: STEER seeks to create a culture that reflects a strong balance between teaching and research, and values both. STEER promotes the adoption of evidence-based teaching practices in all science, technology, engineering and mathematics (STEM) courses, especially in the large-enrollment gateway courses. To facilitate systemic change, the University of South Florida (USF) and Hillsborough Community College (HCC) are partnering to offer professional development for faculty and strengthening coordinated student advising, because the number of STEM community college students transferring to USF exceeds the number who began their studies at USF. STEER's comprehensive approach also addresses other factors that may influence students' academic experiences, such as graduate teaching assistant (GTA) training, student advising, course alignment, institutional policies related to teaching, and physical infrastructure such as classroom configuration. This effort is supported in part by the National Science Foundation, grant number DUE1525574.

Promoting Reasoning In Undergraduate Mathematics (PRIUM)**First Round:** Friday, June 23, 2017 at 10:50 AM**Second Round:** Friday, June 23, 2017 at 11:40 AM**Speakers:** William Martin, North Dakota State University

Additional Authors: Friedrich Littmann, North Dakota State University, Josef Dorfmeister, North Dakota State University, and Draga Vidakovic, Georgia State University

Abstract: PRIUM is a collaborative project involving the mathematics departments at North Dakota State University and Georgia State University funded by the NSF (. We are implementing a proof assessment framework developed at Rutgers that encourages mathematics faculty to assess how undergraduate mathematics majors develop their ability to understand, use and write proofs. Each semester assessments are developed and implemented by our faculty at three points: as Introduction to Proof course pre- and post-assessments and during the final mathematics major Capstone course. By developing the assessments and reflecting on student performance, faculty think about how their instruction throughout the undergraduate program promotes the desired ability of students to reason mathematically by graduation. Proof and reasoning are central to conceptual understanding of mathematics, so this program supports evidence-based reflection by all mathematics faculty about important curriculum and pedagogy. (NSF 1624906 and 1624970)

Patience, Persistence, and Perseverance: Creating Lasting and Meaningful Internal and External Partnerships in K-12 STEM Education**First Round:** Friday, June 23, 2017 at 10:50 AM**Second Round:** Saturday, June 24, 2017 at 10:55 AM**Speakers:** Allison Grabert, University of Southern Indiana**Additional Authors:** Tina Closser, Naval Surface Warfare Center/Crane

Abstract: The Southwest Indiana STEM (SwISTEM) Resource Center was launched in 2007 from funding secured by the University of Southern Indiana from a regional workforce grant coupled with statewide STEM initiative funding. During this session, lessons learned and strategies will be shared in developing and prioritizing internal and external partnerships as it pertains to the impact, sustainability, and scalability of a university-based, K-12 STEM outreach initiative. With ten years of exercise in patience, persistence, and perseverance, the director the SwISTEM Resource Center is excited to share this journey of establishing a meaningful and unlikely relationship between the third largest naval base in the world and a fledgling STEM outreach program at a four-year, comprehensive, state-supported university.

[Fostering diversity, equity and inclusion through teaching orientations for all new engineering instructors](#)**First Round:** Friday, June 23, 2017 at 10:50 AM**Second Round:** Friday, June 23, 2017 at 3:50 PM**Speakers:** Tershia Ann Pinder-Grover, University of Michigan**Additional Authors:**

Abstract: As a part of a university-wide diversity strategic plan, the Center for Research on Learning and Teaching in Engineering at the University of Michigan revamped all of the engineering teaching orientations for new faculty, graduate student instructors, and undergraduate instructional aides. The goal was to create dedicated sessions at the start of each orientation that would focus on inclusive teaching practices. In particular, new instructors engaged in discussions around social identities, discovered how classroom climate impacts teaching and learning, and identified classroom strategies they might employ to teach inclusively. The evaluations of the interactive workshops and/or theater performances revealed mostly positive ratings; however, there were several lessons learned that will be shared as a part of this interactive roundtable discussion.

Re-engaging Teachers in their Craft through Action Research**First Round:** Friday, June 23, 2017 at 10:50 AM**Second Round:** Saturday, June 24, 2017 at 10:55 AM**Speakers:** Michele Guannel and Nastassia Jones, University of the Virgin Islands**Additional Authors:**

Abstract: One critical component of student success is teacher engagement in the profession: through intellectual, emotional, and social connections. In the US Virgin Islands, many local students arrive to college with low STEM skills and interest. To help bridge this gap, the Virgin Islands Institute for STEM Education Research and Practice is working to increase secondary STEM teacher engagement (and therefore, student success). We incorporate project-based learning, interactions with STEM researchers, and the development of professional learning communities. These elements are pursued in different formats: (1) an intensive two-week summer institute, (2) Master's level Action Research courses, (3) in-school support by science education researchers, and (4) academic-year professional development. To date, 40 teachers and administrators on St. Thomas have participated, representing six schools and the disciplines of math, science, and art. Here we discuss evidence of teacher engagement, such as enhanced creativity and connections among K-12 schools, university, and community partners.

The Nebraska Collaborative for Food, Energy, & Water Education: Opportunities and Strategic Visioning**First Round:** Friday, June 23, 2017 at 10:50 AM**Second Round:** Saturday, June 24, 2017 at 10:55 AM**Speakers:** Cory Forbes, University of Nebraska-Lincoln**Additional Authors:**

Abstract: The Nebraska Collaborative for Food, Energy, and Water Education (NC-FEW) is a systemic, statewide, partnership-driven effort to foster science literacy about food, energy, and water systems in youth and adults. The Food-Energy-Water (FEW) Nexus, which emphasizes the interconnections between these systems and their human dimensions, serves as crucial framework through which to both a) cultivate systems thinking through education and outreach programming and b) study cognitive and socio-cultural elements of teaching and learning about FEW systems through discipline-based education research. NC-FEW will serve as a nucleus for transdisciplinary efforts to 1) advance FEW education efforts; 2) foster FEW education research; and 3) enhance collaboration around FEW education and education research. In this roundtable session, we anticipate productive discussion around a) the FEW-Nexus as a conceptual and analytical frame for education programming and research a b) strategies for growing and sustaining NC-FEW over the short- and long-term.

Biology Teaching Assistant Project (BioTAP 2.0): A Network to Build a Capacity for Collaborative Research on Biology Graduate Teaching Assistant Teaching Professional Development (GTA TPD)**First Round:** Friday, June 23, 2017 at 10:50 AM**Second Round:** Saturday, June 24, 2017 at 10:55 AM**Speakers:** Gili Marbach-Ad, University of Maryland**Additional Authors:** Elisabeth Schussler, University of Tennessee, Knoxville; Grant E. Gardner, Middle Tennessee State University; Kristen Miller, University of Georgia; and Judith S. Ridgway, The Ohio State University

Abstract: BioTAP 2.0 is a NSF funded Research Coordination Network grant with the goal to build capacity for collaborative research on biology graduate teaching assistant teaching professional development (GTA TPD). By helping practitioners assess their own programs, and work with others to compare assessments across institutions, the network will build the empirical data necessary to make data-driven decisions about programmatic practices. The year-long BioTAP 2.0 Scholars program leads selected cohorts of interested stakeholders through the process of designing and engaging in a scholarly research project on some aspect of a biology GTA TPD. In the round table session, we will discuss the goals and accomplishments of BioTAP 2.0 to date, including data from a national survey on GTA TPD efforts, and information about the Research Development Sessions and Virtual Learning Communities, which are components of the BioTAP 2.0 Scholars Program. We will also share experiences from the first RDS meeting.

[Creating the Partnering Research and Impact Measurement for Economic Development \(PRIMED\) Database](#)**First Round:** Friday, June 23, 2017 at 10:50 AM**Second Round:** Saturday, June 24, 2017 at 10:55 AM**Speakers:** Julee Farley and Susan Magliaro, Virginia Tech**Additional Authors:** Liesl Baum, Virginia Tech

Abstract: At the Center for Research in SEAD Education (CRSE), we have established partnerships with a consortium of offices who are interested in the pre-college initiatives at Virginia Tech to provide expertise in broader impacts, with a specific focus on PK12 and STEM/SEAD-related work. To support that mission, the CRSE is creating the Partnering Research and Impact Measurement for Economic Development (PRIMED) database. This database creates a reporting structure around the broader impacts of outreach activities occurring at Virginia Tech to create a deliberate broader impacts identity at the University. The presentation will include information that speaks to the importance of establishing interconnection across university offices that traditionally operate as silos as well as describing the process of creating a large database with multiple stakeholders and utilizing existing databases. The table discussion will include time for questions and dialogue around the successes and struggles of this process.

University-Community Partnerships for Experiential Learning to Increase STEM Retention and Success

First Round: Friday, June 23, 2017 at 10:50 AM

Second Round: Friday, June 23, 2017 at 3:50 PM

Speakers: Sharon Locke and Jessica Krim, Southern Illinois University Edwardsville

Additional Authors:

Abstract: Experiential learning in the community offers many benefits to undergraduate students, including opportunities to apply classroom learning in relevant contexts, develop productive work habits and skills, participate in professional networking, and serve communities in need. This roundtable is a forum to discuss best practices for community-based STEM learning that supports undergraduate retention and success. Discussants are encouraged to share examples of experiential learning programs that effectively increase self-efficacy, scientific identity, and/or professional belonging; collaboration practices that foster strong partnerships with community organizations; and surprising/unanticipated program benefits for students, universities, and the community.

Communities of practice for engaging faculty in STEM course reform

Only Round: Friday, June 23, 2017 at 11:40 AM

Speakers: Laura Hahn, University of Illinois at Urbana-Champaign

Additional Authors: Geoffrey Herman, Jose Mestre, Matthew West, and Jonathan Tomkin, University of Illinois at Urbana-Champaign

Abstract: At large research-intensive universities, teaching STEM at scale has posed instructional challenges to faculty who are unaccustomed to addressing pedagogy in a collective, sustainable manner. We will discuss ways to implement communities of practice, which can help integrate the qualities of a strong, collaborative research culture into the context of teaching.

Action Research Fellowships: Communities of Practice in support of non-tenure track faculty

First Round: Friday, June 23, 2017 at 11:40 AM

Second Round: Friday, June 23, 2017 at 3:50 PM

Speakers: Julie Risien, Oregon State University

Additional Authors:

Abstract: Established through an NSF WIDER Grant, the ESTEME@OSU Action Research Fellows program supports instructors already using evidence-based practices in lower division science, mathematics or engineering courses to take the next step in educational innovation through action research; that is, asking and answering questions about practice and collecting evidence in their own classroom to inform practice. Fellows are supported in three ways: 1) participation in an interdisciplinary community of instructors with similar goals to apply what research tells us about learning in the classroom; 2)

partnership with a member of the ESTEME@OSU research team with expertise in education research and classroom practice to support research design, data collection and analysis; and 3) \$3,000 financial support. This program is in the process of recruiting a third cohort and establishing sustainable institutional support. The round table will use this program to spark discussion of best practices for support of contingent, often marginalized, faculty with high potential for positive impact on undergraduate STEM students.

[Update on the Statewide STEM Networks Inventory Project](#)

First Round: Friday, June 23, 2017 at 11:40 AM

Second Round: Friday, June 23, 2017 at 3:50 PM

Speakers: Susan G. Magliaro, Virginia Tech

Additional Authors: Jeremy V. Ernst, Virginia Tech; and Jan Morrison, Teaching Institute for Excellence in STEM

Abstract: Over the past 30 years, cross-sector partnerships, or networks, designed to advance access to and engagement with high quality science, technology, engineering, and mathematics learning experiences often in service to the development of a skilled STEM workforce and economic development, have emerged. The STEM Networks Inventory project, supported by an NSEC Research Action Cluster grant, is designed to create a resource that identifies the statewide or regional STEM networks or partnerships that are available in each state and territory in the United States. Through internet searches, surveys, and interviews, this investigation is examining key variables including type of network, mission and goals, activities, infrastructure, funding, staffing, etc. The results are revealing the considerations for the development of a network, a summary of the relative successes and challenges regarding network development, maintenance, and sustainability.

[STEM Teaching, Engagement & Pedagogy \(STEP\) Program: Roadmap to the Development and Implementation of a STEM Faculty Development Pilot at an R1 Institution](#)

First Round: Friday, June 23, 2017 at 11:40 AM

Second Round: Friday, June 23, 2017 at 3:50 PM

Speakers: Suzanne Tapp and Ken Griffith, Texas Tech University

Additional Authors:

Abstract: In February 2012, the President's Council of Advisors on Science and Technology (PCAST) reported a national STEM retention average of 40% and outlined a strategy to improve STEM education across the country (Olson and Riordan 2012). In August 2016, the Teaching, Learning & Professional Development Center (TLPDC) at Texas Tech University launched a pilot of the STEM Teaching, Engagement & Pedagogy (STEP) Program. After gaining the endorsement from provosts, deans and key department chairs, the STEP Program welcomed STEM faculty from three colleges and seven

departments, respectively. The goal of this session is to report the progress and lessons learned after the first year of the STEP Program pilot, in the hope of helping participants construct a transformational roadmap for their home institutions.

Broadening Participation through Student Recognition

First Round: Friday, June 23, 2017 at 11:40 AM

Second Round: Saturday, June 24, 2017 at 10:55 AM

Speakers: Cynthia Lester, Georgia State University Perimeter College

Additional Authors:

Abstract: In 2012 Georgia State University's Perimeter College Office of STEM Initiatives hosted the first annual STEM Student Scholars Awards program. Each spring, Perimeter College holds its Student of Excellence Awards; however, for a student to receive an award, he/she must be nominated by a faculty member and only one student per discipline is recognized. Therefore, to broaden the scope of students eligible to receive an award and to promote/encourage STEM student excellence, the STEM student scholars program was developed. During the first year, the program honored 74 students. Each year since inception, the program has grown in size and magnitude and most recently honored its highest number of students in 2016 with 175 honorees. For many first-generation, low-income and minority STEM students, it is their first college-level recognition. The presenter will discuss how a low-cost program can be utilized to broaden participation, improve retention, and increase awareness/visibility in STEM.

Quantitative Biology - Assessing Incorporation of Modeling

First Round: Friday, June 23, 2017 at 11:40 AM

Second Round: Friday, June 23, 2017 at 3:50 PM

Speakers: Robert Mayes, Georgia Southern University

Additional Authors: Joe Dauer, University of Nebraska

Abstract: The STEM Institute is collaborating with QUBES on developing assessments for determining the impact of integrating quantitative reasoning into undergraduate biology. QUBES is an NSF funded project creating a network of faculty implementing quantitative approaches into biology. The assessments focus on three aspects of quantitative reasoning: quantitative act – ability to quantify a problem from a STEM context; quantitative interpretation – ability to interpret a model to determine trends, make predictions, translate between representations, and revise model; and quantitative modeling – ability to create and apply a model. The assessments are in the pilot stage. Quantitative Biology courses are an example of an interdisciplinary space for undergraduate students that allow for exploration of authentic STEM problems. Studying the impact of such courses on development of

student understanding of biology through the lens of mathematics is essential to the growth of this interdisciplinary STEM space.

Exploring differences between STEM disciplines regarding values of skills and use of teaching practices: Quantitative and qualitative analyses of faculty and student perspectives

First Round: Friday, June 23, 2017 at 11:40 AM

Second Round: Friday, June 23, 2017 at 3:50 PM

Speakers: Gili Marbach-Ad, University of Maryland

Additional Authors: Carly Hunt and Kaci Thompson, University of Maryland College Park

Abstract: Employers of undergraduates from Science, Technology, Engineering, and Mathematics (STEM) programs report that students frequently lack important workplace skills (e.g., collaboration and writing skills). Our Survey of Teaching Beliefs and Practices for Undergraduates (STEP-U) assesses how much students value skills needed for the workplace (e.g., ability to work in groups), and student experiences with teaching practices thought to reinforce such skills (e.g., groupwork). In the present study, we compare findings from STEP-U responses from students belonging to five STEM disciplines: Biology, Chemistry, Physics, Mathematics and Computer Science. We also present quantitative data from faculty members about the values they attribute to skills included on the STEP-U. To shed light on quantitative results, we interviewed 5 students from each discipline, and conducted focus groups in faculty meetings where we shared the data obtained from students, and asked faculty members to generate explanations for results and provide feedback about the survey.

[Developing a series of video tutorials for study skills](#)

First Round: Friday, June 23, 2017 at 11:40 AM

Second Round: Saturday, June 24, 2017 at 10:55 AM

Speakers: Cindy Ghent, Towson University

Additional Authors:

Abstract: In an effort to provide support for struggling students, I plan on developing a series of student-produced videos that showcase specific study strategies and skills. These videos will be short and focused on specific topics, such as using flashcards appropriately, or decoding figures and graphs. As this project is still in development, I would like to have a discussion that might include topics to cover, but also about overall project goals.

Pre-Calculus and Calculus 1 Readiness Workshops

Only Round: Friday, June 23, 2017 at 3:50 PM

Speakers: Tom Cheatham, Middle Tennessee State University

Additional Authors:

Abstract: Students with gaps in their mathematics background are at risk of not succeeding in their upcoming math class. We have begun to do 3-day intensive math workshops the week before the students start the class to help students fill some of the gaps that may prevent them from succeeding in the course. These workshops have proven to be an inexpensive way to help at-risk students succeed. Students who have previously taken the course, those with poor math ACT scores, students who have not taken math in several years, and others are invited to participate for free. They get to know other students who are in the same boat as they are in and a professor (6 hours per day for 3 days). They fill some gaps and learn that you can study math for a long period of time without dying. Data from the first few semesters is promising.

Academic Investment in Mathematics & Science (AIMS)

Only Round: Friday, June 23, 2017 at 3:50 PM

Speakers: W. Robert Midden, Bowling Green State University

Additional Authors:

Abstract: The Academic Investment in Mathematics & Science (AIMS) is a comprehensive scholarship and support program designed to enhance the success of under-represented minority students and women in earning undergraduate degrees in STEM fields.

Development of the University of Iowa STEM Collaborative for Outreach and Research in Education**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Jamie Tanas, University of Iowa**Additional Authors:** Mark McDermot, University of Iowa

Abstract: This poster summarizes the process and research related to the development of a new STEM center at the University of Iowa; the University of Iowa STEM Collaborative for Outreach and Research in Education (STEM CORE). The UI STEM CORE seeks to bring together STEM involved groups across the University of Iowa campus in order to promote communication, collaboration and coordination of efforts. The UI STEM CORE will draw on the strengths of several unique groups at the University including the Kirkwood Regional Center, a collaboration between area high schools, community colleges and the University of Iowa. With initial funding through the Office for Research and Economic Development, we are currently exploring funding and structure possibilities for the collaborative through stakeholder meetings, cataloging of activities and visits to other STEM centers across the country.

Strategies for Developing and Sustaining a STEM Center Research Agenda**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Sharon Locke, Southern Illinois University Edwardsville**Additional Authors:** Georgia Bracey, Southern Illinois University Edwardsville

Abstract: University-based STEM Centers vary in mission and goals, and many centers have multiple functions that span research, education, and outreach. When faced with competing priorities, centers benefit from a set of guiding principles to inform where and how personnel and financial resources should be allocated to best ensure sustainability. Southern Illinois University Edwardsville's STEM Center was established as a centralized STEM unit for both research on teaching and learning and education/outreach. Because we serve multiple stakeholders, ranging from university faculty and students to the community at large, we must balance more immediate university and community needs with one of our primary goals—to advance knowledge in STEM teaching and learning. This poster will describe our process for developing a research agenda that guides staff on which projects to pursue (or not) and links the center's various activities in complementary ways.

Showcasing approaches to inclusivity and broadening participation in geoscience and STEM**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Rory McFadden, Carleton College**Additional Authors:** John McDaris, Cathy Manduca, and Cailin Huyck Orr, SERC at Carleton College

Abstract: Inclusivity and broadening participation in geoscience and STEM are issues of national importance. Bringing underrepresented perspectives into conversations around pressing societal issues is critical to formulating equitable solutions and maintaining the nation's drive for innovation requires a scientifically literate citizenry. Nationwide, geoscience programs at many types of institution contribute to this work of increasing diversity through multifaceted activities such as developing a sense of community and belonging, targeted academic supports, and increasing student motivation through

demonstrating relevance to their lives. The SERC For Higher Ed portal (<http://serc.carleton.edu/101473>) brings together lessons learned about attracting and supporting diverse students in geoscience and other STEM disciplines. The materials in the portal are drawn from a variety of projects funded by NSF and others across a range of disciplines and institution types over the last decade. These collaborations have resulted in suites of resources and exemplars that demonstrate successful models for broadening participation in a variety of contexts. Taken together, this body of community experience aligns with the results of education research and showcases best practices for bringing diverse voices into the discipline. There are many components that can be involved in these programs. In each context, the varied efforts in broadening participation make use of different combinations of these activities. This makes the examples of how they have achieved success particularly valuable for everyone engaged in making the geosciences and STEM communities more inclusive. By sharing this collected expertise, we can all move forward more effectively rather than reinventing the wheel.

SERC and the IINSPIRE-LSAMP Alliance program workshops in support of broadening participation in STEM

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: Cailin Huyck Orr, SERC at Carleton College

Additional Authors: James E. Swartz, Grinnell College; Ellen R. Iverson, SERC at Carleton College

Abstract: The Iowa Illinois Nebraska STEM Partnership for Innovation in Research and Education (IINSPIRE) mission is to develop a model for Midwest colleges and universities to attract the states' growing under-represented minority population into STEM fields. Since 2012 The Science Education Resource Center at Carleton College has been working with leaders at Grinnell College and the IINSPIRE campus representatives to develop workshops that bring together resources from the alliance participants, and also from other related projects, and to highlight best practices in supporting diversity in STEM and consider how interventions might be implemented at additional institutions. Topics have included:

- Summer bridging programs to support transitions
- Building a sense of community
- Supporting the whole student in and out of the classroom
- Using societal issues to attract and support students
- Teaching with authentic inquiry and research-like experiences to engage students. We invite you to explore workshop materials at <http://serc.carleton.edu/lsamp/index.html>.

Scientist-STEM Center-School Partnerships Engage Students in Research-Inspired Lessons

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: Bryan Rebar, University of Oregon

Abstract: Building on an existing partnership between University of Oregon's STEM center, STEM CORE, and a local STEM middle school, the Arts and Technology Academy, two recently funded research projects led by Earth Sciences faculty aim to engage students in their research topics. In the first project, an oceanographer who studies iceberg formation helps guide the development of a school-wide cross-

curricular project-based unit in which students will have access to real data, field notes, and technical equipment for related investigations. Graduate students co-plan and co-teach activities following the NSF GK-12 Fellowship model. Teacher professional development, logistics support, pedagogical support, and evaluation services are provided by STEM CORE. In the second project, to simulate the phenomenon of interest, a geologist who studies glacier movement provides technical guidance for a physical model and associated middle school lessons to be designed by undergraduates who enroll in a science outreach course offered by STEM CORE.

Pilot Phase Analysis of a CURE Implementation in a Large Enrollment Introductory Biology Laboratory Course

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: Kelly Barry and Jessica Krim, Southern Illinois University Edwardsville

Additional Authors: Kenneth Charles Knoth Jr., Southern Illinois University Edwardsville

Abstract: Unlike traditional "cookbook" laboratory sequences, course-based undergraduate research experiences (CUREs) expose entire course populations to the practices of authentic research. CUREs have been shown to increase retention in science and may have their largest impact through large enrollment introductory courses. Our objective has been to determine the benefits and drawbacks of CURE implementation to the largest audience at SIUE – the introductory biology laboratory course for biology majors. A significant obstacle to curriculum developers of an introductory level CURE is selecting a CURE topic that fits several criteria: affordable resources, lab techniques that can be quickly mastered, time for multiple iterations within one semester, and the opportunity to generate new knowledge. The SIUE CURE focuses on the multidisciplinary process of converting microalgae lipids into biodiesel. CURE participants in the Spring and Fall 2016 pilot phases reported increased project ownership, collaboration, discovery and relevance, iteration, and science identity.

Exploring the Impact of Extracurricular Experiences in General Science Courses

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: Nastassia N. Jones and Michele Guannel, University of the Virgin Islands

Additional Authors: Lawanda Cummings and Samah Abdallah, University of the Virgin Islands

Abstract: First Year Experience (FYE) programs are composed of core academic courses as well as extracurricular components to facilitate a seamless transition for new students into the university community to improve retention. In particular, studies have shown that a strong, positive institutional community improves the retention of STEM students. Therefore, the present study explores the impacts that the extracurricular component within a general science course has on the experience of students. Known as Campus Wide Experiences, this extra credit opportunity allows students to attend and reflect upon extracurricular activities. Students report that CWEs allow them to attend seminars on topics that they would have never otherwise attended. Additionally, although some experiences are reported to be boring and a waste of time, students can more closely pinpoint the fields they are interested in pursuing, early in their college careers. Overall, CWEs are course components that can enhance students' affinity for STEM fields.

A Case Study Describing The Transformation Process of Faculty Members Adopting Learner-Centered Teaching Methods**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Gili Marbach-Ad, University of Maryland**Additional Authors:** Carly Hunt, University of Maryland, College Park

Abstract: We used a case study approach to obtain an in-depth understanding of the change process of two instructors who were redesigned a biology course. There is a critical need to understand how biology instructors transition from teacher-centered teaching towards learner-centered teaching. Using the innovation-decision model for change, we explored the motivation and decision-making and reflective processes of the two instructors through two consecutive, large-enrollment biology course offerings. Our data reveal that the change process is somewhat unpredictable, requiring patience and persistence during inevitable challenges that arise for instructors and students. For example, the change process requires instructors to adopt a teacher-facilitator role as opposed to an expert role, to cover fewer course topics in greater depth, and to give students a degree of control over their own learning. Students must adjust to taking responsibility for their own learning, working collaboratively, and relinquishing the anonymity afforded by lecture-based teaching.

Evolution of interdisciplinary CUREs: all about the independent research project**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Martina Ederer and Trish Hartzell, University of Idaho

Abstract: BRAINS was created so students in freshman biology, microbiology, and chemistry labs could work together to solve complex, interdisciplinary problems. Biology students were given the additional task of conducting independent research projects (IRPs). Here we describe the evolution of this program over a period of four semesters. Initially, inquiry-based experiments were incorporated alongside the IRPs in Biology lab to teach fundamental skills and equipment use. The value of the IRPs became apparent quickly but the time investment in inquiry labs prevented students from working on their IRPs. Hence, we began to phase out the inquiry labs altogether in favor of the independent research projects. The IRP topics have grown from 2 to >15, each having an environmental or health-related theme. Participation PIs and instructors monitor student progress and give feedback at student 'lab meeting' presentations during the semester.

Promoting the Success of Students with Disabilities in STEM Majors**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Christopher Andersen, Ohio University**Additional Authors:** Michelle McCombs, Ohio State University

Abstract: Amid the call for improving the nation's scientific, technological, and economic competitiveness, there is increasing attention being focused on groups that are underrepresented in STEM fields and on strategies to increase their success in the STEM education/career pathway. An estimated 20% of the U.S. population has a disability, yet only 8% of employed scientists and engineers has a disability. Ohio's STEM Ability Alliance was an NSF-funded collaboration between a university

STEM education center, student services offices, and NSF-funded research centers that provided proactive academic and career coaching, internships and research placements, mentoring and community-building, learning communities for students and for faculty/staff, scholarships, and assistive technology to help address inequities in the STEM education/career pathway and increase the number of students with disabilities who complete STEM degrees and transition into the STEM workforce.

Promoting Active Learning in an Introductory Chemistry Course: Challenges and Opportunities

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: David Pugalee and Alisa Wickliff, UNC Charlotte

Additional Authors: Kathy Asala, UNC Charlotte

Abstract: The general chemistry sequence provides the content foundation for upper-level chemistry courses. General chemistry should provide students with the learning tools for success in the upper-level courses also; however, these courses are taught often in a way in which students are passive participants or require minimal effort by the student to take responsibility of their own learning. The result of which can lead to poor performance in upper-level courses by students who have been successful in the general chemistry sequence. Recent efforts to restructure the general chemistry II course at a large public institution to include active learning strategies and self-directed learning activities were made. Students were required to complete a cycle of pre-class, in-class, and post-class assignments that guide them toward accepting responsibility of their own learning and developing their own conceptual and problem-solving knowledge. The impact of the new active learning format on student learning, performance, and attitudes in general chemistry II will be presented. Preliminary results on the effect of the active learning classroom on student performance in upper-level courses will be presented. The challenges and accomplishments of implementing active learning techniques from the perspective of the instructor will be discussed.

Making Connections: How a Small Learning and Teaching Center Has a Big Impact

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: Kristin O'Connell, Carleton College

Additional Authors: Melissa Eblen-Zayas, Carleton College

Abstract: Carleton College's Perlman Center for Learning and Teaching (LTC) is staffed by a faculty member with a 60% appointment in the center and half-time administrator, and is less of a "center" and more of a "connector". This relatively small office is able to have a large impact not by developing extensive programming on its own, but rather by fostering collaboration and communication among individuals, programs, and institutional initiatives and developing programming in coordination with other efforts. In a culture that promotes grassroots efforts, faculty and staff continually work towards improving teaching practices at a variety of scales, from individual courses to department initiatives, collaborative grant-funded initiatives, and institutional changes. The LTC provides connectivity between these various efforts by providing a venue for staff, faculty, and administrators to showcase and reflect on efforts and ideas together, while also planning for new directions. Talks, workshops, book groups, and working groups often lead to follow-on projects and new collaborations.

Center for Science Teaching and Learning: STEM Education and Research across the Teacher Learning Continuum.**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Pradeep (Max) Dass, Northern Arizona University

Abstract: The Center for Science Teaching and Learning (CSTL) at Northern Arizona University offers programs across the entire continuum of STEM teacher learning: From pre-service teacher education programs leading up to certification to in-service professional development of teachers including a graduate degree program; and research and evaluation of a variety of STEM-related programs. The proposed poster will highlight major activities and programs offered by the Center; provide information on how the Center is broadening participation in STEM teacher education through its recruitment activities; include data on the diverse pool of new science and mathematics teachers being produced; describe some of the current professional development projects and their impact; and showcase various partnerships that the Center has developed with K-12 schools and districts; local community college, other scientific institutions, and industries. Come learn about a Center that collaborates with STEM discipline departments to prepare new teachers and professionally enhance in-service teachers. Country.

Undergraduate STEM Students Learn More, Fail Less, and Have Decreased Achievement Gaps With Active Learning Strategies, Even from Novice Instructors**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Shanna Shaked, University of California Los Angeles**Additional Authors:** Brit Toven-Lindsey, Suchi Amin, David Ho, Nikhil Shah, Ronnel Azizollahi, Nguyen Nguyen, and Kelly Wahl, University of California Los Angeles

Abstract: In this study of thousands of students in an introductory physics course, we find that compared to traditional instructors, all faculty using active learning – even those lacking pedagogy training – have students exhibiting significantly higher conceptual learning gains, lower fail rates, and decreased achievement gaps. We provide an overview of the varying and effective implementations of high-impact practices (e.g. peer instruction and learning assistants), as well as show highlights from institutional data dashboards tracking student performance at the course and instructor levels. These dashboard analyses were used by instructors to self-assess the impact of implementing active learning and helped the research team design other statistical analyses including multiple regression to consider the impact of active learning on performance in subsequent courses. We summarize here the rigorous analysis used to demonstrate the effectiveness of active learning, even by untrained faculty.

Designing Educational Innovations for Sustained Adoption**Time:** Friday, June 23, 2017 at 4:30 pm**Speakers:** Charles Henderson, Western Michigan University**Additional Authors:** Raina Khatri, Renee Cole, Jeff Froyd, Debra Gilbuena, Courtney Stanford

Abstract: Systemic and sustained adoption of research-based instructional practices is a goal of those who develop these practices, funding agencies, and many educators. Scholarly studies and national

reports document failure to achieve systemic adoption despite compelling evidence of efficacy of these instructional practices. Based on our synthesis of the literature, analysis of successfully propagated innovations, and analysis of a subset of funded NSF CCLI proposals, we argue that a primary reason for the lack of adoption is that developers focus their efforts on dissemination (spreading the word) instead of propagation (promoting successful adoption). Analysis indicates that planning for scale and propagation typically occur after the product is developed and often leads to failure to propagate. We argue that such planning needs to occur from the very beginning of a project.

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The Role of Peer Leaders in STEM Education

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: Dabney Dixon, Georgia State University

Additional Authors: Rebekah Chapman, Victoria Mariani, Suazette Mooring, Joan Mutanyatta-Comar, Gigi Ray, La'Tawn Roddey, Edmund Rodgers, Brian Thoms, and Paul Ulrich, Georgia State University

Abstract: A variety of factors contribute to challenges in retention and graduation in the STEM disciplines. We have developed many approaches to support our students. The use of peer leaders in a number of ways, including Peer-led Team Learning, Supplemental Instruction, and Learning Assistants, has been helpful. We are developing metrics for direct comparison of the cost effectiveness of these programs. We have worked to create a cadre of high-achieving students who can support one another in research efforts and serve as role models for students earlier in their careers. Scholarship programs as well as Course-based Undergraduate Research (CURE) projects have been useful in this regard.

Education in the Food-Energy-Water-Nexus: A Collaborative DBER Network

Time: Friday, June 23, 2017 at 4:30 pm

Speakers: Cory Forbes, University of Nebraska-Lincoln

Abstract: There is a need for a sustained, systemic, and interdisciplinary education and outreach initiative, including program evaluation and education research, focused on education in the Food-Energy-Water-Nexus (FEW-Nexus). This proposal reports on a growing network of discipline-based education researchers focused on education grounded in the FEW-Nexus. The newly-established Collaborative for Research on Food, Energy, and Water Education will serve as a nucleus for transdisciplinary efforts to 1) advance FEW education efforts; 2) foster FEW education research; and 3) enhance collaboration around FEW education and education research. This presentation provides an overarching vision a network through which to catalyze collaborative projects and comprehensive research programs that produce empirical findings, delineating baseline data to be used to ascertain the effectiveness of new FEW-Nexus education programs, develop innovative tools to aid in educational responsiveness to emergent FEW issues, and to address FEW issues worldwide through effective, research-based educational methods and interventions.

URLS of Interest

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