



SCIENCE EDUCATION FOR NEW CIVIC ENGAGEMENTS AND RESPONSIBILITIES

2018 SENCER Summer Institute

Santa Clara University

August 2-5, 2018



NATIONAL CENTER FOR
SCIENCE & CIVIC ENGAGEMENT



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University**

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#SSI2018



**DENDRŌS
GROUP**

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Download the SSI 2018 Mobile App

The app will serve as your source for up-to-the-minute logistical information, personal scheduling, networking, and social media at this year's Institute.

1. Download the **CrowdCompass AttendeeHub app** from the Apple or Google Play Stores
2. Search for **2018 SENCER Summer Institute** to get started.

The app is available for Apple and Android phones and tablets, and a mobile website is available for other phones, and your computer. You can view the web version of the app here: <https://crowd.cc/ssi2018>



Greetings and welcome! This is our 18th SENCER Summer Institute and we are delighted to be returning to Santa Clara University, the site of the inaugural (2001) Summer Institute, and many others since. We want to offer our heartfelt gratitude to Amy Shachter and Kelly Uchiumi for hosting us on their lovely campus.

We have worked with members of our national community to create a rich program that serves both to present new information, research, trends, and opportunities, and to showcase academic innovations generated by your implementation of SENCER approaches. As usual we have incorporated “team time” for working on specific projects and goals, as well as for networking and exploring new collaborations. We hope our time together will generate new ways of thinking together and learning from one another and will serve its goal of re-energizing and reaffirming our “community of transformation” in STEM.

In addition to formal plenaries and presentations, the SENCER Summer Institute offers time and space for working with our SENCER Leadership and Senior Fellows (for collegial advice, mentoring, and support), connecting with our SENCER Centers of Innovation (for continuity and collaboration on issues of regional significance), with the National Center (for access to national resources), and with educators for other organizations who share your commitment to civically engaged science education and who are facing similar challenges, and pursuing similar goals.

The SENCER Summer Institute has always attracted representatives of organizations and projects that share and support the SENCER “ideals” and we would like acknowledge their presence in year’s program and encourage you to explore how their efforts can support your own:

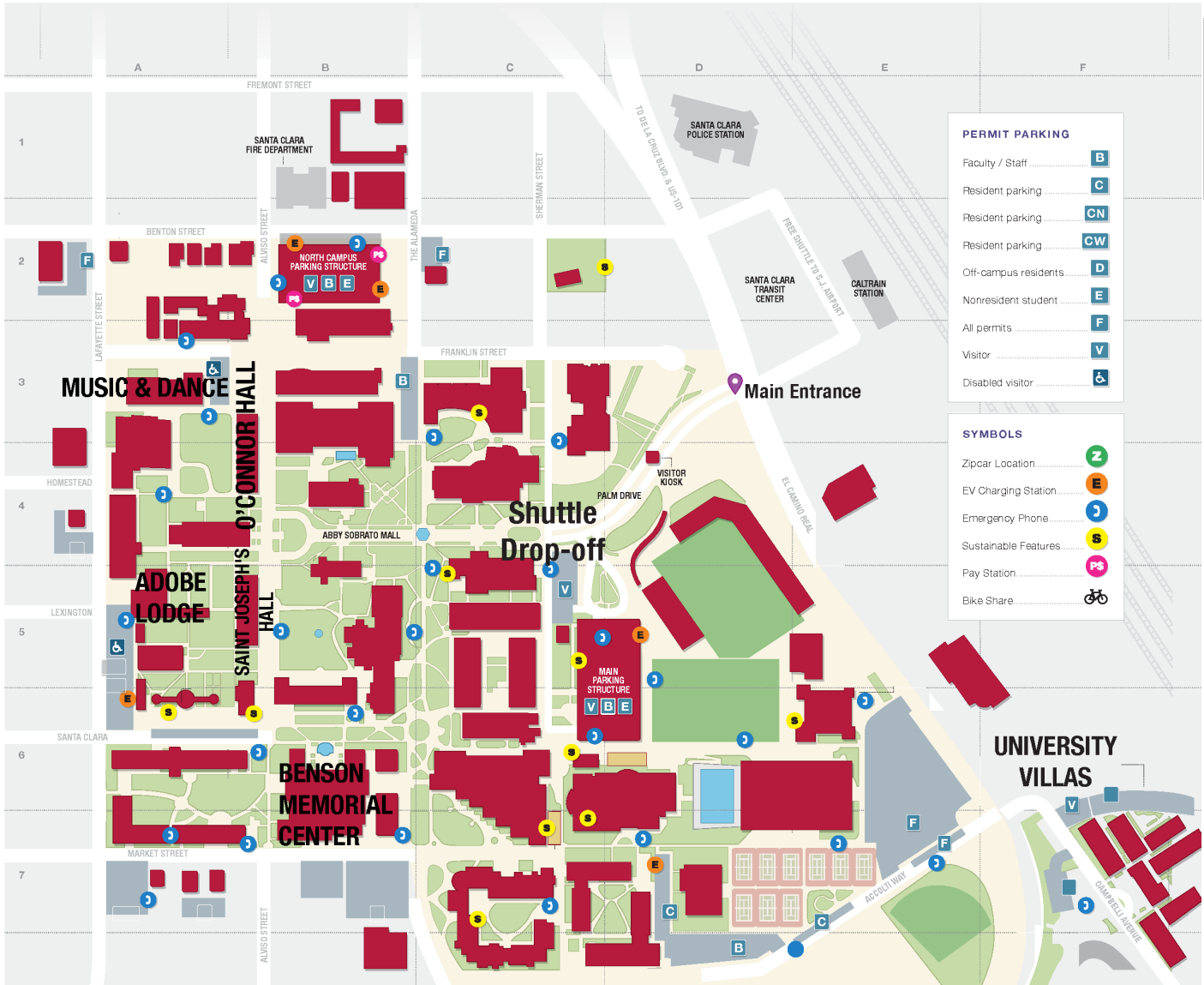
- The Dendros Group
- Learn Through the Universe
- Learning Spaces Collaboratory
- Marsha Semmel Consulting
- Museums + More, LLC
- National Association of Biology Teachers
- Success 4 Higher Education

In the spirit of scientific inquiry and democratic practice, we conceive of SENCER as an ongoing experiment in advancing educational improvement and civic engagement. We use the criticism and suggestions of our participants to shape our programs and our planning. Do not hesitate to make suggestions and, by all means, please complete our online evaluation. We take your advice very seriously.

But while we tackle all the pressing issues and challenges we face as educators and citizens with great seriousness, SSI is also a rare opportunity to think and learn, feel supported and energized, as we enjoy the company of like-minded and committed colleagues, meet new people, and start promising collaborations that will sustain us in the year ahead. It is NCSCE’s pleasure and privilege to play this small part in your efforts to promote learning that really makes a difference to our common future.

The NCSCE Staff

SSI 2018 CAMPUS MAP



SSI 2018 CAMPUS LOCATIONS

Adobe Lodge	A5
Benson Memorial Center	B6
Music & Dance, Recital Halls	A3
O'Connor Hall	B3
St. Joseph's Hall	B5
Shuttle Drop-Off	C4
University Villas	F7

Santa Clara University Address

500 El Camino Real
Santa Clara, CA 95053

Campus Safety

Emergency Telephone:
(408) 554-4444

Non-Emergency Telephone
(408) 554-4441

2018 SENCER SUMMER INSTITUTE INTERNET ACCESS INFORMATION

SSI Participants can use the **SCU-Guest** network to access the internet. Using a browser, navigate to any web page. Read SCU's Terms and Conditions to use this network, and select Agree to connect.

2018 SENCER SUMMER INSTITUTE SHUTTLE INFORMATION

Shuttles to the Holiday Inn San Jose Silicon Valley Hotel will run approximately every **30 minutes**. They will pick up and drop off at the indicated shuttle pick-up location on campus, and will pick up and drop off in front of the Holiday Inn. Shuttles will run during the following time frames:

Date	Start Time	End Time	Service Description
Thursday 8/2	12:00 PM	5:00 PM	Shuttle between Holiday Inn San Jose Silicon Valley and Santa Clara University (starts at Holiday Inn)
Thursday 8/2	7:00 PM	9:00 PM	Shuttle between Holiday Inn San Jose Silicon Valley and Santa Clara University (starts at Santa Clara University)
Friday 8/3	6:30 AM	8:30 AM	Shuttle between Holiday Inn San Jose Silicon Valley and Santa Clara University (starts at Holiday Inn)
Friday 8/3	6:00 PM	8:00 PM	Shuttle between Holiday Inn San Jose Silicon Valley and Santa Clara University (starts at Santa Clara University)
Saturday 8/4	6:30 AM	8:30 AM	Shuttle between Holiday Inn San Jose Silicon Valley and Santa Clara University (starts at Holiday Inn)
Saturday 8/4	11:45 AM		Transportation from Santa Clara University to the Tech Museum of Innovation
Saturday 8/4	4:30 PM	8:30 PM	Shuttle Loop between Tech Museum of Innovation, Santa Clara University, and Holiday Inn San Jose (starts at Tech Museum)
Sunday 8/5	6:30 AM	8:30 AM	Shuttle between Holiday Inn San Jose Silicon Valley and Santa Clara University (starts at Holiday Inn)
Sunday 8/5	4:00 PM	5:00 PM	Shuttle between Holiday Inn San Jose Silicon Valley and Santa Clara University (starts at Santa Clara University)

STAFF OFFICE LOCATION

SSI staff will be available through the institute to assist all participants and facilitators. During session blocks, you may find SSI staff in **Saint Joseph's Hall Room 113**

You may also quickly request help through the SSI 2018 app by messaging Kyle Simmons, NCSCE's Faculty Development Events Manager

IN CASE OF EMERGENCY

In case of emergency after Institute hours, please call **(202) 276-2343**. A staff member will be available overnight to answer your call.

SENCER Summer Institute 2018 Schedule at a Glance

Thursday, August 2, 2018		
Time	Event	Location
8:00 AM - 4:00 PM	Invitational Meeting: Transcending Barriers to Success Project	Holiday Inn San Jose
12:00 - 4:00 PM	SSI 2018 Check-in	Recital Hall Lobby
1:00 PM - 4:00 PM	Case Studies in Academic Leadership: a S4HE Pre-SSI Workshop	O'Connor 102
4:30 - 6:30 PM	SENCER Summer Institute 2018 Opening Plenary Session	Recital Hall
6:30 - 8:00 PM	SENCER Summer Institute Opening Dinner	Adobe Lodge
Friday, August 3, 2018		
7:00 - 8:30 AM	Breakfast	Benson Memorial Center
8:30 - 10:00 AM	All-Institute Plenary Session II	Recital Hall
10:10 AM - 12:00 PM	Session Block I	O'Connor Classrooms
12:00 - 1:30 PM	Lunch	Benson Memorial Center
1:30 - 3:00 PM	Team Time	Santa Clara Campus
3:00 - 4:50 PM	Session Block II	O'Connor Classrooms
5:00 - 6:30 PM	Poster Presentations	Villas Multipurpose Room
Saturday, August 4, 2018		
7:00 - 8:00 AM	Breakfast	Benson Memorial Center
8:00 - 9:50 AM	Session Block III	O'Connor Classrooms
10:00 - 10:45 AM	Team Time	Santa Clara Campus
10:45 - 11:45 AM	Brunch	Benson Memorial Center
11:45 AM - 1:00 PM	Travel to the Tech Museum	Shuttle Pick-up Location
1:00 - 2:00 PM	All-Institute Plenary Session III	Tech Museum of Innovation
2:00 - 5:00 PM	Afternoon at the Museum	Tech Museum of Innovation
Sunday, August 5, 2018		
7:00 - 8:30 AM	Breakfast	Benson Memorial Center
8:30 - 10:00 AM	All-Institute Plenary Session IV	Recital Hall
10:10 - 11:00 AM	Session Block IV	O'Connor Classrooms
11:00 AM - 12:30 PM	Team Time, Regionalization Meetings	Santa Clara Campus
12:30 - 2:00 PM	Lunch	Benson Memorial Center
2:00 - 3:50 PM	Session Block V	Santa Clara Campus
4:00 - 4:30 PM	Institute Adjournment Session	Recital Hall

SENCER Summer Institute 2018 Daily Schedules at a Glance

AT-A-GLANCE
SCHEDULES

Time	Thursday 8/2		
8:00 A			
8:30 A			
9:00 A			
9:30 A			
10:00 A			
10:30 A			
11:00 A			
11:30 A			TBS Meeting – Holiday Inn San Jose
12:00 P			
12:30 P			
1:00 P			
1:30 P	Check-in - Music and Dance Building Lobby		
2:00 P			
2:30 P		S4HE Workshop - O'Connor 104	
3:00 P			
3:30 P			
4:00 P			
4:30 P			
5:00 P	SSI 2018 Opening Plenary Session - Recital Hall		
5:30 P			
6:00 P			
6:30 P			
7:00 P	Dinner - Adobe Lodge		
7:30 P			

Time		Friday 8/3					
7:00 - 8:30 A		Breakfast - Benson Memorial Center					
8:30 - 10:00 A		All-Institute Plenary Session II - Recital Hall					
10:00 A	Designing a SENCER Course - O'Connor 102	Using a "jig-saw" Approach to Designing Civic Engagement Assignments in a High Enrollment Class - O'Connor 104	Working Toward a SENCER-based Biology Teaching Manual - O'Connor 105	Real News or Fake News? Developing Sci. Literacy through Analysis of Media Reports - O'Connor 106	Teaching Economics Through Grand Challenges of Sustainability - O'Connor 107	Improvement Science & Networked Improvement Communities panel - O'Connor 205	
10:30 A			Civic-Centered Chemistry and Biochemistry - O'Connor 105	Ethically Working with Community Partners - O'Connor 106	Creative Fabrication = Engineering + SENCER - O'Connor 107		
11:00 A		Murder, They Wrote: Problem Solving Is Fun! - O'Connor 104				Scaffolding PBL and CUREs Across the Curriculum - O'Connor 105	
11:30 A							
12:00 - 1:30 P		Lunch - Benson Memorial Center					
1:30 - 3:00 P		Team Time, SCI Co-Director Meeting (Co-directors start at 12:15 in O'Connor 102)					
3:00 P	Learn Through the Universe New Tools and Opportunities for SENCER Model Courses - O'Connor 102	Supporting First Generation College Students - O'Connor 104	Course-based Authentic Research Experiences and Opportunities - O'Connor 105	Evidence of Student Learning and Change - O'Connor 106	Sustainability Cross-disciplinary Conversations I: Teaching & Learning about ENERGY - O'Connor 107	Using Indigenous Knowledge to Engage Native Hawaiian Undergrad Students O'Connor 205	Thinking Like Leaders Session I - O'Connor 206
3:30 P			Active Learning - O'Connor 104	Undergraduate Research and Civic Engagement - O'Connor 105	Using SENCER Courses for Research on Teaching - O'Connor 106	Grit and Resilience, Success and Retention - O'Connor 107	
4:00 P		Incorporating Civic Responsibility into a Shared Lab Intensive for Non-majors Bio and Chem Classes - O'Connor 102					
4:30 P							
5:00 - 6:30 P		Poster Reception - Villas Multipurpose Room					

Time	Sunday 8/5					
7:00 A	Breakfast - Benson Memorial Center					
7:30 A						
8:00 A						
8:30 A	All Institute Plenary Session IV - Recital Hall					
9:00 A						
9:30 A						
10:00 A	The Automated Phonetic Transcription Grading Tool: Where Computer Science Meets Clinical Problem Solving in Communication Disorders - O'Connor 102	Connecting Classroom Skills to Everyday Life: the “Three-Column “Approach - O'Connor 105	Using SENCER Strategies to Remove the Mathematics Barrier to Degree Completion - O'Connor 106	Sustainability Cross-disciplinary Conversations III: Teaching & Learning about TRASH - O'Connor 107	Building an Inclusive Classroom - O'Connor 205	
		SENCER in a Small World - O'Connor 105				
10:30 A						
11:00 A	Team Time, Regional Meetings					
11:30 A						
12:00 P						
12:30 P	Lunch - Benson Memorial Center					
1:00 P						
1:30 P						
2:00 P	Creating a Buzz: SENCER'izing Pollination Science in Computer Science, Physics, and the Liberal Arts - O'Connor 102	Engineering and Technology for Social Good - O'Connor 104	Developing a Model for an Interdisciplinary SENCER-based Substance Abuse Awareness Course using Academic Service Learning - O'Connor 105	Grounding Yourself as a Leader - O'Connor 106	Teaching Students How to Learn: Designing Courses that Build Successful, Self-Directed Deep Learners - O'Connor 107	Thinking Like Leaders Session III - O'Connor 206
2:30 P						
3:00 P	Including the Humanities in STEM Courses - O'Connor 102	STEM in Service of Society - O'Connor 104	How to Publish in Science Education and Civic Engagement: An International Journal - O'Connor 105	Creating your Next Professional Career Move: Exploring Options - O'Connor 106		
3:30 P						
4:00 P	Institute Adjournment - Recital Hall					

NOTES ON THE PROGRAM

THURSDAY, AUGUST 2ND

All sessions will be held on the Santa Clara University Campus.

12:00 P.M. – 4:00 P.M. SSI 2018 Check-in

Music and Dance Building Lobby

All SSI 2018 participants and facilitators should check in with SSI staff upon arrival at Santa Clara University's Music and Dance Building to receive SSI materials, including printed copies of the SSI program, name badges (which are required for access to SSI meals and events), a bag, and a water bottle.

1:00 P.M. – 4:00 P.M. Case Studies in Academic Leadership: a S4HE Pre-SSI Workshop

O'Connor 104

Karen Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Amy Shachter

Santa Clara University/Success 4 Higher Education

This pre-institute workshop will use case studies to explore several dimensions of academic decision making and leadership. Pre-registration is required.

4:30 P.M. – 6:30 P.M. SSI 2018 Opening Plenary Session

Music and Dance Building Recital Hall

Welcome to the 2018 SENCER Summer Institute

Eliza Reilly

Executive Director

National Center for Science and Civic Engagement

Introduction of Amy Schachter

Karen Oates

Worcester Polytechnic Institute/Success 4 Higher Education

SSI 2018 Opening Plenary

Amy Shachter

Senior Associate Provost, Research and Faculty Affairs

Santa Clara University/Success 4 Higher Education

Aims for SSI 2018

Eliza Reilly, eliza.reilly@stonybrook.edu

Executive Director

National Center for Science and Civic Engagement

THURSDAY,
AUGUST 2

6:30 P.M. – 8:00 P.M.

Dinner Recognizing Achievements in the NCSCE Community

Adobe Lodge

All SSI 2018 participants are invited and encouraged to attend. During the dinner, we will bring attention to the leaders of all NCSCE initiatives, as well as SENCER Leadership Fellows, and other honored guests who are joining us for the Institute. We will also present this year's William E. Bennett Awards.

FRIDAY, AUGUST 3RD

All sessions will be held on the Santa Clara University Campus.

7:00 A.M. – 8:30 A.M.

Breakfast

Benson Memorial Center

8:30 A.M. – 10:00 A.M.

All-Institute Plenary Session II

Music and Dance Building Recital Hall

Sherryl Broverman, *Duke University*, presiding

Plenary Presentation: Perspectives on Inclusive Teaching

Omar Quintero

Associate Professor

The University of Richmond

10:00 - 11:50 A.M.

Session Block I

A NOTE ON THE SSI 2018 SESSION BLOCKS

In to better customize your experience at SSI, we have put together session blocks in which sessions of different lengths will run concurrently. This approach to scheduling emerges from feedback from past symposia evaluation and from conversation with many members of the community.

The two-hour workshop sessions will provide newcomers with an introduction to basic elements of the SENCER approach, provide alumni with opportunities to apply the SENCER approach to new challenges, and provide workshop-style training on active-learning pedagogies and appropriate assessment.

The 50 minute sessions will allow members of the SENCER community to share targeted learning opportunities about their work and will give participants “takeaways” applicable at their home institutions.

The 20 minute presentation sessions will be reports from the field by SENCER alumni and others intended to facilitate the generation of new ideas and spark new connections.

All sessions are timed to allow 10 minutes of time between each, during which you can move to the next activity.

There are no repeat sessions, though there are multiple sessions that pursue any particular theme. We recommend that teams split up to assure broad exposure to the offerings in each session block.

**FRIDAY,
AUGUST 3**

10:00 - 11:50 A.M.**Designing a SENCER Course***O'Connor 102*Theo Koupelis
Broward College

The SENCER approach generates a curriculum that is relevant to students' needs. Teaching through the lens of difficult and unresolved issues, which are often trans-disciplinary in nature, keeps students engaged, and develops their knowledge, skills, and dispositions. The goal of this workshop, which is presented by a founding "SENCER Model Course" author, is to provide an engaging, hands-on experience in developing a step-by-step outline of a new or revised course, whether it is intended for students majoring in STEM or another discipline, including assessment strategies for the course and opportunities for civic engagement presented by the course content.

10:00 - 11:20 A.M.**Using a "jig-saw" Approach to Designing Civic Engagement Assignments in a High Enrollment Class***O'Connor 104*Linden Higgins
Education for Critical Thinking LLC

One of the distinguishing traits of complex civic problems is that they require input from multiple disciplinary experts and stakeholders when crafting a meaningful remediation. In high enrollment 'gatekeeper' courses such as introductory genetics, creating opportunities for group work on complex problems can be challenging. Group projects built on a "jig-saw" model are one option providing students with an opportunity to explore the sociopolitical implications of modern scientific and technological innovations.

In a jig-saw activity, students are divided first into "expert" disciplinary groups that read distinct foundational documents, then regrouped as "consultants" with one representative from each discipline. The consultants are charged with developing a consensus recommendation for a complex problem, which is shared with the class. This approach can be used both in small-scale in-class activities and to provide scaffolding for large capstone projects. This workshop will describe a successful pharmacogenetics capstone project as a model, provide group-management resources, and provide an opportunity for participants to work on a jig-saw project for one of their classes.

10:00 - 10:50 A.M.

Working Toward a SENCER-based Biology Teaching Manual

O'Connor 105

Robert Seiser
Roosevelt University

Heather Pelzel
University of Wisconsin-Whitewater

Drew Sieg
Young Harris College

Engaging Science is a SCI-Midwest initiative inspired by the NCSCE *Engaging Mathematics* project and the rich history of biological science teaching innovation in the SENCER community. The current goal of the *Engaging Science* project is to develop a collection of science teaching modules that would be accessible online or in book form and could be used in biology and general science courses at the undergraduate level. These modules will follow a standard format that enables instructors to adapt pedagogical and civic engagement activities for their own institutional environment, while ensuring that essential elements of SENCER ideals and learning science are addressed. In this workshop, participants will hear about the history and ideas behind the *Engaging Science* project, see examples of teaching modules that have already been developed, evaluate and provide feedback on the module template and begin to develop new modules based on their experiences.

10:00 - 10:50 A.M.

Real News or Fake News? Developing Scientific Literacy through Analysis of Media Reports

O'Connor 106

Trace Jordan
New York University

Members of the public, college students, and even trained scientists rely on the news media for information on topics at the forefront of science and medicine. In addition to the traditional news outlets of TV, newspapers, magazines, and radio, the internet provides a multitude of other information sources. How should we critically evaluate the science news that we read, see, and hear? This session describes the use of science media as a resource to develop students' scientific literacy. It is based on a collaboration between a science educator, a science journalist, and an expert in teaching critical thinking. During the interactive session, we will examine various types of pedagogical strategies and course assignments that integrate media literacy and scientific thinking. For example, students can critically evaluate a news report on science, and then use scientific database tools to access the primary research literature on which the report was based. In addition, media reports can be utilized as the basis for critical thinking questions in homework, exams, and in-class activities. Throughout the presentation and discussion, we will reflect on how the news media can be a valuable component of science education that develops our students' capacities as informed citizens.

FRIDAY,
AUGUST 3

10:00 - 10:50 A.M.**Teaching Economics through Grand Challenges of Sustainability***O'Connor 107*

Jaclyn Lindo

Kapi'olani Community College

Economics is one of the most misunderstood disciplines among the general public, and one of the most dreaded courses on any college campus. Far beyond demand & supply and "making money," economics is about the allocation of scarce resources, and its basic concepts are universally applicable to every decision made by every individual, household, business, and policymaker. In a traditional economics course, students do not typically grasp this, until years later (if at all) when they're well into their lives and careers. To dispel misconceptions, spark a passion, and inspire civic engagement, an economics class at Kapi'olani Community College has been redesigned with the goal of foregrounding this core concept

Discover how SENCER-izing a Principles of Microeconomics course--through a carefully cultivated collection of active learning strategies--has connected students to their peers, their community, their heritage, and current social issues, while getting them to appreciate and enjoy the discipline. The story of how the course was "transitioned" and an exploration of scaffolded structure offer ways to integrate economics into other courses using:

- Experiential learning
- Place-based learning
- Service learning
- Project-based learning
- Indigenous knowledge, and
- Undergraduate research

10:00 - 11:20 A.M.
Improvement Science & Networked Improvement Communities: Perspectives for Enabling Research & Practice (R&P) Partnerships in Integrated STEM (iSTEM) Programs
O'Connor 205

Paul LeMahieu

The Carnegie Foundation and University of Hawai'i, Mānoa

Rick Duschl

Stephanie Knight

Southern Methodist University

The session will examine new research design approaches and methods for two Research & Practice Partnership Models - 'Networked Improvement Science' (NIC) and 'Design Based Implementation Research' (DBIR) in the context of K-16 iSTEM programs. Part 1 provides an overview of frameworks, guidelines and resources for iSTEM programs and of Networked Improvement Science/DBIR methods. Part 2 introduces an emergent R&P Partnership between the Schools of Education and Engineering at SMU, an industry partner, and a large urban school district examining opportunities/challenges therein. The example serves as a catalyst for thinking about how the new methods and models of assessment, research, and evaluation presented in Part 1 might be integrated into the initial design and implementation of partnership activities, including the creation of a Pre-K-8 STEM-focused community school. In Part 3 attendees will learn about several completed and active STEM 'Improvement Science' and 'Networked Improvement Community' projects.

11:00 - 11:20 A.M.

Civic-Centered Chemistry and Biochemistry

O'Connor 105

Cynthia Maguire
Nasrin Mirsaleh-Kohan
Richard Sheardy
Texas Woman's University

The Department of Chemistry and Biochemistry at Texas Woman's University (TWU) has recently been recognized by the Association of American Colleges & Universities (AAC&U) as a model department for incorporating civic engagement and social responsibility into the majors' curriculum (*peer Review 19-4, 28-30, Fall 201*). Since becoming involved with SENCER in 2007, civic engagement activities have been incorporated into all of the science courses that the department offers for non-science majors. This was a smooth process since the content of these courses can be quite flexible. On the other hand, incorporating civic engagement activities, along with social responsibility, into the majors' courses is more difficult since the content is fairly rigid and coverage is critical. However, content will not be sacrificed if such activities are creatively coupled with, and incorporated in, the laboratory components of these courses. This presentation is a brief description of how civic engagement and social responsibility was incorporated into TWU majors' curriculum, beginning with freshman chemistry through upper division courses and through undergraduate research. Finally, this talk will address how linking content to real world issues positively impacts student learning.

11:00 - 11:50 A.M.

Working Ethically with Community Partners

O'Connor 106

Sherryl Broverman
Duke University

Academia has long used communities for research and education. However, not all of these interactions have been beneficial and rarely have communities had equal power in the relationships. University engineering programs are increasingly connecting theoretical work to community design projects as a way of engaging students earlier in their career and retaining underrepresented students. However, these programs can also inadvertently exploit community needs for student learning without leading to long term, equitable, or sustainable solutions. Even the 'human centered design' model attributes more power, control, and insight to the engineering student than the community partner. This talk will examine the possible pitfalls of design and other partnerships with the goal of forming more just and respectful relationships, and better outcomes.

FRIDAY,
AUGUST 3

FRIDAY,
AUGUST 3

11:00 - 11:50 A.M.

Creative Fabrication = Engineering + SENCER

O'Connor 107

Rebecca Bruce

Susan Reiser

University of North Carolina Asheville

Members of UNC Asheville's Creative Fabrication course collaborated with senior residents of a public housing apartment and the Mountain Area Health Education Collaborative (MAHEC) to design medication dispensers customized for the functional needs and the aesthetic preferences of the client. Over the course of the semester, students engaged with their clients in interdisciplinary teams consisting of new media and mechatronics engineering majors. Each iteration of their design was evaluated by the clients as well as by subject matter experts from MAHEC and industry. At the end of the semester, each student team presented an electronically-enhanced functional prototype for their client. For example, one of the clients made birdhouses, so his student team designed and fabricated a medication dispenser in the shape of a birdhouse. Green LED's illuminate the medication to be taken. Sensors note a missed dose and trigger the LED color to change to red. Creative Fabrication's learning objectives for all students included the user-focused design process, 3D modeling, the elements of art and principles of design, and experience with manual and digital fabrication techniques utilizing our 12,000 square foot maker place, UNC Asheville's STEAM Studio.

11:30 - 11:50 A.M.

Murder, They Wrote: Problem Solving Is Fun!

O'Connor 104

Gary Hall

Lipscomb University

This presentation is about a class where math is integrated with problems in everyday life. The students discuss how to solve real world problems, problems not usually associated with mathematics. George Polya's four step problem solving process is used as a method for solving these everyday problems.

Along with this intertwining of math and real-life problems mystery stories and novels are used to try to hone in the students' skills in problem solving. These books are the "hook" to get students interested in the course.

11:30 - 11:50 A.M.

Scaffolding PBL and CUREs Across the Curriculum

O'Connor 105

Davida Smyth

Mercy College

This talk will describe Mercy College's Biology Department's efforts to integrate projects and research across the curriculum to engage and interest our minority and underrepresented students in STEM. Challenges and barriers shall be described as well as efforts to assess the efforts, and results to date will be offered. Lastly, future goals for the project will be outlined.

11:30 - 11:50 A.M. Incorporating Civic Engagement in Cross- Disciplinary Courses Between Journalism and STEM Students

O'Connor 205

Margaret Altizer
Suffolk County Community College

SENCER's Helmsley Grant Team Member and Journalism Professor Molly Altizer joined colleagues from STEM fields two years ago to participate in a project that evaluated water quality on Long Island.

This session will describe her ideas and strategies to advance civic engagement projects and to further enhance those projects through interaction and team building among campus journalism programs and their students and STEM programs and students. Learn how to make connections. Launch projects, and inspire students!

12:00 – 1:30 P.M. LUNCH

Benson Memorial Center

12:15 – 3:00 P.M. SCI Co-Director Meeting

O'Connor 102

This meeting is for SENCER Regional Center for Innovation Co-Directors and is by invitation only.

1:30 – 3:00 P.M. Team Time

Teams may find any suitable location on campus to conduct a team meeting.

3:00 - 4:50 p.m Session Block II

3:00 - 4:20 P.M. Learn Through the Universe: New Tools and Opportunities for SENCER Model Courses

O'Connor 102

Mercedes Talley
Learn Through the Universe

This session will explore several existing SENCER courses for how they might be enhanced by using the novel perspectives of scale offered by *Learn Through the Universe*. The meaning and importance of scale in both space and time, and its importance in "systems thinking" is rarely examined in educational settings. *Learn Through the Universe* is a new approach that leads students through the crafting of true-to-scale 2D and 3D models of the universe at powers of ten. It offers innovative ways of learning for students of all ages, in both formal and informal settings.

3:00 - 3:50 P.M.*O'Connor 104***Supporting First Generation College Students**

Theo Koupelis
Broward College

Karen Oates
Worcester Polytechnic Institute/Success 4 Higher Education

The fastest growing demographic profile of students entering our higher education institutions are first generation college students seeking undergraduate degrees. Many of these students will come from low-income homes and be confronted with a maze of opportunities and challenges. An estimated 50% of the college population is comprised of people whose parents never attended college. The National Center for Education Statistics indicates that 30% of all entering freshmen are first-generation college students and yet only 20% of first-generation college students ultimately obtained a four-year degree 10 years after their high school sophomore year, compared to 42% of continuing-generation students.

In this session we focus on what each of us can do to increase the retention and graduation rates of our first generation undergraduate students. Participants will leave with a Best Practice Inventory to help guide faculty actions and university support structures.

3:00 - 3:50 P.M.*O'Connor 105***Course-based Authentic Research Experiences and Opportunities**

Davida Smyth
Mercy College

Drew Sieg
Young Harris College

Maintaining undergraduate interest in STEM is a multifaceted challenge. Numerous studies, including *Engage to Excel* and *Vision and Change*, report that providing underclassmen with structured, authentic research experiences in the classroom increases retention rates and introduces students to the skills needed to conduct independent research as upperclassmen and beyond. Most importantly these strategies are inclusive, enabling all students regardless of their backgrounds to be exposed to and involved in research. A range of funded, multi-institutional initiatives have been developed to promote authentic research pedagogies, all of which vary in terms of size, scope, disciplinary focus, and access.

This session is designed to accomplish three goals. First, we will compare how authentic research initiatives, such as CUREnet, The Small World Initiative, SEA-PHAGES and others, align with SENCER ideals. We shall also describe how additional faculty have designed their own CUREs which incorporate aspects of their personal research or allow faculty to engage in collaborative CUREs involving several faculty at once in their design and implementation. Second, we will break down our experiences regarding the implementation of authentic research, at several scales and across the disciplines, and how it can contribute to personal disciplinary or pedagogical research objectives. Third, we will discuss assessment strategies and metrics for tracking student performance in an authentic research classroom, including a breakdown of survey instruments and literature that can be used to support the use of these pedagogies at your own institution.

3:00 - 3:50 P.M.**Evidence of Student Learning and Change***O'Connor 106*

Matt Fisher

Saint Vincent College

Evidence is central to a wide range of activities that SENCER faculty engage in, including assessment, promotion and tenure, grant-seeking, and scholarship of teaching and learning. But many faculty may not be familiar with the full range of forms of evidence that we can draw on related to student learning and impacts of the SENCER approach on students. This session is designed to survey a wide range of forms of evidence –quantitative and qualitative, direct and indirect – ranging from student work on exams and assignments (and some thoughts on how to design those to function better as evidence) to the use of rubrics to coding to surveys like the SALG to focus groups. Participants will be pointed towards resources they can explore at greater depth on their own. As part of the session, each participant will be provided time to think about their particular context/need and next steps they could take in regards to evidence for their particular situation (such as assessment, personal scholarship, or promotion/tenure).

3:00 - 3:50 P.M.**Sustainability Cross-disciplinary Conversations I: Teaching & Learning about ENERGY***O'Connor 107*

Tim Lindstrom

Cathy Middlecamp

University of Wisconsin-Madison

Energy-related issues are intriguing, cross-disciplinary, and offer multiple points of entry for student engagement. What better way to start a conversation about sustainability than with everyday activities of energy use, such as bicycling, taking a shower, or turning on a light?

This interactive session on teaching and learning energy provides stories, activities, and resources, all sprinkled with practical knowledge and bits of humor. It is one of a three-part series at the 2018 SSI aimed at helping instructors design course activities that utilize your campus as a living laboratory for sustainability. Feel free to attend one or all three parts of the series!

3:00 - 3:50 P.M.**Using Indigenous Knowledge to form Scientific Hypotheses: An Effective Strategy to Engage Native Hawaiian Undergraduate Students in STEM Education***O'Connor 205*

Michael Ross

Kapiolani Community College

Merging modern sciences with indigenous knowledge systems can be an effective strategy to increase enrollment of highly underrepresented minority groups, such as Native Hawaiians, in STEM disciplines. However, the integration of science and indigenous knowledge can be an even more powerful tool in persistence and retention of underrepresented undergraduate students in STEM fields by engaging them in high-impact practices, such as undergraduate research. Native Hawaiian indigenous knowledge developed over thousands of years as a wealth of empirical observations regarding ecological and environmental phenomena accumulated. Using these rich observations as a means to form scientific hypothesis not only makes the research more culturally-relevant to the student, but many times results in an on-going research project that extends across multiple semesters. There will be time allotted for participants to work together to share their own experience with this strategy, or similar strategies, as well as time to consider the advantages and disadvantages of implementing this approach.

3:00 - 4:50 P.M.

Thinking Like Leaders: A Systems Approach to Improving Introductory Level Courses -- Session I

O'Connor 206

Steve Christenson
Brigham Young University

Theo Koupelis
Broward College

Jay Labov
National Academies of Sciences, Engineering, and Medicine

Jacki Reeves-Pepin
National Association of Biology Teachers

Eliza Reilly
National Center for Science and Civic Engagement

George Boggs
Palomar College, and the American Association of Community Colleges (emeritus)

David Ferguson
Stony Brook University

Gordon Uno
University of Oklahoma

Karen Oates
Worcester Polytechnic Institute and Success 4 Higher Education

Introductory courses in biology and other STEM fields are (or should be) the keystones to recruiting majors to the discipline, improving STEM literacy for both prospective majors and students who will pursue other courses of study, and for preparing future K-12 teachers of STEM. “SENCERizing” such courses could enhance all of these roles. However, instructors may find themselves impeded by their colleagues in a course, other members of a department, or upper level leaders in their efforts to do so. Thus, despite best efforts to improve student learning, components of the higher education system may pose barriers. But understanding the larger system and the sometimes competing needs and interests of the multiplicity of stakeholders within the system may also provide important insights opportunities for education reform.

This series of workshops is organized in collaboration with the leadership of SENCER, the National Association of Biology Teachers (NABT), and the Board on Life Sciences of the National Academies of Sciences, Engineering, and Medicine. Thus the systems analyses will use introductory biology as a primary focus but with the recognition that changes to these courses can have profound impacts on other disciplines (and vice versa).

4:00 - 4:50 P.M.

Active Learning

O'Connor 104

Drew Sieg

Young Harris College

For many early-career faculty, there is an abrupt transition from building mastery of a scientific discipline to emerging as an effective educator. A lack of teaching experience or pedagogical training, resistance from colleagues that are averse to change, balancing teaching and research expectations, and minimal time for course development can be intimidating. Despite a wealth of peer-reviewed support for student-centered pedagogies, new faculty can default to teaching as they were taught, which can invoke an approach with minimal engagement that may hinder student development.

During this workshop, we will use a mixture of in-class activities to examine the foundations of active learning, including social constructivism, metacognition, and novel assessment techniques. A discussion on common challenges associated with implementing active learning will also be held. We will also evaluate peer-reviewed support for these practices that can be used to generate enthusiasm for course redesign within your department.

4:00 - 4:50 P.M.

Undergraduate Research and Civic Engagement

O'Connor 105

Steve Bachofer

Saint Mary's College of California

Cynthia Maguire

Nasrin Mirsaleh-Kohan

Richard Sheardy

Texas Woman's University

Both undergraduate research and civic engagement are acknowledged “high impact” educational practices. The incorporation of research activities in the curriculum allows more students to have access to those experiences. Civic engagement activities facilitate student learning and motivation since students observe the positive impact of their work to benefit the community. This session will describe numerous SENCER projects where research experiences are coupled with civic engagement work. These projects range from GIS mapping, soil sampling, native plant gardening, and environmental educational outreach. The impacts of student learning will be discussed and benefits for the community will be outlined. A small group discussion will enable participants to map out undergraduate research and civic engagement projects. In the closing discussion, the impact on faculty will be highlighted.

FRIDAY,
AUGUST 3

FRIDAY,
AUGUST 3

4:00 - 4:50 P.M.

O'Connor 106

Using SENCER Courses for Research on Teaching

Linden Higgins

Education for Critical Thinking

Monica Devanas

Rutgers University

As you consider your courses and design or re-design them through the SENCER approach, rich opportunities to use the process for developing new areas of research on teaching will emerge. The Scholarship of Teaching and Learning (SoTL) as developed by the Carnegie Foundation, is a systematic inquiry into student learning. But before that level of work is undertaken, faculty need to be thinking ahead and with deliberation about their courses. Preparation for SoTL begins with careful attention to current research on teaching and learning, the planning of research question(s), ideas about activities and assessments, i.e. the research, and how that evidence will be used to improve student learning. Finally, one needs to consider how to share that work with the larger community and “go public” with the outcomes.

Participants in this session will consider questions regarding the literature and characteristics of scholarship of teaching and learning; what are the forms of evidence for this type of scholarship; what constitutes a public forum for dissemination of this research. Most importantly, discussion will focus on how SENCER is a useful approach to connect the faculty, students and community with this form of scholarship.

4:00 - 4:50 P.M.

O'Connor 107

Grit and Resilience, Success and Retention

Amy Shachter

Santa Clara University

4:00 - 4:50 P.M.

Getting Started with the SENCER-SALG

O'Connor 205

Stephen Carroll
Santa Clara University

This session will introduce attendees to the SENCER–SALG (Student Assessment of their Learning Gains) and provide instructions on how to use it to assess student learning in their classes. The session will begin with some basic principles of the SENCER-SALG’s design and show how understanding those principles helps faculty understand and assess their students’ learning more effectively. Participants will learn how (and why) the SENCER-SALG differs from other classroom assessment instruments, how to set up survey instruments for their own classes, how to administer the surveys, and how to interpret the results. Participants will also learn how to customize the instrument to include their own course goals. This session is especially geared for those new to the SENCER–SALG.

Participants will be able to:

- understand basic principles of assessing student learning (especially as they are manifested in the SENCER–SALG),
- use the SENCER–SALG to assess student learning in their classes, and
- customize the SENCER–SALG to include their own course goals.

4:30 - 4:50 P.M.

From the Classroom to the Community: Incorporating Civic Responsibility into a Shared Lab Intensive for Non-majors Biology and Chemistry Classes

O'Connor 102

Lisa Hoferkamp
Todd Radenbaugh
University of Alaska

Civic duties are legally mandated responsibilities for which all citizens should feel an obligation. The American university system offers an exceptional opportunity to demonstrate the importance and benefits of fulfilling these responsibilities. Many faculty in higher education, especially those in STEM disciplines, seem uncomfortable including in their curricula discussions of a political nature and rarely if ever, promote civic and community engagement. However, recent partisan discourse has begun to limit the amount of STEM knowledge included in legislative discussions that ultimately produce decisions or set policy. Clear demonstrations of the links between sound decision making and considerations of scientific data in non-majors science courses are an ideal opportunity to encourage analytical thinking regarding those civic responsibilities among young adults, some of whom may eventually work in governmental or policy-making roles.

This presentation will present plans for a multi-disciplinary intensive lab that complements a 100 level biology and a 100 level chemistry course and uses the National Center for Science and Civic Engagement’s SENCER approach to insert important links between civics and STEM education. The intended outcome of the proposed course is to strengthen student’s understanding of STEM principles by connecting course topics to local and global issues of importance. This presentation will present plans for classroom and laboratory activities that reveal how the scientific method and scientific principles provide a consistent and predictive tool for the impacts of human action (and inaction). Similar to previous efforts at the University of Alaska to “SENCERize” physical geography and climate change courses, laboratory activities and course revisions aimed at delineating the important links between STEM principles, human impacts and civic engagement will be presented with a specific focus on changes in culture, ecology, and climate in Alaska. The overarching goal is a course that encourages students to deepen their understanding of how science influences governmental policy.

FRIDAY,
AUGUST 3

5:00 P.M. – 6:30 P.M.

POSTER PRESENTATIONS

Villas Multipurpose Room

Poster presenters may put up posters beginning at 8:00 AM today. There will be refreshments served at tonight's reception.

Poster Presentation Remarks

Karen Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Bruce Alberts

Chancellor's Leadership Chair in Biochemistry and Biophysics for Science and Education *University of California, San Francisco*

A NOTE ON THE SSI 2018 POSTER PRESENTATIONS

We are pleased to invite you to attend a special poster session that features the work of SSI 2018 participants. Poster authors will be on hand to share their work, exchange ideas, and answer questions during the designated Poster Presentations time.

**FRIDAY,
AUGUST 3**

Planting SENCER at Auburn University: Growth from Small Beginnings

Paula Bobrowski

Robert Holm

Auburn University

Our poster charts the history of SENCER at Auburn University. From a small beginning with one person bringing the SENCER ideal to the Auburn campus in 2012, in six short years the SENCER ethos is now shared by over 10 faculty in diverse departments ranging from music to psychology to communication disorders. The university counts three SENCER fellows among its faculty. Past SENCER/NSF grants and the continuing support of university administration have nurtured the growth of SENCER; encourage faculty to become involved in SENCER and present either a poster or hold a panel presentation at the SENCER Summer Institutes. Topics presented include the Science of Music, the Evolution of a Music and Science Course, the Integration of Arts and Humanities with STEM.

Broadening Interest in STEM in High School Students through Foldscope-Based Interdisciplinary Activities

Quyen Aoh

Nicholas Conklin

Barbara Priestap

Anne Schmitz

Gannon University

Data from the US Bureau of Labor Statistics predicts that by 2022, occupations in science, technology, engineering, and math (STEM) are projected to grow to more than nine million. This growing workforce is expected to make up over five percent of all jobs. Indeed, many predict that the new global economy will be built on STEM careers. However, recent studies suggests that a significant number of high school students begin to lose interest in STEM fields as they get older, in part because of lack of exposure to STEM and its applications and a lack of confidence in their ability to pursue STEM-related careers.

To bolster interest and confidence in self-efficacy to pursue STEM fields, we have developed a one-day outreach program that focuses on the engineering, theoretical basis, and application of the Foldscope paper microscope. Among a population of college-bound, but at-risk matriculating high school students, we found that this outreach program increased student interest in STEM in general, improved confidence in their ability to learn STEM, and increased students' openness to careers in STEM fields. Interestingly, students most enjoyed the construction and use of the Foldscope, and least enjoyed understanding the basic optics behind the Foldscope. These results are consistent with student data that show more interest in applied than basic study of STEM fields.

Geology Outreach to the Scouting Community

Julia Nord
Amanda Schulte
George Mason University

George Mason University (Mason) with Northern Virginia Mineral Club (NVMC), holds a highly successful annual Gem, Mineral and Fossil Show that attracts over 1000 community members, many of them children. Building on this success, in 2014 Mason joined with Boy Scouts of America (BSA), to offer programs for Boy Scout Merit Badges in Geology, and Webelos and Cub Boy Scout pins and belt-loops, now changed to STEM Awards. The event is held in the Mason geology labs and is run by geology-focused students in the Graduate School of Education. Each lab hosts a specific requirement and students rotate between labs. Faculty run Requirement 4, as the scout needs to "visit a geologist in their place of work", learn about their research and talk about career opportunities. The other 4 requirements are led by undergraduates, including students in GEOL 302, Mineralogy, Learning Assistants and graduate students.

The one-of-a-kind program has been very successful, although numbers have fluctuated dramatically and many lessons have been learned including the importance of teamwork between three very different entities with education as a common goal. It is the only large STEM event held at a university within the DC/Maryland/Virginia region that works with BSA. Maintaining student interest in Science through middle and high school is imperative for creating a strong future STEM workforce.

Nationally, the number of Boy Scouts receiving this badge has declined by approximately 15% over the past five years (BSA), despite being one of the more popular merit badges when excluding all required badge programs. Since 2014 approximately 550 Boy Scouts, Webelos, and like-minded youth (including females) have attended the Mason program. 52 Boy Scouts have obtained their geology merit badges and 481 Webelos have received STEM awards. In 2018 we offered a well-attended spring event for the first time. Beginning in 2019, BSA will allow females to attain Merit Badges and we expect an increase in female attendees.

FRIDAY,
AUGUST 3

A Switch at Lipscomb Turns on the LIGHT: Illuminating Global Engagement

Tamera Klingbyll
Lipscomb University

After the initial conversions of general education biology courses, Foundations of Biology and Power of Science, the integration of biology and chemistry, into the Lipscomb LIGHT Initiative (illuminating global engagement) and a redesign of the SALG used for classes, Spring 2018 produced the first official data for the courses and the value of the new learning styles. Foundations of Biology data was obtained from two classes, one day and one night. The learning styles in adherence to the purpose of LIGHT brought an intentional focus on a more global and local sense of study with a prominent presence of the humanities. For the first time, students, in place of taking a cumulative final exam, would produce a cumulative final project. Classes were shown how the projects were made cumulative and incorporated an entire semester's volume of learning. While making sure students learn information, students also built on hidden competencies e.g. confidence, information manipulation, learning for understanding, reflection and teamwork. Course materials are currently under review moving towards a more of flipped-classroom design, thus allowing for more discussion. A SALG redesign follows.

Using Hands-on Activities in Teaching Mathematics K-4th

Carroll Wells
Lipscomb University

Topics which were taught in a summer institute for K-4th teachers sponsored by a Math/Science Partnership Grant, summer 2018, will be presented. Use of hands-on activities to get students involved in learning mathematics will be illustrated. These include items from number sense, geometry, and problem solving.

A Project-Based Learning (PBL) Approach For Engaging Students in Undergraduate Chemistry Courses

Madhavan Narayanan
Joshua Sabatini
Davida Smyth
Geetha Surendran
Mercy College

It has been well documented that student learning is significantly impacted positively by exposing them as early as possible to project based or research based courses. The number of foundational level model chemistry courses that involve either of these approaches are few and far between. This is understandable considering the difficulty one is faced with when deciding the number of key concepts to be covered within the limited time during a semester. At Mercy College, we use project-based learning (PBL) in first and second year undergraduate chemistry courses with the aim to engage students in learning to help them understand core concepts, develop core scientific competencies, and improving student's attitude towards chemistry. We have designed and implemented an antacid based PBL in general chemistry I laboratory and a mini research project on the effect of nuclear chemistry in society in the general chemistry I lecture. In the organic chemistry II laboratory our students did a project analyzing the key organic ingredients in carrier oils, essential oils and sunscreens, the students' extract aromatic organic compounds from commercial oils and sun-screens and quantify them using optical spectroscopy. Here we present results from Student Assessment of Learning Gains (SALG) surveys from these courses.

Developing Signature Assignments in a Multidisciplinary Integrated Learning Community Focused on Climate Change

Catherine Duckett
Katie Gatto
Monmouth University

Monmouth University will pilot an integrated learning community designed to deepen student critical thinking skills and develop other skills in a form that students find relevant and meaningful in Fall 2018. Students will enroll in three courses required in the Monmouth general education curriculum. Two of the courses focus on development of skills rather than on expanding student subject knowledge (Information Technology and English Composition); the third is an interdisciplinary freshman seminar (Science and Literature) which addresses transitional issues and developing critical thinking through course work. These three courses all explore the topic of climate change and will share some reading materials.

An Active Learning Approach Utilizing Case Study Presentations to Demonstrate physiological Principles in Anatomy and Physiology

Bernadette Dunphy
Monmouth University

Inclusion of active learning techniques, specifically case study work, resulted in learning gains as noted by increased scores on a national standardized exam. Active Learning is a method that can be used in a classroom that directly involves students in the learning process. This method can include case study presentation and analysis, students using the whiteboard during discussions, or small group discussion in class. This type of metacognitive learning is successful in documented gains in the more difficult integrative physiological processes.

Metacognitive learning research has been done, however we were primarily interested in the use of active learning in upper level anatomy and physiology classes. This integration would not only benefit the student's learning of physiological processes, but also give them a platform to build the knowledge of different human systems, and integrate that knowledge throughout the two course series. It is hypothesized that the use of active learning students will learn the material better and the results will be an increased score on the HAPS exam. This is a comprehensive exam produced by the Human Anatomy and Physiology Society. It can be assumed that a majority of professors in the United States primarily teach using traditional methods. The students' scores on this exam were recorded in the spring 2016 (n=25) and spring 2017 (n=17) semesters. Student's t-test was used to compare each semester to the national average. Using this test, it was found that in both semesters, the students scored significantly higher than the national average. This difference can be attributed to active learning, and has shown that active learning is a better technique than traditional learning in Anatomy and Physiology.

FRIDAY,
AUGUST 3

A Picture and a Thousand Words: Demonstrating Outcomes in a General Education Science Course

Robin Kucharczyk
Monmouth University

Monmouth University offers Discovery and Thinking in the Natural Sciences (SC100) as one of the General Education Natural Science course options for non-science majors. This survey course covers major developments in physics, chemistry, and biology and is taught in a traditional format. When Robin Kucharczyk became Coordinator of General Education Natural Science in fall 2017 she returned to teaching SC100 after a seven-year hiatus and brought SENCER-inspired innovations into her classroom. Drawing inspiration from a poster she had viewed at one Summer Institute she created a novel photograph-based assignment that engaged her students in writing about science at the start and end of the semester.

At the start of the term students submitted photos of themselves with objects or in settings that were of interest to them. To their photo they attached a paragraph in which they described the science behind their object or setting as they currently understood it. As part of their final exam in the course, they then wrote a structured paper that described their understanding of their object or setting as seen through the lens of the course content. They also compared this writing with their writing at the start of the course and reflected on their learning. Robin will share photographs and writing excerpts that illustrate how her students used a lava lamp, a dirty outdoor pool, a pet ladybug, a water slide, and other selections as tools through which they measured for themselves the transformation in their ability to recognize, understand, and communicate the science in the world they live in.

Student Assessment of Learning Gains (SALG): A Reassessment of Validity

Linden Higgins
Education for Critical Thinking LLC

Heide Estes
Catherine Duckett
Monmouth University

Student evaluations of courses have been shown to be biased against challenging content and against instructors who diverge from the presumed white, heterosexual, cis-male faculty “norm.” The Student Assessment of Learning Gains (SALG) has been understood to avoid problems with other methods of student course and faculty evaluation. However, a study of two comparable courses of different difficulty has challenged the validity of the SALG. We evaluated two First Year Seminar courses at a regional comprehensive university by administering the SALG both pre- and post-course and analyzing student essays for measures of critical thinking to investigate correlations between self-assessed learning gains and student performance on a late semester essay.

Review of syllabi and course assignments along with student reports of difficulty agree in judging one course to have been more challenging than the other. In the less challenging course, the variation in critical thinking in student essays is greater than in the more difficult course, where the average performance was the same but there was very little variation among students. However, improved performance does not correlate with student reports of learning gains on the SALG. Students in the more challenging course reported “little gain” in their critical thinking skills, while students in the less challenging course reported “great gain.” Students’ enthusiasm for the course correlated with self-reported greater improvement in critical thinking skills. This difference suggests that even for the SALG, students’ own assessments may be biased by their enthusiasm for the course and/or the instructor. As such, the self-assessment is not a consistent good indicator of actual student learning gains, and its use should be accompanied by other measures of student performance.

Developing a SENCER Model Substance Abuse Awareness Course: A Campus-Community Effort Focused on Interdisciplinary Learning Strategies

Irene Dabrowski
Roberta Hayes
St. John's University

The civic engagement goal of an interdisciplinary learning community has focused on addressing the local and national substance abuse epidemic (tobacco, alcohol, and opioids) in order to increase student understanding and awareness of the factors involved in perpetuating a culture of substance abuse. Two core curriculum courses, Scientific Inquiry and Introduction to Sociology, placed a socio-biological lens on substance abuse incorporating collaborative research projects and student engagement activities over the course of two semesters on the Staten Island, NY campus of St. John's University.

The students in the respective classes worked with a problem-solving approach fulfilling an academic service learning (AS-L) requirement with written and participatory assignments piloting a potential template for a SENCER Model Substance Abuse course. These requirements entailed five digital research assignments for reviewing both the popular media and the scholarly literature to "get the facts" about substance abuse as portrayed to the general public and how that may differ from reading scholarly/scientific articles. Students attended a month long speaker and film series on substance abuse to complement their research activities. The speakers were selected in partnership with community groups and university faculty. Team work became integral to learning and problem-solving as students collectively constructed infographic and public service posters for presentation in an interdisciplinary class designated as an open dialogue day, allowing students from both science and sociology to "talk over" results with one another. The posters were finally shared with the entire campus community on a university-wide research day placing emphasis on "peers educating peers" about the dangers of drug use. In addition, all students in the university have been invited to respond to a tobacco survey for the purpose of collecting empirical data directed toward the policy formation of a tobacco-free university in conjunction with one of our ASL partners.

FRIDAY,
AUGUST 3

Integrating Liberal Arts and Engineering through the National Academy of Engineering Grand Challenges

Karen Oates
Worcester Polytechnic Institute/Success 4 Higher Education

With the support of the Teagle Foundation, Four campus which are part of the AITU system (Association of Independent and Technical Universities) underwent a two year cycle to bring together Engineering and Liberal Arts Faculty with the goal of; (1) creating new modules/courses/ activities or experiences that integrate multidisciplinary perspectives, ways of knowing and approaches to solving problem of social consequence; (2) studying the interactions of the engineering and liberal arts faculty and how communications takes place amongst and between them in developing a shared academic experience while; (3) creating for each campus a successful application for the National Academy of Engineering (NAE), Grand Challenge Scholars Program which emphasizes the influence the liberal arts disciplines have in preparing engineering students for both their profession as well as their social responsibility. We present our experiences working as a team on campus and as part of this multi campus project, as well as the challenges we faced and the overall success of introducing the NAE -Global Grand Challenge Scholars Program to students and faculty.

Promoting Science Through Wizardry

Cynthia Maguire
Texas Woman's University

An unexpected opportunity comes along when we least expect it, and that is how Cynthia Maguire came to travel to Middle Earth (New Zealand) as a wizard apprentice in fall 2016. Along the way, she learned a totally new and unique way of relating science information to children, thereby increasing their interest in science. Her poster is a description of her journey as she truly became the Mistress of Potions (MP for short).

Since returning to Texas, she is seeking opportunities to visit schools for kids of all ages in order to demonstrate the power—and fun—of science! Wizarding performances are provided free of charge, but when overnight travel is needed the community is asked to provide local meals and a bed in someone's home. This provides the opportunity to strengthen bonds with the people she meets while reducing the cost of providing this unique performance to schools. Performing as the Mistress of Potions, she hopes to be a role model for young women in science and an ambassador for TWU. For more information, email MP at cmaguire@twu.edu

Multi-faceted Civic Engagement in a Belize Village

David Rylander
Texas Woman's University

San Antonio Rio Honda is a small village in Belize (approx. 500 people) that had little economic opportunity, no books for the school/children, no waste management, minimal use of gardening opportunities, and a culture that suppressed women and girls. With the help of a former Peace Corps volunteer living in the village, Texas Woman's University students developed and implemented a 5-year plan of civic engagement to help improve these conditions. This was done through a student organization (Enactus/SIFE) and a study tour course.

Through a series of three student trips to the village and additional support from a distance, students were able to make an impact in each area of need, while achieving a depth of learning beyond what a regular classroom setting can provide. Projects included support for women's craft businesses, books for a children's library, a new girls soccer team, gardening initiatives, and other sustainable-focused efforts. Students engaged in learning local culture and history, the natural environment, and political and business environments. Highlights of the projects will be presented, along with outcomes, challenges, assessments and sustainable impacts.

Research Discovery in Instrumental Analysis and Environmental Chemistry Laboratories at Texas Woman's University

Manal Omary
Texas Woman's University

This presentation will overview our research discovery-style for both the Instrumental Analysis and Environmental Chemistry laboratories at Texas Woman's University. The lab involves two components, one based on conventional experiments in standard textbooks/manuals for these types of labs, and the second component which targets new research discoveries whereby the same techniques on standard materials are applied for interesting technological applications. For example, we have been analyzing polluted water from hydraulic fracturing (fracking) sites in Texas/Oklahoma natural gas wells to investigate their various organic and inorganic pollutants both quantitatively and qualitatively via various analytical techniques (HPLC, Atomic absorption, UV/vis, and GC-MS).

Transcending Boundaries and Monitoring Change: Resilience and Adaptation throughout the Yukon River Watershed

Larry Duffy
University of Alaska Fairbanks

The Yukon River Watershed provides an ideal, broad scale topic for resilience studies. Our goal is to create a sustainable research program to study the impact of climate change on water security and resilience in Alaska. Global warming and industrial development have the potential to cause large scale changes in the Yukon River Watershed and the associated human dimension. We propose to use the Yukon River Watershed to:

- establish and expand a baseline against which future change can be more accurately assessed,
- enhance the Alaskan research and education infrastructure,
- Promote interdisciplinary research and Citizen Science, and
- advance regional economic analysis.

Traditional Ecological Knowledge (TEK) will be integrated with Resilience Theory.

SATURDAY, AUGUST 4TH

Sessions will be held on the Santa Clara University Campus and at the Tech Museum of Innovation in San Jose

7:00 A.M. – 8:00 A.M. **BREAKFAST**
Benson Memorial Center

8:00 - 9:50 A.M. **Session Block III**

**SATURDAY,
AUGUST 4**

8:00 - 9:50 A.M.**Integrating Music into STEM***O'Connor 102*

Frank Abrahams
Elena Byasse
Janet Cape
Jessica Dalrymple
DonnaJean Fredeen
Palmer Haffner
Nichola Lampe
John Lucado
Lindsey Reinhard
Rider University

In this session we present the results of a research project to investigate materials, and design instruction for a music curriculum that aligns to the goals and objectives of STEM – a national initiative to improve the quality of public school education by focusing on Science, Technology, Engineering and Mathematics in elementary and secondary pre-college education. Some arts educators believe that adding the arts to STEM creating STEAM, provides a more relevant and comprehensive approach to educating the complete child, and provides opportunities for children to express themselves through the arts in ways that enhance engagements with science, technology, engineering, and mathematics.

The scope of the project was to identify a theoretical framework, develop a template for instruction, and generate sample plans for music experiences to connect and integrate into the goals and content of STEM subjects, always maintaining the integrity of music as a subject worthy of study on its own. While it is important to consider dance, drama, and visual arts, those considerations were beyond the scope of this study. This session is in two parts. First, we present the theoretical framework, literature review, lesson plan and ensemble plan templates and describe some sample lessons. After, participants will have the opportunity to try some of the materials to explore options for creative expression integrating music into STEM.

8:00 - 9:20 A.M.**How to SENCERize the Curriculum***O'Connor 104*

Theo Koupelis
Broward College

The SENCER approach is about the teaching and learning of a challenging curriculum steeped in civic engagement issues. Including this approach as an integral part of a curriculum change can be done at any level, from the individual course to the general education curriculum. The goal of this session is to engage in a dialogue that covers the entire process of such a change, discuss challenges, support needed, guiding principles, and to provide examples of successful efforts. The session is intended for participants new to the SENCER project.

8:00 - 8:50 A.M.

Informal Science for Inquiring Minds: K-4 Science Exploration Projects

O'Connor 105

Ginger Reasonover

Lipscomb Academy Elementary School

Lipscomb Academy Elementary School provides both formal in-school science teaching and after-school science exploration programs for students in grades K-4. Next generation science labs cover a host of science principles through food and cooking: physics, biology, chemistry, and environmental science, in particular. Food and/or cooking can be used to teach the rock cycle, states of matter, layers of the earth's crust, temperature, the butterfly life cycle, the science of suns and comets, aquifers, and sustainability. This session will be a hands-on presentation of a food science project that allows students to explore physics, chemistry, and biology concepts in a fun and informal science exploration class. The session will also provide networking and collaboration potential for K-12 educators.

8:00 - 8:50 A.M.

Science, Humans, and Nature: A Southern Appalachia Story

O'Connor 106

LaRoy Brandt

Lincoln Memorial University

The SENCER-ISE program was designed to foster cross-sector civic engagement partnerships. Utilizing the financial support from this program a three-way partnership between the Lincoln Memorial University Department of Biology, the Abraham Lincoln Library and Museum, and the Cumberland Mountain Research Center (all in Harrogate, TN) was established. This project developed specialized training for LMU conservation and wildlife biology students in the environmental history and human geography of southern Appalachia, as well as formal training in interpretive programing. Under faculty guidance, LMU students developed educational programs that were offered through the Museum to middle school students from our local community. On Oct 27, 2017, LMU hosted over 80 middle school students for a rotating sequence of three programs: (1) Water as an Environmental and Historical force, (2) History and Current Status of Regional Biodiversity, and (3) Humans and Land Use Nature Hike. The SENCER SALG was utilized to obtain feedback from LMU students about their experiences in this program. Although this project is viewed as a success, discussions concerning of the project from inception to development to implementation to assessment and various hurdles along the way are warranted.

**SATURDAY,
AUGUST 4**

8:00 - 8:50 A.M.**SoTL: Designing Student Assessments to Stimulate Reflection on Complex Problems***O'Connor 107*

Linden Higgins
Education for Critical Thinking

Monica Devanas
Rutgers University

SENCERized courses present both benefits and challenges to students, in part due to the interdisciplinary approach required to work on the real-world problems at the core of the SENCER ideal. Students, developmentally and in their prior experiences, often approach problems in a linear fashion. Moreover, 'transfer' across courses and among disciplines is widely acknowledged as one the most challenging things to learn, and to teach. In today's workshop, we will discuss some strategies for helping students when they struggle with the inherent complexity of SENCERized courses and real world problems, provide an outline of activities and strategies for different points in the semester, and provide time and resources for participants to outline an activity for one of their courses. We will close with an overview of resources for managing discussions around particularly challenging topics that may trigger strong emotional reactions in students.

8:00 - 8:50 A.M.**Sustainability Cross-disciplinary Conversations II: Teaching & Learning about FOOD***O'Connor 205*

Tom Bryan
 Cathy Middlecamp
University of Wisconsin-Madison

Food-related issues are intriguing, cross-disciplinary, and offer multiple points of entry for student engagement. What better way to start a conversation about sustainability with students than with the food they eat on campus? As an instructor, you can help students find examples of how what they eat affects both their health and the health of the planet.

This interactive session on teaching and learning food provides stories, activities, and resources, all sprinkled with practical knowledge and bits of humor. It is one of a three-part series at the 2018 SSI aimed at helping instructors design course activities that utilize your campus as a living laboratory for sustainability. Feel free to attend one or all three parts of the series!

8:00 - 9:50 A.M.

Thinking Like Leaders: A Systems Approach to Improving Introductory Level Courses Session II

O'Connor 206

This is the second of the three sessions in the Thinking Like Leaders workshop sequence. It will examine the interconnectedness of introductory biology to other disciplines in STEM as well as the arts and humanities from a systems perspective using a facilitated case study.

Bruce Alberts

Chancellor's Leadership Chair in Biochemistry and Biophysics for Science and Education *University of California, San Francisco*

David Ferguson

Stony Brook University

Matt Fisher

Saint Vincent College

Theo Koupelis

Broward College

Cathy Middlecamp

University of Wisconsin-Madison

Jay Labov

National Academies of Sciences, Engineering, and Medicine

Eliza Reilly

National Center for Science and Civic Engagement

9:00 - 9:50 A.M.

Brownfield Action: Active Learning in a Constructivist Environment

O'Connor 105

Peter Bower

Barnard College/Columbia University

Brownfield Action (BA) is a web based, interactive, three dimensional digital space and learning simulation in which students form geotechnical consulting companies and work collaboratively to explore and solve problems in environmental forensics. Brownfield Action (BA) was selected in 2003 as an example of "national model curriculum" by SENCER. BA is the only SENCER Model with a network of faculty collaborating in a community of practice. The simulation and the faculty network will be described as well as its impact on student learning and career goals.

**SATURDAY,
AUGUST 4**

9:00 - 9:20 A.M.**Civic Engagement in a Kentucky Context***O'Connor 106*

Martin Brock

Eastern Kentucky University

This presentation will explore several models in which Kentucky-specific issues can be and have been used as frameworks for furthering content delivery in both natural science and social science contexts. The four examples to be emphasized include the chestnut problem, in which chestnut blight decimated the dominant arboreal species in much of Appalachia; the Bluegrass Army Depot, at which tons of nerve agent have been stored since the mid-20th century and against which treaty obligations have made their destruction mandatory, but which emerging technologies had been expected to resolve the issues quickly; Maxi Flats, a very bad model of mis-handling radioactive waste, and which continues to play out, in spite of lessons that were supposed to have been learned; and finally the problems associated with traditional energy generation and the difficulties with transitioning to alternative sources. Each of these models work at the interface between the social sciences, including political science, economics, sociology, and geography, and one or more of the natural sciences, although for this presentation mostly chemical aspects will be emphasized. In addition, solutions to each of these issues will require cooperation among a number of civic players. Through role playing, students are able to better appreciate the complexity of the issues facing our commonwealth.

9:00 - 9:50 A.M.**Engineering, Technology and the Liberal Arts***O'Connor 107*

Dave Ferguson

Stony Brook University

This session will focus on courses and other experiences aimed at helping students outside of engineering and technology better understand some of the technical dimensions and societal implications of a world that is increasingly driven by extreme automation. Participants will explore ways in which curricula or courses may address the challenges and opportunities created by engineering-driven approaches to such issues as health/medicine, sustainability, and security.

9:00 - 9:50 A.M.**Beyond Assessment: Designing Informative Evaluations of Student Learning***O'Connor 205*

Linden Higgins

Education for Critical Thinking LLC

Many faculty are deeply interested in knowing whether their teaching strategies are having impacts on student learning. Detecting impacts is the focus of program evaluation, and this session introduces the basic concepts of designing an evaluation. Following a presentation of how evaluation is distinct from research, there will be a whiteboard collaborative mapping of resources, outputs, and desired impacts for a hypothetical course activity. Based on this model, the group will identify and discuss possible evaluation questions, considering factors such as generality, context, and foundational questions in the literature around teaching and learning. After a brief presentation about choosing appropriate indicators, 'triangulation,' and the meanings of validity and reliability in SoTL data analysis, the group will identify possible indicators for the hypothetical program model, and discuss how those might be measured. The session will close with discussion of participants' thoughts of how to proceed with evaluating impact of their SENCER courses.

9:30 - 9:50 A.M.

Using Number Talk Training To Train Teachers

O'Connor 104

Brandon Banes
Lipscomb University

Number Talks are rich instructional activities that help students develop number sense and flexible thinking in mathematics. For teachers, number talks require a wide set of teaching skills. This presentation will showcase the presenter's experience using number talk training to motivate teachers to develop their teaching practice in general.

9:30 - 9:50 A.M.

Community Based Learning in a Rural Environment

O'Connor 106

Pamela Proulx-Curry
Maine Campus Compact

Community Based Learning evolved largely in urban environments where many structures that facilitate student involvement in off-campus projects (e.g. local transportation systems, large social service agencies with volunteer management personnel). Many times these structures don't exist in rural communities, thus creating a unique set of challenges for faculty interested in involving their students in off-campus civic engagement activities. This session will engage participants in a discussion of these challenges and approaches to dealing with them.

10:00 - 10:45 A.M.

Team Time

Teams may find any suitable location on campus to conduct a team meeting.

10:00 - 10:45 A.M.

SENCER-ISE: Help Guide the Next Steps

O'Connor 102

Marsha Semmel
Marsha Semmel Consulting

Dave Ucko
Museums+More LLC

In this session, we will use SENCER efforts to date in partnering higher education institutions with informal learning organizations as a springboard for conversation. You will share your experience with cross-sector partnerships as we explore new opportunities for collaboration. Your input will enable us to build on prior work and new ideas in planning future SENCER projects.

10:45 - 11:45 A.M.

Brunch

Benson Memorial Center

11:45 A.M. - 1:00 P.M.

Travel to the Tech Museum

Bus Loop

SSI participants will board the bus to the Tech Museum of Innovation at the bus loop as indicated on your campus map.

**SATURDAY,
AUGUST 4**

1:00 – 2:00 P.M. ALL-INSTITUTE PLENARY SESSION III

Tech Museum of Innovation New Venture Hall

Marsha Semmel, presiding

Plenary Presentation: Community Involvement and Participation Advancing Learning and Civic Engagement

Tim Ritchie

President and CEO

The Tech Museum of Innovation

2:00 - 5:00 P.M. Afternoon at the Tech Museum

Tech Museum of Innovation

Following the plenary address, SSI participants will have the afternoon to spend in the Tech Museum. Please consult the shuttle schedule in your program book for transportation back to campus and the Holiday Inn.

SUNDAY, AUGUST 5TH

All sessions will be held on the Santa Clara University Campus.

7:00 A.M. – 8:30 A.M.

BREAKFAST

Benson Memorial Center

7:00 A.M. – 8:30 A.M.

Transcending Barriers Meeting

O'Connor 102

8:30 A.M. – 10:00 A.M.

ALL-INSTITUTE PLENARY SESSION IV

Music and Dance Building Recital Hall

Eliza Reilly, NCSCE, presiding

Plenary Presentation: Making Community Property of Teaching, Learning, and the Cries of the World

Matt Fisher

Associate Professor, Chemistry

Saint Vincent College

10:00 - 10:50 A.M.

Session Block IV

**SUNDAY,
AUGUST 5**

10:00 - 10:20 A.M.

The Automated Phonetic Transcription Grading Tool: Where Computer Science Meets Clinical Problem Solving in Communication Disorders

O'Connor 102

Marisha Speights Atkins
Dallin Bailey
Cheryl Seals
Auburn University

The use of innovative technologies for clinical practice in speech-language pathology is revolutionizing practices for diagnosis and treatment of communication related disorders across the life-span. This evolution has also required educators to integrate the use of technologies into the clinical training pedagogy. Phonetic transcription, a foundational skill presented early in the undergraduate speech-pathology curriculum, serves as the basis for advanced coursework in problem solving and clinical diagnostic decision-making. When learning methods for phonetic transcription, students benefit from regular feedback on their progress. We sought to explore a method to address the pedagogical challenge of providing objective and timely feedback to students using a user-friendly, computer-based platform. The development of The Automated Phonetic Transcription Grading Tool (APT-GT), served as a mechanism for an integrated learning opportunity between the departments of Communication Disorders and Computer Science and Software Engineering at Auburn University. The marriage of communication disorders and computer software engineering learning objectives meet two major goals: (1) to provide increased student engagement between social sciences and engineering and (2) to increase applied science by addressing real-world problems. This session will describe the collaborative and multi-faceted effort, to create a rich learning experience for students in both departments.

10:00 - 10:20 A.M.

Connecting Classroom Skills to Everyday Life: the “Three-Column” Approach

O'Connor 105

Nasrin Mirsaleh-Kohan
Texas Woman's University

This presentation will discuss an activity called, “Three-Column,” which is designed for students to develop an appreciation of how important physics is in their everyday lives. Through this activity, students are asked to take a piece of paper and, without writing their names on it, divide the page into three columns. In the first column, there are to write something they are struggling with or that is troubling them at the moment. In the second column, students are asked to suggest solutions to the problem in their first column. And finally, in the third column, students are asked to write something they are passionate about or something that motivates them. In adding the third column, the focus is on their thoughts on their passions or goals for two reasons: when thinking about our passions, we become happier and automatically move toward a better state of mind making it more probable that we can solve our problems or at least think about our problems in an effective way. This activity can be completed in a few different ways, either individually or as a group. Students can use this method to refocus on a problem or topic they are struggling with or this activity can be used as an icebreaker on the first day of class.

The goal of this activity is to demonstrate why it is important to practice problem solving and analytical thinking skills inside and outside of the classroom. In this presentation, some student responses will be shared along with the ways activity has helped them appreciate the subject and improve their skill sets in this class. Furthermore the session will share how the presenter's outlook has changed by learning more about students and their struggles.

**SUNDAY,
AUGUST 5**

10:00 - 10:50 A.M. Using SENCER Strategies to Remove the Mathematics Barrier to Degree Completion

O'Connor 106

Cindy Kaus
Metropolitan State University

Mathematics students from diverse backgrounds have the power to serve as invaluable resources for their classmates, teachers and the community. They bring a broad range of experiences and perspectives that enrich the learning environment. How do we transform the classroom to support and encourage students from all backgrounds to adopt the identity of a mathematical thinker? What structural barriers are in place that we must move beyond? How do we change our students' mathematical stories so that they learn to appreciate the beauty and applications of mathematics and also have confidence in their mathematical ability? I will present a model that addresses these questions for a group of students who have taken me on a professional path I never expected.

10:00 - 10:50 A.M. Sustainability Cross-disciplinary Conversations III: Teaching & Learning about TRASH

O'Connor 107

Tom Bryan
Tim Lindstrom
Cathy Middlecamp
University of Wisconsin-Madison

Trash-related issues are intriguing, cross-disciplinary, and offer multiple points of entry for student engagement. What better way to start a conversation about sustainability with students than by "talking trash"? Researching and reducing campus waste streams, including those from student residence halls, quickly can engage students and instructors alike.

This interactive session on teaching and learning trash provides stories, activities, and resources, all sprinkled with practical knowledge and bits of humor. It is one of a three-part series at the 2018 SSI aimed at helping instructors design course activities that utilize your campus as a living laboratory for sustainability. Feel free to attend one or all three parts of the series!

10:00 - 10:50 A.M. Building an Inclusive Classroom, or "Why doesn't the black/female/latinx/URM student in my class ask more questions?"

O'Connor 205

Sherryl Broverman
Duke University

Focus continues to increase on the critical need to recruit and retain under-represented minorities and women into STEM programs. Programs, faculty, and financial investment often start by focusing on access and rectifying perceived "intrinsic" deficits in students, such as coming from poor high schools or lack of AP courses, often leading to a deficit mindset for both students and faculty. Recent literature and new models indicate that looking at 'extrinsic' factors, such as classroom structure and dynamics, can dramatically improve outcomes and reduce the achievement gap. This session will show data and share strategies to structure classroom interactions to build a more inclusive classroom.

10:30 - 10:50 A.M.

SENCER in a Small World

O'Connor 105

Heather Pelzel

University of WI - Whitewater

In the Spring 2018 semester, students at UW-Whitewater joined an international search for novel antibiotic-producing bacteria as part of the Small World Initiative (SWI). SWI is a loose curricular program that facilitates student-led experiments in which they collect soil samples, isolate diverse bacteria, test their bacteria against clinically-relevant microorganisms, and characterize those showing inhibitory activity. The course design allows students to experience a more authentic research process rather than the more traditional “cookbook” labs. In the fall semester, a new group of students will join the project, but the project will be a coordinated effort between UWW students and Wisconsin Science Festival attendees, who will have the opportunity to collect and donate soil samples to the project. The students in the class will then communicate throughout the semester with the citizen scientists that collected the soil samples.

11:00 A.M. – 12:30 P.M.

Team Time

Teams may find any suitable location on campus to conduct a team meeting.

12:30 - 2:00 P.M.

Lunch

Benson Memorial Center

2:00 - 3:50 P.M.

Session Block V

2:00 - 2:50 P.M.

Creating a Buzz: SENCER'izing Pollination Science in Computer Science, Physics, and the Liberal Arts

O'Connor 102

Judy Beck

Susan Reiser

Cathy Whitlock

University of North Carolina Asheville

Food production is tied to pollination and, for a variety of reasons, the number of pollinators is decreasing. In response, UNC Asheville developed sustainable habitats for pollinators and was recognized for doing so by being designated a Bee Campus USA. Our pollination-themed project conducted in the fall 2017 was to create beeswax soaps as an interdisciplinary collaboration between three introductory classes: students and faculty from a first year seminar on honeybees collected the wax and honey. Computer science students and faculty prepared the designs to be 3D printed with polylactic acid (PLA) filament and conduct the mold-making. Physics/Astronomy students and faculty from a first year seminar on the Sun designed and built solar melters to be used to purify the beeswax. The dual-enrolled computer science students from Cherokee High School came to UNC Asheville to mold the soaps and learn about the campus. Subsequently, in the spring semester, with the support of the North Carolina Science Festival, we hosted a design competition for all ages to create custom, pollination-themed, food-safe silicone molds from 3D prints, and to make honey-based molded treats to distribute during a pollination festival. At the end of April, we hosted the pollination festival on campus for local participants. During an afternoon, campus experts conducted tours of UNC Asheville's Bee Hotel, the pollination gardens, the beehives, and the display of the solar wax melters, 3D designs, and molds. Participants could build their own bee hotels and enjoy custom treats molded from the winning designs. Contest winners received silicone molds incorporating all of the winning designs.

**SUNDAY,
AUGUST 5**

2:00 - 2:50 P.M.
O'Connor 104

Engineering and Technology for Social Good

Dave Ferguson
Stony Brook University

This session will focus on courses and other experiences aimed at helping engineers and technologists understand how values are reflected in all dimensions of their work, including the selection of problems and the design of devices and systems. Given that the workforce is distributed and that applications find their way into many parts the world, considerations of cultural and global relevance are essential.

2:00 - 2:50 P.M.

Developing a Model for an Interdisciplinary SENCER-based Substance Abuse Awareness Course using Academic Service Learning

O'Connor 105

Irene Dabrowski
Roberta Hayes
St John's University

Students in Scientific Inquiry and Introduction to Sociology, two core curriculum courses, on the Staten Island, NY campus of St. John's University, participated in problem-solving based activities in conjunction with a community partner to fulfill course academic service learning (AS-L) requirements. Using a socio-biological lens each course explored multiple factors related to substance abuse utilizing collaborative research projects and student engagement activities.

The written and participatory assignments were chosen to explore a potential template for a SENCER Model Substance Abuse course. These requirements entailed five digital research assignments for reviewing both the popular media and the scholarly literature to "get the facts" about substance abuse as portrayed to the general public and how that may differ from reading scholarly/scientific articles. Students attended a month long speaker and film series on substance abuse to complement their research activities. The speakers were selected in partnership with community groups and faculty within the university. Group work was a part of learning and problem-solving as students collectively constructed infographic and public service posters for presentation in an interdisciplinary class designated as open dialogue day allowing students from both science and sociology to "talk over" results with one another. The posters were finally shared with the entire campus community on a university-wide research day emphasizing the importance of "peers educating peers" in the student culture about the dangers of drug use. In addition, all students in the university have been invited to respond to a tobacco survey for the purpose of collecting empirical data directed toward the policy formation of a tobacco free university in conjunction with one of our ASL partners.

Learning Objectives were focused on understanding substance abuse as a personal and public issue along with the need for responsible lifestyle choices and community action; the importance of scientific and sociological education in understanding and cultivating substance abuse awareness; and becoming informed about the laws regulating drugs and the legal consequences.

2:00 - 2:50 P.M.

Grounding Yourself as a Leader

O'Connor 106

Karen Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Amy Shachter

Santa Clara University/Success 4 Higher Education

Authentic leaders, those individuals who choose to live their values and passions while putting their skills into practice to service the academy are aware of the importance of staying grounded. Leading is high stress work. A well-grounded leader is both confident and steady while dealing with the chaos what may surround them. You can be sure, as a leader, your institution will never stop making demands of you, so the responsibility to draw the line, to determine how much you are willing to give, rests with you.

In this session we explore how to integrate your professional and personal life, to be grounded in your authentic self, especially when the outside world is chaotic. We will provide a series of steps you can take now to ground you as a leader while maintaining your authentic self.

2:00 - 2:50 P.M.

Teaching Students How to Learn: Designing Courses that Build Successful, Self-Directed Deep Learners

O'Connor 107

Stephen Carroll

Santa Clara University

Our students' personal and professional success in a rapidly changing world will depend on their ability to learn new ideas, skills and habits quickly and effectively. Yet few students have been explicitly taught how to learn so most of them misunderstand the process and rely on inefficient and counterproductive learning strategies. Twelve years' worth of data shows that explicitly teaching students what learning is and how to do it effectively makes students better learners: they learn faster, learn more and retain what they learn longer. This session will draw on current research in cognitive science, physiology of learning and neuro-psychology to build a six-phase model that measurably accelerates students' learning—reducing their dependence on their instructors and enhancing faculty performance. You'll learn by doing—experiencing pedagogies and learning activities you can use to deepen student learning and accelerate their progress toward becoming effective self-motivated, self-directed and self-regulating learners.

**SUNDAY,
AUGUST 5**

2:00 - 3:50 P.M.

Thinking Like Leaders: A Systems Approach to Improving Introductory Level Courses -- Session III

O'Connor 206

This is the third and final of the three sessions in the Thinking Like Leaders workshop sequence. Participants and discussion leaders will discuss the development of a “systems-informed” plan to address the challenges that they are facing on their campuses and then work in groups to review and offer suggestions for improving the plan. Small group discussions will be facilitated by presenters and panelists.

Jay Labov

National Academies of Sciences, Engineering, and Medicine

Jacki Reeves-Pepin

National Association of Biology Teachers

Eliza Reilly

National Center for Science and Civic Engagement

3:00 - 3:20 P.M.

Including the Humanities in STEM Courses

O'Connor 102

Tom Wood

George Mason University School of Integrated Studies

This presentation will trace the development and lessons learned by incorporating art into a STEM non-major course focused upon the science of climate change and biodiversity loss. Preparing students for, and intentionally incorporating, learning focused on the affective domain enhances student interest in scientific canons ranging from evolutionary principles to the Keeling curve. Student assessment of this approach to learning, incorporating scientific knowledge into artistic expression, will be presented. Faculty interested in developing new approaches to engaging students in basic science may find this to be a useful approach to teaching.

**SUNDAY,
AUGUST 5**

3:00 - 3:50 P.M.

STEM in Service of Society

O'Connor 104

Morgan Thompson

Harvard University

Participants in this session will contribute to the development of a new NCSCE initiative to create a series of course models and faculty development opportunities that apply SENCER principles to the integration of social justice and human issues into a range of disciplines, including STEM.

3:00 - 3:50 P.M.

How to Publish in Science Education and Civic Engagement: An International Journal

O'Connor 105

Trace Jordan
New York University

Matt Fisher
Saint Vincent College

Do you want to publish a journal manuscript to share your educational innovations with the SENCER community and beyond? This session describes a peer-reviewed online journal that is inspired by the SENCER project and published by the National Center for Science and Civic Engagement. The journal serves as a forum for publishing creative work at the interface of science education and civic engagement. We will provide practical advice for preparing a journal manuscript by focusing on how to translate your educational practice into scholarship on teaching and learning. As part of the session, each participant will identify one idea for developing a journal manuscript, assess how developed the idea is, and identify next steps to move closer to the goal of submitting to the journal.

3:00 - 3:50 P.M.

Creating your Next Professional Career Move: Exploring Options

O'Connor 104

Karen Oates
Worcester Polytechnic Institute/Success 4 Higher Education

Amy Shachter
Santa Clara University/Success 4 Higher Education

As you begin moving forward and exploring new positions, you may find yourself searching for that first step. Some people devote all their attention to this first step because for them, it's all about getting ready. Others recognize this step as the first of many toward an important goal, and they are already starting to think far ahead into the future. Others see the first step as something that tests the validity of even getting on a path. The Important part is you begin to move towards your ultimate goal. We aim for both success and fulfillment! Success is often measured in external ways, but there's an internal measure of success, called fulfillment. Fulfillment comes from realizing your talents-adding value and living by your values. Richard Leider wisely writes: fulfillment comes from being who you are and expressing who you are as fully as possible. It doesn't have to do with your job description or the specifics of your work. It has to do with how you bring yourself to your work, regardless of what that work is.

In this session we explore what a successful career means to you, and what fulfills your needs both professionally and personally through a variety of activities including a values inventory.

4:00 P.M. – 4:30 P.M.

SSI 2018 ADJOURNMENT SESSION

Music and Dance Building Recital Hall

This session will close out the 2018 SENCER Summer Institute with some reflections, next steps, and announcements about upcoming meetings and initiatives.

**SUNDAY,
AUGUST 5**

BIOGRAPHICAL SKETCHES OF SSI 2018 PLENARY SPEAKERS AND STAFF

David Ferguson holds a Ph.D. from the University of California, Berkeley where he studied mathematics and mathematics education. He is a distinguished service professor in the Department of Technology and Society in the College of Engineering and Applied Sciences at Stony Brook University. He holds affiliated appointments in Applied Mathematics and Statistics, and Computer Science. In addition to his departmental responsibilities, he holds the position of Provost's Scholar for Leadership and Transformation in Diversity. He helped to establish the Department of Technology and Society at SUNY Korea. He has directed numerous projects, including a dozen NSF projects, aimed at improving science, technology, engineering, and mathematics (STEM) education at both the undergraduate and graduate levels. His research and teaching thrusts are in the areas of problem solving, advanced technologies in the learning and teaching of mathematics and science, and socio-technological decision-making. Dave is a New York State and national leader in programs to enhance the participation of underrepresented groups in science and engineering. He directs two NSF-funded projects in this area: the SUNY Louis Stokes Alliance for Minority Participation (LSAMP), and the Alliance for Graduate Education and the Professoriate-Transformation Project (AGEP-T). He is PI on Stony Brook's Science and Technology Entry Program (STEP) and Collegiate Science and Technology Entry Program (CSTEP)—both funded by the New York State Education Department. He is the recipient of several awards: the U.S. Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM), the Archie Lacey Award of the New York Academy of Sciences, and the Engineering Educator Award of the Joint Committee on Engineering of Long Island. Dave is also a Co-Principal Investigator for SENCER.

Matt Fisher is an associate professor of chemistry at Saint Vincent College and a senior fellow with the National Center for Science and Civic Engagement, where he coordinates NCSCE's efforts in the scholarship of teaching and learning. He received a bachelor's degree in biochemistry from Temple University in 1982 and a Ph.D. in biochemistry from the University of Wisconsin-Madison in 1990. In addition to his responsibilities as a faculty member, Matt was department chair for seven years and the director of Saint Vincent College's Teaching Enhancement and Mentoring Program for a similar length of time. He has developed two SENCER model courses: Chemistry of Daily Life: Diabetes and Malnutrition (2005) and Undergraduate Biochemistry Through Public Health Issues (2009). Chemistry of Daily Life is a course for non-science majors that fulfills general education requirements while Undergraduate Biochemistry Through Public Health consists of two courses for undergraduate STEM majors. Matt has been active in the American Chemical Society's (ACS) Division of Chemical Education, serving on the Division Program Committee and as meeting program co-chair for the Division's program at the August 2008 ACS National Meeting in Philadelphia. He was a member of the ACS Committee on Environmental Improvement (CEI) for over a decade, helped lead CEI's efforts in education during that time, and chaired the committee in 2013. He now serves as a member of the ACS Committee on Science where he chairs the Public Policy Subcommittee. Matt is a 2005 Carnegie Scholar and spent the 2005-2006 academic year working on a project to connect topics in undergraduate biochemistry to public policy, public health, and institutional/personal values in support of integrative learning. He has given presentations at conferences and facilitated workshops on integrative learning in the context of undergraduate science courses, published several book chapters on his work in SENCER, and is co-author (with Jacqueline Dewar and Curtis Bennett) of the forthcoming volume *The Scholarship of Teaching and Learning: A Guide for Scientists, Engineers, and Mathematicians*. Matt has been recognized as an ACS Fellow and received the ACS-CEI Award for Incorporating Sustainability into Chemistry Education in 2015.

Omar Quintero is an Associate Professor at The University of Richmond where he was a member of the team responsible for revising the Biology Curriculum to align with the recommendations of the “Vision & Change in Undergraduate Biology Education: A Call to Action” report from the NSF and AAAS. He began preparing for his career as a research-active, student-centered, teaching-focused faculty member during his IRACDA-funded postdoctoral fellowship at the University of North Carolina-Chapel Hill where he trained in teaching and pedagogy as well as in the cell biology of molecular motors and the cytoskeleton. He has maintained an active research program where undergraduates are co-authors on many of his publications. His model for running his research group is based on his experiences under the guidance of Dr. Jo Rae Wright during his PhD work at Duke University. The success of his group is based upon each individual’s ability to contribute to the team, and each team member’s ability to contribute depends upon the mentor’s ability to individually guide and motivate each member on that team. His approach to his work in the classroom is similar—he views each class as a unique project where all members of the team (students and faculty) play an active role in the learning and success of the class. In addition to leadership roles in pedagogy development in his home department, Dr. Quintero has taken a leadership role in the education-focused activities of his professional society, serving of the Education Committee of the American Society for Cell Biology.

Eliza Reilly is the Executive Director of the National Center for Science and Civic Engagement. Eliza has two decades of experience in the design and implementation of programs and materials to advance curriculum, academic leadership and faculty development. She has served as the Executive Director of the American Conference of Academic Deans and as a Director of Programs at the Association of American Colleges and Universities, where she was one of the original staff members for the SENCER initiative. In the last decade she has focused on campus-based faculty development and curricular integration through directorships of the Center for Liberal Arts and Society and the Phillips Museum of Art at Franklin & Marshall College, where she also had a faculty appointment in American Studies. Eliza holds a M.A. in the History of Art and a Ph.D. in American History from Rutgers University. She has been an ongoing participant in SENCER and the National Center’s other programs since 2001 and currently serves as the Executive Director for NCSCE. She is also the General Editor of the SENCER Models and the co-Editor of the journal.

Tim Ritchie is president and CEO of The Tech Museum of Innovation. Tim joined The Tech in 2011, with a mandate to breathe life into its mission – inspiring the innovator in everyone. Since then, the institution has transformed its exhibits and programs to make them more relevant to schools, families and the community. Tim came to The Tech from McWane Science Center, in Birmingham, Ala, where he was president and CEO. A varied career led him to the science center world. After earning his B.A. from Davidson College and his J.D. from Duke Law School, he worked as a clerk for the Chief Justice of the North Carolina Supreme Court, represented defendants on North Carolina’s death row, practiced law in Birmingham and was president of Louisville Diversified Services, a Kentucky non-profit supporting adults with developmental disabilities. He also has an M.P.A. from Harvard.

Amy Shachter is the senior associate provost for research and faculty affairs and an associate professor of chemistry at Santa Clara University. She received her bachelor’s degree at Knox College and earned her Ph.D. in inorganic chemistry at the University of Colorado-Boulder. Her research interests center on porphyrin synthesis. Her work to improve undergraduate science education has been supported by the Howard Hughes Medical Institute, the National Science Foundation, W.M. Keck Foundation, and the Camille and Henry Dreyfus Foundation.

Kyle Simmons is the Faculty Development Events Manager for NCSCE, SENCER and related initiatives. In this role, he plans and manages NCSCE’s signature annual events, the SENCER Summer Institute and the DC Symposium, and provides support for other regional meetings. He also works with regional organizations and initiatives to ensure communication and the sharing of best practices. Kyle brings with him experience from his work with the Junior Statesmen Foundation, where he planned and managed civic education conferences for high school students. Kyle holds a B.A. in political science from Howard University.