

SENCER

SCIENCE EDUCATION FOR NEW CIVIC ENGAGEMENTS AND RESPONSIBILITIES



NATIONAL CENTER FOR
SCIENCE & CIVIC ENGAGEMENT

2019 SENCER Summer Institute

Case Western Reserve University

August 1-4, 2019

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S4HE

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University

#SSI201



Greetings and welcome! This is our 19th SENCER Summer Institute and it is a great pleasure to be hosted for the first time by Case Western Reserve University. We would like to offer our heartfelt gratitude to our CWRU team, Glenn Odenbrett, Lynn Rollins, and Kurt Rhoades for hosting us on their truly impressive campus and in the wonderful city of Cleveland, OH. Thanks also to Donald Feke, Office of the Provost, Karen Cohen, Events and Facilities, Betsy Banks, Center for Civic Engagement and Learning, for their help and support for this institute.

We have worked with new and longstanding 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.

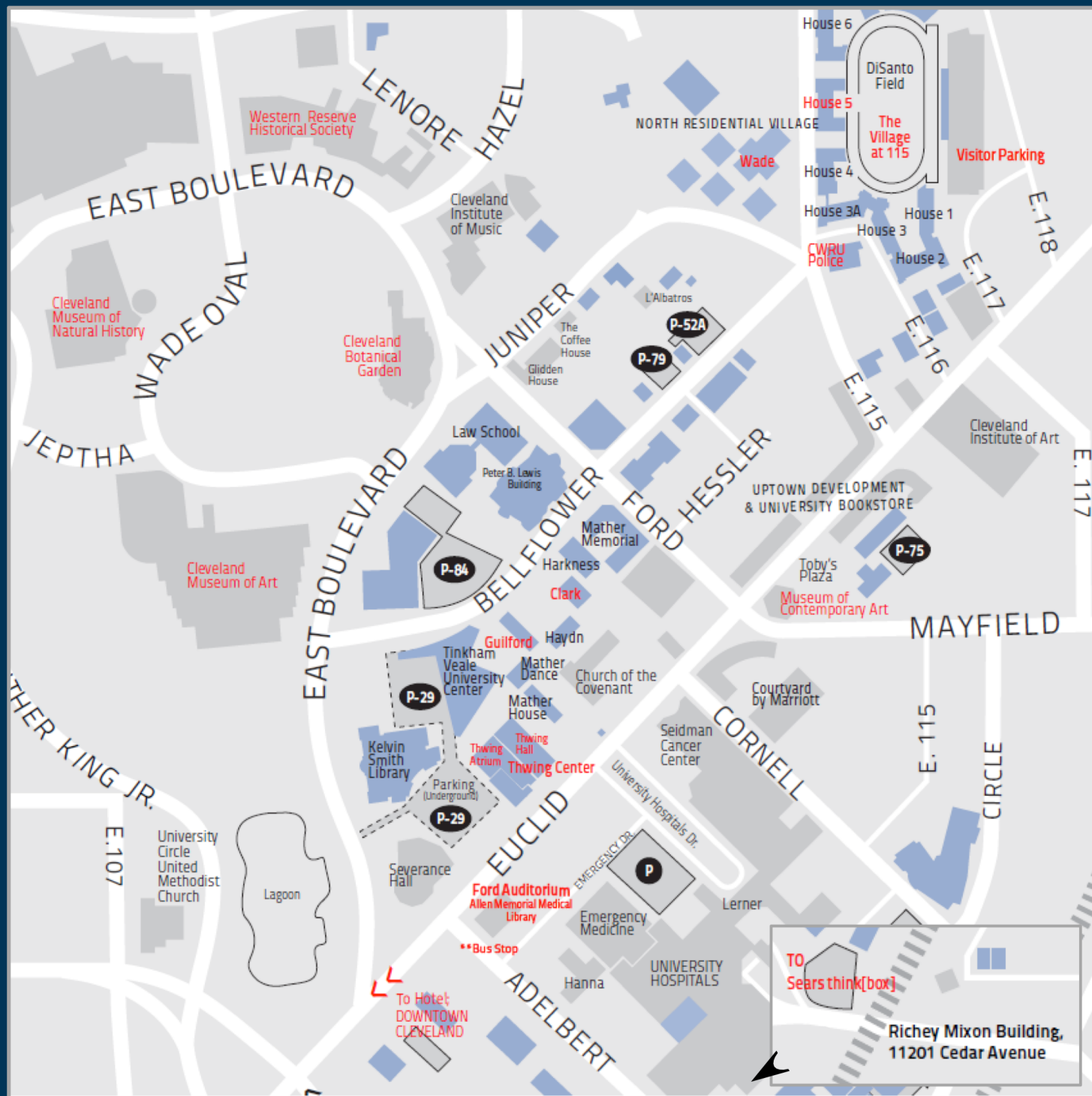
The SENCER Summer Institute has always attracted organizational partners that share and support the SENCER “ideals” and we would like to acknowledge their contributions to this year’s program and encourage you to explore how their efforts can support your own:

- Learn Through the Universe
- Marsha Semmel Consulting
- Museums + More, LLC
- 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. Its success as a national initiative is a result of the efforts, creativity, and innovation of its participants. The National Staff and SENCER leadership relies on the continuous feedback practitioners to shape and guide our programs and planning. Do not hesitate to let us know your thoughts on our work, and especially, about needs that our organization can meet.

While we tackle the pressing issues and mounting challenges we face as educators and civic agents with great seriousness, SSI is also a rare opportunity to think and learn, feel supported and energized, 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 a small part in your efforts to promote learning that really makes a difference to our common future.

The NCSCE Staff



SSI 2019 SCHEDULE OVERVIEW

Time	SSI 2019 SCHEDULE-AT-A-GLANCE				Friday, August 2	Saturday, August 3	Sunday, August 4
7:00 AM					Friday, August 2	Saturday, August 3	Sunday, August 4
7:30 AM					Breakfast Jolly Scholar	Breakfast Jolly Scholar	Breakfast Jolly Scholar
8:00 AM							
8:30 AM							
9:00 AM					Plenary Ford Auditorium	Plenary Ford Auditorium	Session Block V
9:30 AM							
10:00 AM							
10:30 AM					Session Block I	Session Block III	Lunch
11:00 AM							
11:30 AM					Lunch	Lunch	Lunch
12:00 PM							
12:30 PM							
1:00 PM	Thursday, August 1				Session Block II	Session Block IV	Final Plenary and Next Steps
1:30 PM	Case Studies in Academic Leadership (Clark 205)	Question Formulation Technique for Undergraduate Classrooms (Clark 302)	Assignment Design for Civic Learning (Clark 308)	Civic Eng. 101 (Clark 101)			
2:00 PM							
2:30 PM							
3:00 PM							
3:30 PM					Team Time/Consultations		
4:00 PM							
4:30 PM							
5:00 PM	Opening Plenary				Poster Session Reception		Nautica Queen (For those who reserved)
5:30 PM							
6:00 PM							
6:30 PM	Awards Dinner						
7:00 PM							
7:30 PM							

Schedule-at-a-Glance										
Time	Clark 104 (20)	Clark 205 (30)	Clark 302 (40)	Clark 308 (30)	Clark 309 (70)	Clark 110 (15)				
Session Block I - Friday, August 2nd										
10:30 AM	Browne, Monaghan, Holzer: Integrating Civic Engagement into the K-12 Curriculum: How Higher Ed. Faculty and Informal Science Educators Can Help	Franco: Clear or Fuzzy Vision: The Census In 2020	Broverman: Building an Inclusive Classroom	Labov: Undergraduate Research Experiences and Civic Engagement	Devanas, Koupelis: Designing a SENCER Course in 90 Minutes					
11:00 AM										
11:30 AM										
Session Block II - Friday, August 2nd										
1:30 PM	Monaghan,Browne, Holzer: Integrating Civic Engagement into the K-12 Curriculum: A Hands-On Workshop	Yust: Quantitative Approaches to Fair Representation	Gurkan, Martin: Art, Science, Technology Integration	Banks: Best Practices for Stenghtening Civic Engagement	Assessment Mini Symposium(Fisher, Higgins, Duckett, Smyth, Hill)	Fisher:Scholarship of Teaching and Learning: Publishing in SECEJ (By appointment)				
2:00 PM										
2:30 PM		Sheon, Frank: Engaging Students Through Mapping, Visualizing and VR on Health Disparities	Haushalter: Teaching and Learning Inside of Prison	Folsom: Self Driving Tricycles						
3:00 PM	Bardhagen: Inclusion/STEAM/Workforce		Weaver: Using Art to Connect Grad Clinicians to Community							
3:30 PM		Think Box Field Trip (Sign Up)	Odenbrett: Civic Engagement 101 - Definitions, Goals, Strategies				Talley: Learn Through the Universe			
4:00 PM	Grapski, Berroa, Browne: Civic Eng. Rising Teachers									
4:30 PM	Browne, Holzer, Monaghan: Civic Eng. Veteran Teachers									
Session Block III - Saturday, August 3rd										
10:30 AM	Klingbyll: LIGHT-Learning Inner Global Higher Thinking	Oates, Koupelis: Supporting First Generation Students	Seiser: Same Fish, Different Ponds: Adapting to Change in Higher Education	Ucko, Semmel: SENCER ISE- Cross-Sector Collaborations	Assessment Mini Symposium (Continued)					
11:00 AM	Wood, Hasager, Franco: Environment and Indigenous Knowledge: Transcending Barriers to Success						Aoh: Higher Ed, Industry, and Middle School Collab. to Foster STEM Engagement	Koke: Applying Informal Learning Assessment Strategies in Undergraduate Ed.		
11:30 AM										
Session Block IV - Saturday, August 3rd										
1:30 PM	Atkins, Seals, Bennett, Cao: Interdisc. Research in Communication Sciences and Software Engineering	Rhoades, Rollins, Rollins: Problem Solving Through Interdisciplinary, Student-Led Design Teams	Wells: Keeping the 3R in STEM	Lerner: Power of the Campus Museum	Assessment Panel Discussion					
2:00 PM										
2:30 PM	Forum: Civic Engagement and K-12 (Browne, Monaghan, Holzer)	Forum: Academic Leadership (Oates, Shachter, Seiser)	Forum: Education's Role In Civic Renewal (Martin and KY Team)	Forum: STEM/Arts/Humanities (Semmel, Reilly)	Forum: Diversity and Inclusion (Broverman, Hasager)					
3:00 PM										
3:30 PM	Team Time									
4:00 PM										
4:30PM										
5:00 PM										
Session Block V - Sunday, August 4th										
9:00 AM	Higgins: Open Inquiry Laboratories	Morgan, Schapiro: Unusual Allies: Connecting Math Reforms to Civic Engagement	Minigan: Build Consensus and Facilitate Effective Decision Making with the Right Question Strategy	Smyth/Conefrey: E-Portfolios For Science Literacy	Fisher: Educating for Head, Hand, and Heart					
9:30 AM										
10:00 AM										
10:30 AM	Seiser: Weekly Student Seminar as SENCER Course	Koupelis: Co-Requisites-A Risky Experiment	Hall: Overcoming Math Anxiety	Smyth:Colleges as Ecosystems: Lessons to be Learned from Microbial Networks	Broverman: Working for Social Good: Beyond Human Centered Design					
11:00 AM										

GENERAL INFORMATION

Carbon Footprint!

The CWRU team has worked with the student sustainability organization to reduce the carbon footprint of the meeting. Water bottles have been provided to all attendees courtesy of S4HE. Breakfast and Lunch will be served on compostable ware, and leftover food will be composted. Because the hotel is only a mile from the meeting site, we did not hire buses for transport. There is an RTA bus stop less than a block from the hotel, and it is 5 stops to Adelbert Road and Allen Memorial Library. Detailed directions for taking the bus, walking, and buying RTA passes have been sent by email before the conference.

Session Locations

All SSI sessions and activities are in four buildings in close proximity: **Thwing Center, Ford Auditorium (Allen Memorial Library), Clark Hall, Guilford House**. The **Staff Office will be set up in Guilford House** on the first floor. There is also a Parlor and a Seminar Room in Guilford for off-schedule meetings that can be scheduled by request.

Internet Access:

"Case Guest" WiFi is accessible all over campus.

Printing:

If you need a few last minute copies there is a printing kiosk in Thwing Atrium and a CWRU faculty or staff member can print for you (and be reimbursed). There is also a Fed Ex office in Thwing Center that is open Thursday, Friday, and Saturday if you need printing or shipping services.

Coffee Breaks:

Coffee stand will be set up in Scholar in Thwing Center on Friday and Saturday for between session breaks.

Nautica Queen River Tour:

A chartered bus will pick people up at the Holiday Inn Cleveland Clinic at 6pm on Saturday, make a stop on campus outside Ford Auditorium, and proceed downtown. The bus will pick people up after the tour and return to campus and the hotel.

Think[box] Tour:

Please sign up for a tour of this remarkable facility/resource at CWRU (Friday 3:30-5:00). There will be a sheet at registration OR send email to eliza.reilly@stonybrook.edu Meet in Thwing Center Atrium and a guide will lead people to and from the think[box] for a tour by the Director.

NCSCE Staff are available to help you. Please visit the office or email:

Eliza Reilly: eliza.reilly@stonybrook.edu

Carrie-Ann Miller: carrie-ann.miller@stonybrook.edu

Ahmad Pratama: ahmad.pratama@stonybrook.edu

THURSDAY, AUGUST 1ST

All sessions will be held on the Case Western Reserve University Campus

1:00 p.m. – 4:00 p.m.

SSI 2019 Check-in

Ford Auditorium, Allen Memorial Library

All SSI participants and facilitators should check in with SSI staff on campus 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. Late check in will be set up in the Staff office in Guilford House.

1:00 p.m. – 4:00 p.m.

Pre-Institute Workshops

Case Studies in Academic Leadership

Clark 205

Karen Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Amy Shachter

Santa Clara University/Success 4 Higher Education

We know that good academic administrators are hard to find and a poor leader can cause undeterminable damage to the department and institution. This pre-institute workshop will use a variety of case studies and vignettes, as well as focused discussion, to explore several dimensions of academic decision-making and leadership.

Introduction to the Question Formulation Technique: A High-Impact Practice for Student Inquiry

Clark 302

Andrew Minigan

Right Question Institute

This interactive workshop will provide participants an introduction to the Question Formulation Technique (QFT), a simple, powerful, evidence-based strategy used by over 350,000 educators to teach students how to ask their own questions. The QFT helps to advance teaching and learning goals across all disciplines through cultivating collaborative, student-centered learning. Participants will learn how to facilitate the strategy and will have the opportunity to plan on how to best integrate the QFT into their instruction to support ongoing work.

Assignment Design for Powerful Civic Learning in STEM

Clark 308

Yao Z. Hill

University of Hawaii, Manoa

Tom Wood

George Mason University

In this highly interactive 3-hour workshop participants apply design strategies to improve their own assignments and provide peer feedback. The facilitator will present exemplary assignment design strategies that empower civic learning in STEM fields and have participants apply these strategies and critique sample assignments that target civic learning outcomes. Majority of the workshop will be devoted to peer share and peer feedback. For those who are interested, the facilitator will provide consultation on assessing the impact of the improved assignment on their students. Participants are expected to bring 5 copies of assignments to the workshop to share.

2:30 p.m. – 4:00 p.m.

Civic Engagement 101

Clark 101

Glenn Clayton Odenbrett
Case Western Reserve University

Are you asking yourself “What is civic engagement exactly?” This interactive session is designed for faculty who are planning, or in the initial stages of integrating, civic engagement with one or more of their undergraduate courses. Participants will explore various types and examples of civic engagement in higher education at the course and institutional level. They will then match at least one civic engagement activity with one or more course learning goals related to KAS (knowledge, abilities, and skills) and/or 21st Century Skills acquisition. Participants will also develop strategies to generate and sustain support for their course-based civic engagement activities in their departments, institutions, communities, and professional associations.

4:30 p.m. – 6:00 p.m.

SSI 2019 Opening Plenary Session

Ford Auditorium, Allen Memorial Library

Welcome to the 2019 SENCER Summer Institute at Case Western Reserve University

Ben Vinson, III
Provost and Executive Vice President
Case Western Reserve University

Eliza Reilly, Executive Director
National Center for Science and Civic Engagement

SSI 2019 Opening Keynote: “Partnership Power” For Learning and Civic Engagement

Marsha Semmel
Marsha Semmel Consulting

Marsha Semmel is an independent consultant working with cultural and educational organizations on leadership development, strategic planning, and partnerships. She recently published *Partnership Power: Essential Museum Strategies for Today’s Networked World*, Rowman & Littlefield (2019). She currently serves as Special Initiatives Advisor to the National Endowment for the Humanities, Senior Adviser to the National Center for Science and Civic Engagement, and Adjunct Faculty at the Bank Street College Graduate School of Education’s Leadership in

Museum Education Program. Semmel was the Director for Strategic Partnerships, Deputy for Museum Services, and Acting Director at the Institute of Museum and Library Services (IMLS) from 2003-13. From 1993-1996 she was Director, Division of Public Programs, at the National Endowment for the Humanities. She also served as President and CEO of Conner Prairie, a history museum near Indianapolis, and President and CEO of the Women of the West Museum in Denver. She currently serves on the boards of the Institute for Learning Innovation and the Council of American Jewish Museums. Semmel is also chair of the Arlington County Arts Commission.

Aims for SSI 2019

Eliza Reilly

6:00 p.m. – 8:00 p.m.

Awards Dinner Recognizing Achievements in the NCSCE Community

Thwing Ballroom

Presiding:

Monica Devanas

Rutgers University

All SSI 2019 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. The team award goes to the New Jersey K-12 SENCER team, Kathy Browne, Jessica Monaghan, and Missy Holzer, for their important work advancing civic engagement in k-12 education. The Individual award goes posthumously to longstanding SENCER leader, advocate, champion, David Ferguson.

FRIDAY, AUGUST 2ND

7:30 a.m. – 9:00 a.m. BREAKFAST

The Jolly Scholar, Thwing Center

9:00 a.m. – 10:30 a.m.

All-Institute Plenary Session II

Ford Auditorium, Allen Memorial Library

Presiding:

Karen Kashmanian Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Partnership Power: Creating Collaborative Community Connections

Felton Thomas, Jr.

Executive Director, Cleveland Public Libraries

Felton Thomas, Jr. has served as Executive Director of Cleveland Public Library (CPL) since January 2009. Since beginning his tenure at CPL, Director Thomas has furthered the mission of CPL to be “The People’s University”, including launching initiatives aimed at addressing community needs in the areas of access to technology, education, and economic development.

Felton’s awards and accomplishments include being named a “Mover and Shaker” by the *Library Journal*, and acting as a fellow in the Urban Library Council’s Executive Leadership Institute. Nationally, in 2015, Felton was elected as President-Elect of the Public Library Association (PLA), served as President beginning in 2016; and now serves as Past President. Felton is also a member of the Aspen Institute Task Force on Learning and the Internet. He currently serves as Board President of the Greater Cleveland Food Bank, and a trustee on the boards of Sisters of Charity Foundation, University Circle Inc., United Black Fund of Greater Cleveland and United Way of Greater Cleveland.

10:30 a.m - 12 p.m. Session Block I (Workshops)

Designing a SENCER Course

Clark 309

Monica Devanas

Rutgers University

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. This workshop, which is presented by two founding “SENCER Model Course” authors, is recommended for those new to SENCER. It provides an engaging, hands-on experience that provides a step-by-step process for developing a new or revised course. whether it is intended

for students majoring in STEM or another discipline. Assessment strategies for the course and opportunities for civic engagement will also be explored.

Integrating Civic Engagement into the K-12 Curriculum: Higher Education Faculty and Informal Science Educators Can Help!

Clark 104

Kathleen Browne
Rider University

Missy Holzer
School District of the Chathams

Jessica Monaghan
New Brunswick Public Schools

Colleagues with expertise in STEM and STEM-Education fields are encouraged to attend this session to learn how they can help K-12 teacher infuse civic engagement into their students' learning experiences. A brief introduction to the Next Generation Science Standards (NGSS) will first be provided including synergies between engineering design components and SENCER ideals. Then participants will be guided to link basic science concepts to observable natural phenomena and related civic issues. Participants from all disciplines are encouraged to join this exercise. Results will be shared with K-12 teacher networks.

Clear or Fuzzy Vision: the Census in 2020

Clark 205

Robert Franco
Kapi'olani Community College, University of Hawai'i

Given our national political climate, there are valid and heightened concerns about the administration, integrity, and accuracy of the 2020 Census. The Census results will have a major impact on targeted resource allocations, the reapportionment of the US Congress, and legislative district boundaries; all of which can lead to policy changes that disrupt the public support systems and programs that underserved communities, families and individuals' need. What can we learn from history? What actions can be helpful now as we prepare for Census 2020? What can we do as institutions of higher education to work along side our respective communities to increase awareness, to stay current on the latest Census related news; and take action to ensure a representative count. For more than a year, the presenter has been facilitating a national iterative dialogue on Census 2020 with SENCER and Campus Compact colleagues and will invite place-based discussion of how the "science of the census is science for civic engagement for all our campuses and the communities they serve."

Expanding Opportunities for Undergraduate Research Experiences in STEM Through Integration with Civic Engagement

Clark 308

Jay Labov
National Academies of Sciences, Engineering, and Medicine (Retired)

Undergraduate Research Experiences (UREs) are part of an expanding toolkit of experiential learning experiences that can help students engage with the practices and processes of STEM. Civic engagement is another type of experiential learning experience that can offer students meaningful interactions in the wider community, thus leading to greater relevance and application of their learning. Research suggests that both civic engagement and UREs are high-impact practices. However, much of the work to date on experiential learning has been discipline-based. This may be due to challenges in getting faculty members from disciplines to work together, or because of issues with infrastructure, budget policies, credit hours, incentives, and/or the reward systems in higher education.

This workshop will explore opportunities for synergies in learning opportunities by integrating UREs in STEM with research and activities in civic engagement and other disciplines. Participants will be expected to have read the [Executive Summary](#) (freely downloadable) from the National Academies' 2018 report, [The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education: Branches from the Same Tree](#). A recent paper by the organizer and coauthors in *Science Education and Civic Engagement: An International Journal*. Discussions of opportunities and next steps will build upon these two references. The paper is available at: Labov, J.B., Brenner, K.A., and Middlecamp, C.H. 2019. Integrating Undergraduate Research and Civic Engagement. *Science Education and Civic Engagement: An International Journal*. 11(1):64-78. <http://new.seceij.net/articletype/review/integrating-undergraduate-research-in-stem-with-civic-engagement/>

Building an Inclusive Classroom

Clark 302

Sherryl Broverman
Duke University

There is a critical need to recruit and retain and empower first generation students, under-represented minorities and women in university programs. Programs, faculty, and financial investment often start by focusing on access and rectifying perceived deficits in students, such as coming from poor high schools or lack of AP courses. 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.

12:00 – 1:30 LUNCH

Jolly Scholar, Thwing Center

1:30 p.m – 5:00 p.m. Session Block II

1:30-5:00 p.m.

Mini Symposium on Assessment: Designing Assessments of Student Outcomes (Part 1)

Clark 309

Matthew Fisher
Saint Vincent College

Linden Higgins
University of Vermont and Education for Critical Thinking

Catherine Duckett
Monmouth University

Davida Smyth
The New School

Yao Zhang Hill
University of Hawaii, Manoa

This mini-symposium will consist of six 50-minute presentations, followed by a panel discussion. The first four presentations will take place on Friday, the next two presentations and discussion on Saturday. Presenters will guide participants through the process of designing student assessments and surveys to capture the outcomes of SENCER courses for research and evaluation. We start with the foundational issue of identifying the question(s) that you would like to answer, then present three sources of data: survey data, individual assignments, and student research projects. The design and use of rubrics to foster and document learning in SENCER courses provides a means for collecting data from student work. The mini-symposium ends with a discussion around ethical and logistical issues such as designing inclusive studies, communicating with your institutional review board, and provides additional time for participants and presenters to discuss the challenges of designing studies using multiple data sources. The order of topics and presenters will be:

1. Matt Fisher – What question(s) am I asking? Looking at the questions that can be asked from either an assessment or SoTL perspective, identifying the question(s) to start with 2. Linden Higgins – Analyzing survey data for reliability and validity – there will be a handout on different instruments, including the SALG, for different questions from Matt’s SoTL for STEM book appendix. 3. Catherine Duckett – Using repeating assignments to encourage and monitor student growth. 4. Davida Smyth– Assessing the breadth and diversity of student learning through project-based learning and undergraduate research experiences. 5. Yao Zhang Hill -- Using rubrics to foster SENCER learning 6. Panel discussion – Closing loop: Challenges and opportunities in using multiple sources of data to assess student-learning outcomes.

1:30 – 2:55 p.m.

Integrating Civic Engagement into the K-12 Curriculum: A Hands on Workshop

Clark 104

Jessica Monaghan
New Brunswick Public Schools

Kathleen Browne
Rider University

Missy Holzer
School District of the Chathams

Presenters will guide participants in work to infuse civic engagement into their K-12 science curriculum by leveraging the engineering design process in the Next Generation Science Standards (NGSS). A brief introduction to the NGSS standards will be provided to clarify the dimensions of the NGSS and how they should be integrated. Identifying local observable phenomena and/or issues will help get participants started in the process of designing their own lesson. Participants will get guidance for selecting components of the standards

to compose 3-dimensional learning objectives focused on a natural phenomena and civic issue. Lastly, participants will begin the design of a lesson in time that remains using resources provided by facilitators.

1:30 - 2:25 p.m.

A Course on Quantitative Approaches to Fair Representation

Clark 205

Ann Yust

The New School

Recent US Supreme Court cases targeting partisan gerrymandering have driven public examination of the fairness of the US political system. Evaluating fairness in representation is a complex and often ill-defined problem, requiring both qualitative and quantitative approaches. A team of three mathematicians at The New School designed an undergraduate course on the use of quantitative methods to assess fairness in representation entitled, Fair Representation: Gerrymandering and the Political Process. Students needed no prerequisite political or mathematical knowledge. The major theme of the course is racial and partisan gerrymandering, while additional topics include voting systems and apportionment. In this session, the presenter will give an overview of the course structure, student learning objectives, and topics. Then they will highlight a few key assignments and guest speakers who provided first-hand accounts of portions of the political process. Assessment of the course and revisions for its second iteration will conclude the session.

Integrating Art, Science, and Technology

Clark 302

Ina Martin

Burcu Gurkan

Umut Gurkan

Case Western Reserve University

This session will showcase art, science, and technology integration activities at Case Western Reserve University, which are carried out in collaboration with Cleveland Institute of Art.

Presentations include:

Ina Martin: “Integrating Optical Imaging and Data Science for Technical Art History”

Burcu Gurkan: “Animations and visual illustrations for understanding the fundamental science behind energy storage devices”

Umut Gurkan: “Science, Technology and Art (STArt) to integrate STEM education with visual arts pedagogy”

Strengthening our Approach to Responsible Civic Engagement

Clark 308

Elizabeth “Betsy” Banks

Case Western Reserve University

While we have good intentions when designing the community engagement component of a program or course, these intentions don't always translate into community engagement that is helpful or responsible. In fact, we - or our students - may inadvertently approach community engagement in ways that perpetuate harm, including the reinforcement of paternalism and stereotypes. To provide a framework for planning and implementing responsible engagement programming, the Center for Civic Engagement & Learning at Case Western Reserve

University articulated a set of five best practices. This session will provide an overview of these best practices and share civic engagement scenarios that are problematic. We'll cover several simple activities you can adapt for use with your students to strengthen their understanding of responsible engagement, including an activity to get them thinking about how they might take action to contribute to social change beyond the conclusion of your course/program. Participants will also have the opportunity to share their own efforts to prepare students to engage responsibly in communities so we can all strengthen our approach and practice.

2:30 - 3:25 p.m.

Supporting First Generation Undergraduate College Students

Clark 205

Karen Kashmanian Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Theo Koupelis

Broward College

The fastest growing demographic profile of students entering our higher education institutions is that of first-generation college students seeking undergraduate degrees. Many of these students will come from low-income homes and are 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* obtain a four-year degree ten years out from 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.

Self-Driving Tricycles

Clark 308

Tyer Folsom

University of Washington

Building an autonomous vehicle is an exciting area for STEM projects, but the costs have been prohibitive. Automation equipment typically costs \$40,000 and up, plus the cost of buying a car. The Elcano Project uses an electric bicycle or tricycle as the base vehicle and offers open-source automation software and hardware for about \$2000, including all sensors and actuators. The result is a person-carrying autonomous vehicle costing \$3000 to \$10,000. The trike offers a platform for real-world experiences in a number of STEM fields. Automated trikes may offer the best hope for zero-carbon urban transportation. When equipped with a body to protect from the weather, the trike can operate as an autonomous taxi. At a given speed, such vehicles use 30 times less energy per person than a single-occupancy car or 5 times less energy than a packed commuter train. Because of its light weight, the trike can be powered by a 25-pound battery and achieve the same performance as an electric car using 300 to 1000 pounds of battery. A light battery enables refueling by robotic battery swap, eliminating range anxiety. The bank of depleted batteries allows harnessing renewable energy anytime the sun shines or the wind blows.

2:30 – 2: 55 p.m.

Turning STEM Education Inside-Out: Teaching and Learning Inside of Prison

Clark 302

Karl Haushalter

Harvey Mudd College

The Inside-Out Prison Exchange Program is a national network of teachers and learners who work to break down walls of division by facilitating dialogue across social difference. In this model, which was first developed by Lori Pompa at Temple University, campus-based college students (outside students) join together with incarcerated college students (inside students) for a full, credit-bearing, college course that is taught inside of a correctional facility. Compared to other disciplines, STEM courses are underrepresented in the Inside-Out program. This presentation will discuss the challenges and opportunities of teaching a STEM course inside of prison, including the lessons learned from a pilot offering of an Inside-Out course on Infectious Disease in Society taught at the California Rehabilitation Center (CRC) in Norco, CA with a blended group of Claremont College students and incarcerated students from CRC. The class was structured to engage both sets of students to work together to address complex problems at the interface of STEM and society. Practical considerations for implementing a course with an experiential justice education component will be discussed.

3:00 – 3: 55 p.m.

STEAM-infused Education Retooled as TEAMS: Inclusion Leading to 21st Century Workforce Development Options

Clark 104

Susan Bardenhagen

Virginia Association of Science Teachers; American Association of University Women

STEM+ the Arts/STEAM, an acronym whose anagram, TEAMS, better delineates how collaboration and purposeful planning of instruction can result in educational preparation for 21st century careers. The National Academies of Science, Engineering, and Medicine published their report, aka “Branches of the Same Tree” in 2018, which validates STEM and Arts/Humanities inclusion in higher education which would also support PK-12 curriculum and instruction. For example, by incorporating civics education objectives into a study of literature-mythology and folklore; into the history of science, math, architecture, and cultures; and jointly applying space exploration’s outreach and the necessary ethics to be addressed- educators can collaborate with their many stakeholders to establish a meaningful design for career and workforce development.

Problem/Project-Based Learning and the engineering design process combined with the scientific method reinforces the value of inquiry and research. All disciplines include these. STEAM/TEAMS-infused education models can prepare students for careers in which they showcase a positive work ethic, critical thinking, and problem solving with inclusivity that transcends diversity- goals employers have sought for decades. The presenter’s experience in coordinating thirty gender-equity STEAM career conferences for students with research-based workshops for adults and coordinating six regional STEAM professional events, provides the expertise to share.

3:00 – 3:55 p.m.

Using Art to Connect Graduate Clinicians to the Community & Kindergarteners to Anatomy

Clark 302

Aurora Weaver

Auburn University

The link between art and education has been recognized for hundreds of years. In the past few decades, research has confirmed the benefits of the use of art and anatomy within medical education. Some of those benefits include the use of art to improve observational skills in clinical practice, to gain a greater understanding of disease, patient's perspective, and greater ability to empathize (Bell & Evans, 2014). Two semesters of a graduate anatomy and physiology course will be discussed with a focus on how art assignments were used. The first year this was measurably unsuccessful. Modifications, the following year, to how art assignments were designed and applied based on SENCER ideals, improved outcomes greatly (e.g., active learning, metacognition, teaching-effect, civic engagement).

Participants working in small groups will: Determine why the first year was unsuccessful and why the second application had a lasting impact; Share own what has been successful and unsuccessful in their own courses; identify a change in each project that might turn an unsuccessful effort into a rewarding outcome for the students and the community; Determine a project where the teaching-effect could be used to promote community and student knowledge on a course topic

3:00 – 4:55 p.m.

Learn Through the Universe: An Introductory Experience

Clark 308

Mercedes Talley

Pasadena, California

For the last two years, Learn Through the Universe (LTTU) has been developing a website that presents a new approach to learning based on the human experience of oneself and others in space and time. It makes clear the physical structure of the universe while focusing on how humankind perceives and interacts with the beings and things that compose it. In this way LTTU integrates what and how we learn with the fundamental questions of "What is the universe?" "Who are we?" and "Why are we here?" The approach has learners construct true-to-scale two-dimensional and three-dimensional models of the universe at powers of ten, starting with the scale of oneself, and proceeding down into the subatomic realm and out to the edge of the universe. The models are used to study relevant topics in the traditional disciplines of the humanities, social sciences, natural sciences, as well as in applied disciplines such as health, business and engineering. This workshop will introduce *Learn Through the Universe* (LTTU) and quickly transition to a group collaboration focused on the billion-times-smaller Earth-Moon System presented in the poster session. Mercedes Talley, LTTU founder, will lead the group through the design aims of several activities associated with the model and then elicit ideas for how the model could be used in their or other SENCER courses. Ideally this would lead to ongoing collaborations among a few members of the group with the aim of developing and vetting a wide variety of lessons for exploring the world at scale. People who are interested but unable to attend please pick up a card at the poster session.

www.learnthroughtheuniverse.org

3:00 – 4:55 p.m

Individual Consultations on the Scholarship of Teaching and Learning (SoTL) and on Publishing in *Science Education and Civic Engagement: An International Journal* (by appointment—sign up at registration)

Clark 110

Matt Fisher

St. Vincent College

Co-Editor, Science Education and Civic Engagement: An International Journal

3:30 – 5:00

Tour of the Sears *think[box]* at Case Western Reserve University (sign up at registration or by sending email to eliza.reilly@stonybrook.edu)

Ian Charnas

Director of Innovation and Technology, think[box], Case Western Reserve University

Richard Graham

Coordinator, think[box]

The *think[box]* is a seven-story, 50,000-square-foot facility on the CWRU campus that contains a world-renowned makerspace for prototyping and fabricating, as well as a full spectrum of legal and business resources for entrepreneurs to build and grow their business ventures and not-for-profit organizations. Uniquely, this space is free and open to the public and serves as a nexus for collaborations from science and engineering, business and law, art and design, by innovators from around the world, and by members of the community of all ages and backgrounds. In addition to a tour, the staff will describe some of the many community collaborations catalyzed by *think[box]* participation. Participants will meet in Thwing Center at 3:30 for the walk over.

4:00 – 4:55 p.m.

Civic Engagement 101 (one hour version of Friday a.m. workshop)

Clark 302

Glenn Clayton Odenbrett

Case Western Reserve University

Are you asking yourself “What is civic engagement exactly?” This interactive session is designed for faculty who are planning, or in the initial stages of integrating, civic engagement with one or more of their undergraduate courses. Participants will explore various types and examples of civic engagement in higher education at the course and institutional level. They will then match at least one civic engagement activity with one or more course learning goals related to KAS (knowledge, abilities, and skills) and/or 21st Century Skills acquisition. Participants will also develop strategies to generate and sustain support for their course-based civic engagement activities in their departments, institutions, communities, and professional associations.

4:00 – 4:25 p.m

Integrating Civic Engagement into the K-12 Curriculum: Perspectives from “Rising Teachers”

Clark 104

Kasmir Grapski
Socrate Berroa
Kathleen Browne
Danielle Jacobs
Peter Hester
Rider University

Undergraduate students preparing to become high school science or math teachers often take education courses and complete a major in the discipline they plan to teach. Two “rising teachers” at Rider University will present their perspective on how activities offered to complement their academic requirements can better prepare them to succeed as teachers working with underserved student populations. Focusing on some of the SENCER ideals provided a unique set of learning experiences and outcomes that enable “Rider Noyce STEM Scholars” (funded by an NSF Noyce grant) to address inequities in K-12 school systems.

4:00 – 4:25 p.m.

Integrating Civic Engagement into the K-12 Curriculum: Perspectives from Veteran Teachers & Informal Science Educators

Clark 104

Kathleen Browne
Rider University

Missy Holzer
School District of the Chathams

Jessica Monaghan
New Brunswick Public Schools

Sandra Lavigne
Great Swamp Watershed Association

Jeff Hoagland
Stony Brook-Milstone Watershed Institute

Although the NGSS have been adopted by 20 US states plus Washington DC, and adapted by 21 states, making the transition to the NGSS prescribed methods of teaching and learning has been a challenge for teachers and students. This presentation will share the efforts of two NJ teachers who created an equitable learning experience around local community civic issues. Students used disciplinary core ideas, science and engineering practices, and crosscutting concepts, the three dimensions of the NGSS, to design/engineer solutions centered on social justice and sustainability.

5:00 – 7:00 p.m. Poster Presentations and Reception

Thwing Atrium

We are pleased to invite you to attend a special poster session that features the work of SSI 2019 participants. Poster authors will be on hand to share their work, exchange ideas, and answer questions during the designated Poster Presentations time. A guide to poster presentations and presenters' contact information will be available as a handout at the session. Digital copies of the posters will be uploaded to the SENCER website after the Institute (with permission of the author).

A cash-bar and appetizers will be served in the Jolly Scholar, adjacent to the Poster Presentations.

Posters can be left in the SENCER campus office (Guilford, first floor) and set up in the Thwing Atrium by 3:00pm on Friday.

POSTERS:

Autumn Marshall, Lipscomb University

Milking Science for Undergraduate Student Learning Gains: The Lactose Free Research Project

Frances Solomon, Western Washington University

EDuCation about Endocrine Disrupting Chemicals: Bridging the Gap between Scientists and the General Public

Julia Nord, George Mason University

STEM Challenge: Exploring GMU's Energy Footprint

Karen Oates, Worcester Polytechnic Institute

Creating a Grand Challenge Scholars Program

Katie Gatto, Monmouth University

Developing a Pedagogical Compiler Aligned to Computer Science Coursework

Madhavan Narayanan, Mercy College

Chemistry and Civic issues to Improve Student Engagement in General Chemistry

Mercedes Talley

Learn Through the Universe

Rowan Hannan, Oberlin College

Developing a Cleveland Metro Region Environmental Dashboard: A Partnership between Oberlin College and the Great Lakes Science Center to Promote Community-based STEM Education

Ulla Hasager, University of Hawaii, Manoa

Transcending Barriers to Success: Integrating Indigenous Knowledge and Modern Science

Katie Gatto and Catherine Duckett, Monmouth University

Thematic Learning in Information Technology: An Initial Assessment of Student Artifacts

Marisha Speight Atkins, Auburn University

Developing a Model for SENCERized Labs at Auburn University

SATURDAY, AUGUST 3RD

7:30 a.m. – 9:00 a.m. BREAKFAST

Jolly Scholar, Thwing Center

9:00 a.m. – 10:30 a.m.

All-Institute Plenary Session III

Ford Auditorium, Allen Memorial Library

Presiding:

Eliza Reilly

National Center for Science and Civic Engagement

How Asking the Right Questions Can Improve Learning and Build Civic Participation

Andrew P. Minigan

Right Question Institute

Andrew P. Minigan is the Right Question Institute's (RQI) director of strategy for the Education Program. He is a co-principal investigator (Co-PI) on a National Science Foundation funded research grant to help researchers, including doctoral students and faculty in higher education, learn how to formulate better, more transformative research questions. He has facilitated learning experiences for faculty and doctoral students at Brandeis University, Northeastern University, the University of Connecticut, the University of Massachusetts Lowell, Mt. San Antonio College, Citrus College, and the University of Prince Edward Island. Hundreds of faculty and students from around the country have participated in his active learning experiences, including a recent webinar for the American Society for Engineering Education. Andrew has written on the importance of question formulation and its connection to curiosity for *Education Week*, *Social Education*, *Educational Leadership*, and PBS.

10:30 a.m. – 12:00 p.m. Session Block III

10:30 - 10:55 a.m.

LIGHT – Learning Inner Global Higher Thinking

Clark 104

Tamara Klingbyll

Lipscomb University

The newest Quality Enhancement Plan (QEP) of Lipscomb University enhances the Serving And Learning Together (SALT) program, but also stands and shines alone – LIGHT: Illuminating Cultural Engagement. While LIGHT has other meanings, Learning Inner Global Higher Thinking is the motto for two general education courses, Foundations of Biology and Power of Science (a course which integrates biology and chemistry). In the past, education encouraged the amount of content a student could learn during their time of academic pursuit. In the information age, the amount of available content seems limitless; however, data indicate the ability to reflect and evaluate content requires assistance. The learners in the process are two-fold; professors must learn to glean information regarding global relevance and students must learn how to self-process the information. Deeper thinking occurs on two-fronts, professors and students. Professors cannot use time to regurgitate

unusable facts, instead more planning, pedagogy, is required to develop a fifteen-week course. Students must relearn how to focus and tie seemingly different concepts together. This session will discuss how this two-pronged approach encourages these changes to occur, and will provide SALG data from two years of development, examining which practices work best and how practices reflect differences in classes.

10:30 – 11:55 a.m.

Assessment Mini-Symposium (Continued from Friday)

Clark 309

10:30 – 11:25 a.m.

Engaging Students Through Mapping, Visualizing, and VR on Health Disparities

Clark 205

Amy Sheon

Scott Frank

Case Western Reserve University School of Medicine

Cleveland & Cuyahoga Health Data Matters (HDM) (healthdatamatters.org) was established in 2015 to make local data on health available to students, researchers, policymakers and community members regarding social determinants of health and health disparities. Data visualization including charting, dash-boarding, interactive mapping, and storytelling features were added in 2016 (hdm.livestories.com). These technologies have been integrated into teaching and student assignments related to community health assessment, dissemination of interventions, and capstone projects. The utilization of data and data visualization tools by community organizations and other academic institutions is evidence of the successful dissemination of the technologies. Recently, using HDM technology and data resources, a virtual reality simulation was created to provide an immersive, visceral experience of these data, enabling viewers to walk in the shoes of individuals in a highly segregated neighborhood with entrenched generational poverty. Strengths, limitations and lessons learned in the deployment of these cutting edge technologies with University and Community College students, clinicians, policy makers, community advocates and with entrepreneurs will be reviewed. Attendees will have the opportunity for hands on exploration of the tools.

Cross-Sector Collaborations Between Formal and Informal Education: Next Steps for SENCER-ISE

Clark 308

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.

10:30 - 11:55 a.m.

Same Fish, Different Ponds - Adapting to Changes in Higher Education

Clark 302

Robert Seiser
Roosevelt University

Faculty appointments are defined through traditional, arguably outdated measures of an individual's "fit" within an institution: Tenure-track, NTT and contingent. Time and effort spent on teaching, research and service. Big fish in small ponds vs. small fish in big ponds. But academic institutions are changing in scope and faster than ever. What do faculty members do when enrollment grows (or shrinks) dramatically? Or when trustees approve a sweeping new strategic plan? Or when a program goes fully online? Or when the faculty title stays the same and the job description changes?

In this session, participants will discuss their experiences in the light of academic employment trends, institutional mergers and evolving faculty responsibilities. We will examine ways to recognize and describe faculty contributions that go beyond traditional metrics, and will form a better understanding of how faculty can redefine their roles in the changing higher education landscape.

11:00 - 11:55 a.m.

Integrating Indigenous Knowledge and Modern Science

Clark 104

Ulla Hasager
University of Hawaii, Manoa

Tom Wood
George Mason University

Robert Franco
Kapi'olani Community College, University of Hawai'i

This session will describe national efforts to advance robust partnerships between indigenous peoples and local formal and informal educators to improve educational outcomes for all students, promote cultural understanding, and foster long-term collaborations on issues of common concern. Local environmental and health issues provide a context for inquiry-based learning that transcends perceived conflicts between indigenous, local, and "Western" knowledge systems.

11:30 - 11:55 a.m.

Collaboration and Engagement between Higher Ed, STEM Industries, and Community Schools to Improve STEM interest in Middle School Students

Clark 205

Quyen L. Aoh
Gannon University

Engaging students to increase their interest in Science, Technology, Engineering, and Math (STEM) is crucial to maintaining the STEM pipeline. In particular, studies have shown that students begin to lose interest in STEM in middle school and that students in low-income, socioeconomically disadvantaged schools are disproportionately

affected. As part of the Erie Public Schools and United Way of Erie County Community School Initiative, Gannon University piloted an afterschool STEM program *Feeding Minds and Families* at Strong Vincent Middle School. In this six-week program, students were mentored by Gannon University STEM faculty and local STEM professionals in topics ranging from DNA technology to computational thinking. The program used family meals as an opportunity for engagement across all stakeholders. This presentation describes the collaboration, program development, and outcomes for improving STEM interest through activities that engage students and their families.

Adapting Free Choice Learning Assessment Strategies for Undergraduate Education

Clark 308

Judith Koke

Institute for Learning Innovation

The SENCER-ISE projects emerged from the insight that SENCER's emphasis on student interest and topical relevance, as well as its emphasis on affective and dispositional outcomes, shared much common ground with the principles of Informal Science and free-choice learning. This session will explore how the assessment strategies that have been developed in ISE could be adapted for undergraduate curricula.

12:00 – 1:30 LUNCH

Jolly Scholar, Thwing Center

1:30 p.m. – 5:00 p.m. Session Block IV

1:30 – 2:25

Fostering Undergraduate and Graduate Interdisciplinary Research in Communications Sciences and Disorders and Software Engineering to Develop Online Phonetics Training Modules

Clark 104

Marisha Speights Atkins

Cheryl Seals

Abigail Bennett

Yang Cao

Auburn 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.

Problem Solving through Interdisciplinary, Student-Led Design Teams

Clark 205

Kurt Rhoads

Andrew Rollins

Lynn Rollins

Case Western Reserve University

The CWRU Center for Engineering Action (CEngA) directs, supports, and mentors interdisciplinary student design teams solving problems, specifically in low-resource communities. CEngA has two main objectives. The first is to teach students the skills they need to solve future problems by working on real-world problems. The second is to increase the capacity of communities to help them achieve their own goals. One of our core values is developing a true two-way partnership between our teams and the partnering communities. The partnership not only increases the chance for project success, but also better enables future success for both the students and the community partner.

During our collective experience participating in projects in Uganda, The Dominican Republic, Costa Rica, Cleveland, and elsewhere, we have learned lessons for improving student learning and project success. Technical skills are a necessary part of the solution, but communication, leadership, and cooperation are also necessary. Student-led teams (properly mentored) have unique challenges and characteristics yet offer the opportunity for student autonomy, confidence, motivation, and personal growth. Some of the remaining challenges for developing CEngA activities include sustainability, fundraising, maintaining student-led leadership, finding professional and faculty mentorship, and continuation of projects.

Keeping the 3 R's in STEM

Clark 302

Carroll G. Wells

Lipscomb University

The three R's (reading, writing, and arithmetic) are foundations for much of education, especially STEM. However, many schools are currently reporting that graduating seniors are reading at the third grade level. Also, educational research is indicating that student retain materials better if they take notes or do homework with pencil and paper rather than on their computer or iPad. Many are also complaining that students can't add or do simple arithmetic without a calculator or computer. Are these the outcomes that are desired? In this presentation, some methods used to address these issues will be discussed. The methods are being used by the presenter in teaching geometry and have been part of the materials used for the past fourteen years in professional development institutes for mathematics teachers K-12th.

The Power of the Campus Museum for Connecting Students, Faculty and the Community at Large

Clark 308

Heather Lerner

Earlham College

Campus museums are a ready-made place where powerful connections can be made between the college and the community. College museums have access to a broad community audience as well as expertise in informal

education that can be leveraged to make meaningful experiences for students and faculty. Furthermore, embedding outreach activities into the college curriculum and a departmental culture can help retain underrepresented minority groups in STEM (Puritty *et al.* 2017). We present examples from four types of museum-faculty collaboration: (1) a two-week museum outreach module embedded into existing STEM college curriculum, (2) a volunteer/extra credit opportunity for STEM college students and faculty, (3) a semester-long informal STEM outreach course and (4) student docents at a campus natural history museum. Valuable student benefits from these experiences include an increase in public-speaking confidence, commitment to STEM education, commitment to a STEM field, sense of community and commitment to the community.

Assessment Symposium Panel Discussion

Clark 309

Open discussion of insights, conclusions, and ideas emerging from the Assessment Symposium

2:30 – 3:30 p.m.

OPEN FORUMS

These facilitated topical forums are intended to provide an opportunity unscripted discussions on topics of strong interest and relevance to the SENCER/NCSCE community. Participants are invited to propose ideas for future work, national or regional programs, or research that might advance science education and civic engagement.

Civic Engagement and K-12 Education

(Facilitators: Browne, Monaghan, Holzer)

Clark 104

Academic Leadership

(Facilitators: Oates, Shachter, Seiser)

Clark 206

Higher Education's Role in Civic Renewal

(Facilitators: Martin, KY Team)

Clark 302

STEM/Art/Humanities Integration

(Facilitators: Semmel, Reilly, Labov)

Clark 308

Diversity and Inclusion

(Facilitators: Broverman, Hasager)

Clark 309

3:30 – 5:30 p.m.

TEAM TIME

This time slot is open for teams to work together, for individuals to network, or to meet with SENCER Sr. fellows for consultations. To request consultations or off schedule meetings go to Staff Office in Guilford House.

SUNDAY, AUGUST 4TH

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

7:30 a.m. – 9:00 a.m. BREAKFAST

Jolly Scholar, Thwing Center

9:00 - 11:30 a.m. Session Block V

9:00 - 10:25 a.m.

Designing Open-Inquiry Laboratories: It Needn't Be Chaotic!

Clark 104

Linden Higgins

Education for Critical Thinking LLC.

There is growing evidence that students need to be engaged in open inquiry at all levels of science course work. Exposure to experiences with uncertain outcomes accomplishes many things, among them increasing engagement with authentic scientific processes, countering the common misconception that experiments are designed to prove hypotheses, and helping students experience, interpret, and move beyond perceived failures. However, many faculty and departments avoid student driven open-ended laboratory activities in introductory courses for fear of chaos or added expenses. After a brief overview of the research into the impacts of inquiry on student persistence and retention, we will have a planned conversation about barriers to open-inquiry laboratories in foundation science courses at their home institution. I will then introduce an approach to laboratory design that allows open inquiry without greatly increasing expense or chaos. The remainder of the session will be spent developing model laboratory exercises for participants' classes.

Build Consensus and Facilitate Effective Decision-Making with the Right Question Strategy - Andrew P.

Clark 302

Andrew Minigan

The Right Question Institute

Regardless of whether one holds a formal leadership position, getting buy-in from different stakeholders can be challenging. How can asking questions and focusing sharply on key decisions lead to greater buy-in, more inclusivity, and better collaboration? The Right Question Strategy offers a powerful, yet simple process for jumpstarting an institutional or departmental change process that generates buy-in from the different stakeholders involved. The strategy focuses on the use of two key skills: the ability to formulate questions and the ability to participate effectively in decisions.

Session participants will leave with a deep understanding of the strategy and will know how to facilitate the strategy with colleagues, staff, faculty, and others to better effect change within your teams, department, college, or university.

9:00 – 10:25 a.m.

ePortfolios for Civic Scientific Literacy

Clark 308

Theresa Conefrey
Santa Clara University

Davida Smyth
The New School

Once the purview of composition courses, ePortfolios are a high-impact practice that have gradually transformed the entire curriculum. At the same time, critical thinking and reflection have become integral, not only to the humanities, but also to STEM courses. Our workshop will develop these connections further as we report on our efforts to promote folio thinking in both biology and advanced writing for science majors. We show how ePortfolios can be used to integrate curricular knowledge into solutions for authentic, real world science problems to increase student motivation and to develop the critical thinking skills necessary to evaluate science reporting in both scholarly and popular media sources. In addition, we show how ePortfolios encourage students to reflect on what is being learned in the course and how that learning connects to their other courses and to their lives outside the classroom. With rapid advances in science competing for public attention in the era of Fake News, we need a commensurate increase in information literacy for all graduates and, in particular, those in STEM fields. In this workshop, we offer suggestions for strengthening the acquisition of STEM concepts, as well as the promotion of critical thinking, self-efficacy and reflection to better integrate knowledge learned across the curriculum and to connect it to students' lives. We demonstrate how ePortfolios can be used to transform STEM courses to engage all students, especially those who are currently underrepresented in our fields, and to promote civic scientific literacy across the curriculum. (245 words)

Educating for Head, Hand, and Heart

Clark 309

Matt Fisher
Saint Vincent College

As professions, science and engineering both share a commitment to serve the general welfare of society. As William Sullivan wrote 15 years ago, "The idea of the professional as neutral problem solver, above the fray, which was launched with great expectations a century ago, is now obsolete. A new ideal of a more engaged, civic professionalism must take its place." Drawing on Sullivan's three apprenticeships of professional education – cognitive, skills, and ethical/moral – as well as the idea of "reflective practitioners," this session will explore how curricula for STEM majors can incorporate opportunities for students to grow in all three of Sullivan's dimensions. Participants will examine the relationship between Sullivan's apprenticeships and SENCER's ideals and approaches as well as important issues in various STEM disciplines to identify and develop specific

9:00 – 9:55 a.m.

Unusual Allies: Connecting Undergraduate Mathematics Reforms to Civic Engagement and Learning Opportunities

Clark 205

Nancy Shapiro

Dewayne Morgan

University System of Maryland

Colleges and universities have a mission to give students the skills they need for personal success as well as the values, ideals, and civic virtues on which American democracy depends. What might colleges and universities do to reinvigorate their commitments to their public mission? **The University System of Maryland answered this question by creating a P-20 partnership framework that embraced the idea that strong mathematics understanding is not just a tool for science and technical fields, but critical full civic engagement.** In October of 2015, USM's MMRI was awarded a \$3 million grant from the U.S. Department of Education's FIPSE program to revise its developmental mathematics course sequence and design a mathematics pathway that is more aligned with and responsive to the needs of non-STEM undergraduate majors. Presenters will share useful tools for cross-sectional engagement that meets students' immediate and long-term civic engagement needs. Finally, participants will leave the session with least three steps they can take and use immediately to assist their institutions in providing opportunities for students to process, understand, and apply various forms of data and information to solve critical world, national and local problems.

10:00 – 10:25 a.m.

Thematic Learning in Information Technology: An Initial Assessment of Student Artifacts

Clark 205

Katie Gatto

Catherine Duckett

Monmouth University

Thematic learning allows students to engage with new materials in ways that, ideally, will allow them to apply newly learned skills to real world problems. Students were given the opportunity to engage in a general education Information Technology course that emphasized thematic problem solving as related to climate change. This research evaluates the impact of the teaching of basic Technology/ Digital Literacy skills in a thematic classroom via the analysis of student artifacts (research papers) that should show students ability to apply technological/ digital literacy skills. Student in the thematic classes artifacts were compared to students who did not engage in thematic Information Technology learning, but did take a general education Information Technology with the same classroom professor.

10:30 – 11:30 a.m.

The Weekly Student Seminar as an Open-Ended SENCER course

Clark 104

Robert Seiser

Roosevelt University

Roosevelt University's Biochemistry 393 is a one-credit, student-led seminar course required for undergraduate biochemistry majors and also popular with biotechnology and biomedical science graduate students. Over the

last two years, the course has been adapted to include SENCER-inspired student practice in civic engagement and scientific communication.

The current course schedule incorporates external speakers, a film screening and discussion, followed by a written assignment on the theme of research ethics and broader impacts. Students make two presentations on a biochemistry topic, one framing the topic with respect to a societal issue and the other describing specific research results in context. They also write a brief review article with annotated bibliography. By allowing students to choose their own topics within a broad biochemistry framework, multiple areas of interest and “science and society” intersections can be explored on a weekly basis. In this session, we will look at examples of student work in the course and discuss the use of the seminar format as a low-risk, high-reward way to explore civic engagement in research practice.

A Risky Experiment to Improve Student Success Rates and “Throughput” in a Pathways Environment

Clark 205

Theo Koupelis

Broward College

In recent years the metaphor of “pathways” has replaced the more impersonal “pipeline” as a description of the students’ passage through post-secondary education on their way to jobs and careers. The American Association of Community Colleges has formalized the concept in its Gates Foundation funded “Pathways Project,” which now includes hundreds of institutions across the country. Similarly, efforts to accelerate students’ remediation work and enroll them in college-level courses are underway at many community colleges, supported by Complete College America. This session will describe a risky change to the math curriculum at Broward College that is based on the co-requisite model. This change is being shaped by the concurrent implementation of Pathways. The hope is to support students who need remediation but also those who could handle college-level math with additional support. There are clear benefits but also risks to this planned approach, and the college plans to explore ways that the SENCER approach could ameliorate some of the concerns about this effort. In addition to describing implementation efforts related to both the Pathways and co-requisite approaches at Broward College, which are not complete yet, the presenter invites constructive input and learning from the related experiences of participants in this session.

Overcoming Math Anxiety

Clark 302

Gary Hall

Lipscomb University

One problem that separates students in the math classroom is their fear of math and thinking that they cannot “do math”. Participants will look at twelve ideas to help teachers make the class room a safe place for students to learn mathematics. As there will be an emphasis on overcoming “math anxiety”, at the same time there will be an equal emphasis on the students actually learning.

Colleges as Ecosystems: Lessons to be Learned from Microbial Networks

Clark 308

Davida S. Smyth

The New School

While teaching microbiology at primarily undergraduate institutions, it has often crossed my mind how similar our college ecosystems are to microbial ecosystems. It is possible to identify the layers and the structures that stratify the institution and to elucidate the various interactions that are manifest among the persons residing in these educational habitats. From negative interactions like competition between faculty for resources, grants and space to more positive ones like cooperation and collaboration to generate research findings and to explore new ways of teaching, interactions between faculty and students, administrators and their environments can either propel the institution towards their goals or hinder progress at several levels and scales. Sometimes faculty must seek a new ecosystem in which to flourish and one such ecosystem is SENCER or Science Education for New Civic Engagements and Responsibilities. SENCER is the signature initiative of the National Center for Science & Civic Engagement, the project is focused on empowering faculty and improving STEM teaching and learning by making connections to civic issues. The international SENCER community is composed of professionals, informal and formal educators, and administrators in K-12 and higher education institutions. Notably, SENCER has been recognized as a community of transformation. My presentation will describe examples of ongoing actions that have been catalyzed by SENCER, helping individuals, populations and communities to improve the educational outcomes for students, professional development for faculty and support for administrative initiatives. I will demonstrate how SENCER is helping faculty to overcome negativity and to promote positive interactions in their college ecosystems and the larger academic community.

Working for social good: Beyond Human-Centered Design

Clark 309

Sherryl Broverman

Duke University

Academia has long used outside communities for research and education. However, not all of these interactions have been beneficial, rarely have communities had equal power in the relationships, and sometimes communities have been inadvertently exploited for student learning without leading to long term, equitable, or sustainable solutions. The 'human centered design' model would appear to make progress in putting community members at the center, but they generally attribute more power, control, and insight to the visiting students than the community partners. This talk will examine the possible pitfalls of design and other partnerships, with the goal of forming more just and respectful relationships, and yielding better outcomes.

11:30 – 12:30 LUNCH

Jolly Scholar, Thwing Center

12:30 p.m. – 2:00 p.m.

SSI 2019 Closing Plenary and Adjournment

SENCER: Past, Present, and Future

Clark 309

Eliza J. Reilly

National Center for Science and Civic Engagement

Jay Labov

National Academies of Sciences, Engineering, and Medicine (Retired), SENCER Sr. Fellow

This session will close out the 2019 SENCER Summer Institute with a look back at the intellectual and organizational origins of SENCER, and some reflections on its nineteen years of growth, development and innovation. It will offer a report on NCSCE activity since last year, new partnerships, next steps, and announcements about upcoming meetings and initiatives. Participants will be invited to offer closing remarks and observations about the way ahead for science education and civic engagement.

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NOTES

NOTES



Greetings and welcome! This is our 19th SENCER Summer Institute and it is a great pleasure to be hosted for the first time by Case Western Reserve University. We would like to offer our heartfelt gratitude to our CWRU team, Glenn Odenbrett, Lynn Rollins, and Kurt Rhoades for hosting us on their truly impressive campus and in the wonderful city of Cleveland, OH. Thanks also to Donald Feke, Office of the Provost, Karen Cohen, Events and Facilities, Betsy Banks, Center for Civic Engagement and Learning, and Katherine Leon for their help and support for this institute.

We have worked with new and longstanding 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.

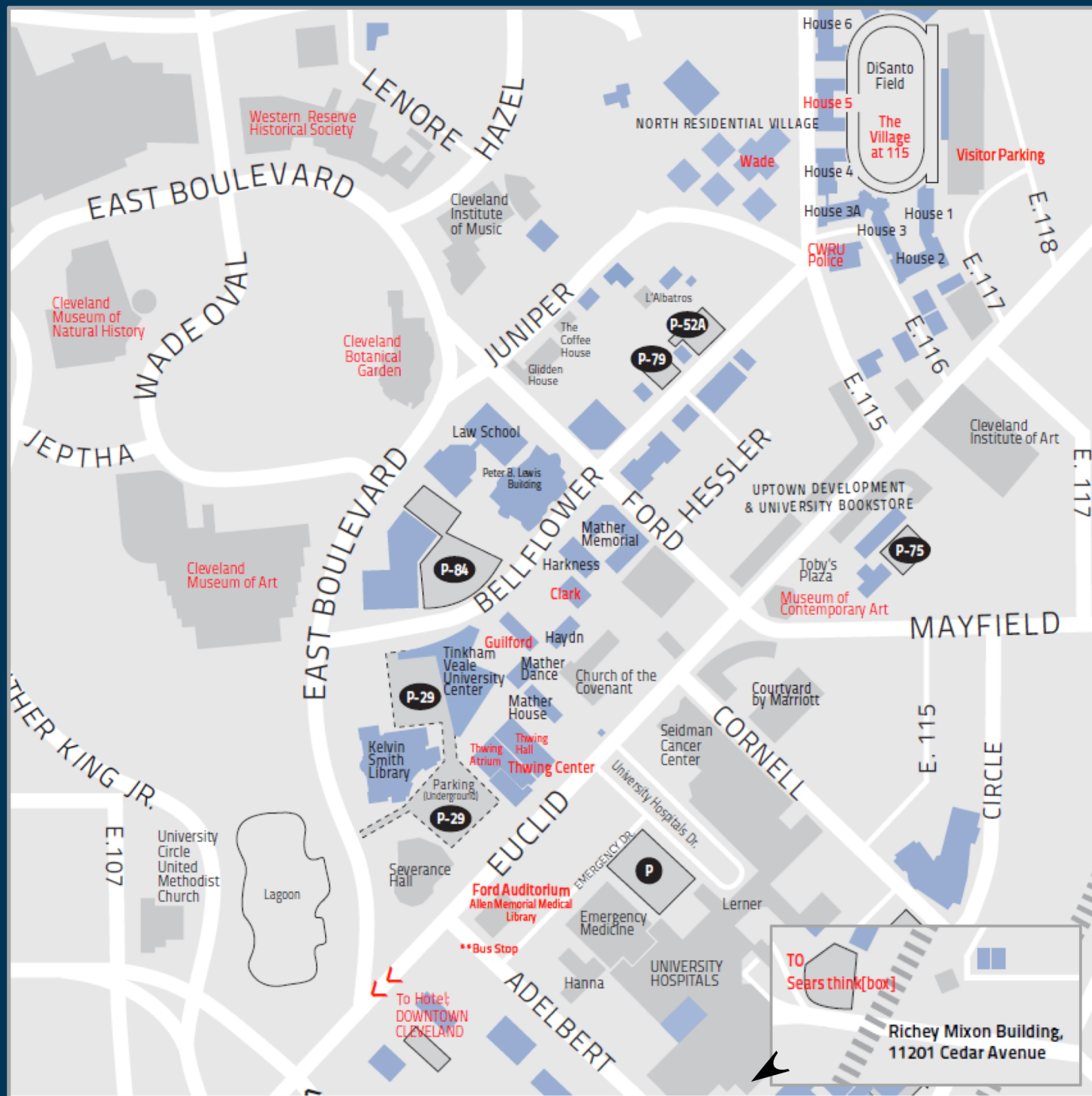
The SENCER Summer Institute has always attracted organizational partners that share and support the SENCER “ideals” and we would like to acknowledge their contributions to this year’s program and encourage you to explore how their efforts can support your own:

- Learn Through the Universe
- Marsha Semmel Consulting
- Museums + More, LLC
- 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. Its success as a national initiative is a result of the efforts, creativity, and innovation of its participants. The National Staff and SENCER leadership relies on the continuous feedback practitioners to shape and guide our programs and planning. Do not hesitate to let us know your thoughts on our work, and especially, about needs that our organization can meet.

While we tackle the pressing issues and mounting challenges we face as educators and civic agents with great seriousness, SSI is also a rare opportunity to think and learn, feel supported and energized, 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 a small part in your efforts to promote learning that really makes a difference to our common future.

The NCSCE Staff



SSI 2019 SCHEDULE OVERVIEW

Time					Friday, August 2	Saturday, August 3	Sunday, August 4
7:00 AM					Breakfast Jolly Scholar	Breakfast Jolly Scholar	Breakfast Jolly Scholar
7:30 AM							
8:00 AM							
8:30 AM							
9:00 AM							
9:30 AM					Plenary Ford Auditorium	Plenary Ford Auditorium	Session Block V
10:00 AM							
10:30 AM					Session Block I	Session Block III	
11:00 AM							
11:30 AM							
12:00 PM	SSI 2019 SCHEDULE-AT-A-GLANCE					Lunch	Lunch
12:30 PM	Thursday, August 1				Lunch		
1:00 PM	Case Studies in Academic Leadership (Clark 205)	Question Formulation Technique for Undergraduate Classrooms (Clark 302)	Assignment Design for Civic Learning (Clark 308)		Session Block II	Session Block IV	Final Plenary and Next Steps
1:30 PM							
2:00 PM						Topical Forums	
2:30 PM							
3:00 PM							
3:30 PM			Civic Eng.101 (Clark 101)				
4:00 PM						Team Time/Consultations	
4:30 PM	Opening Plenary						
5:00 PM							
5:30 PM					Poster Session Reception		
6:00 PM	Awards Dinner						
6:30 PM						Nautica Queen (For those who reserved)	
7:00 PM							
7:30 PM							

Schedule-at-a-Glance							
Time	Clark 104 (20)	Clark 205 (30)	Clark 302 (40)	Clark 308 (30)	Clark 309 (70)	Clark 110 (15)	
Session Block I - Friday, August 2nd							
10:30 AM	Browne, Monaghan, Holzer: Integrating Civic Engagement into the K-12 Curriculum: How Higher Ed. Faculty and Informal Science Educators Can Help	Franco: Clear or Fuzzy Vision: The Census In 2020	Broverman: Building an Inclusive Classroom	Labov: Undergraduate Research Experiences and Civic Engagement	Devanas, Koupelis: Designing a SENCER Course in 90 Minutes		
11:00 AM							
11:30 AM							
Session Block II - Friday, August 2nd							
1:30 PM	Monaghan,Browne, Holzer: Integrating Civic Engagement into the K-12 Curriculum: A Hands-On Workshop	Yust: Quantitative Approaches to Fair Representation	Gurkan, Martin: Art, Science, Technology Integration	Banks: Best Practices for Stengthening Civic Engagement	Assessment Mini Symposium(Fisher, Higgins, Duckett, Smyth, Hill)	Fisher:Scholarship of Teaching and Learning: Publishing in SECEJ (By appointment)	
2:00 PM		Sheon, Frank: Engaging Students Through Mapping, Visualizing and VR on Health Disparities	Haushalter: Teaching and Learning Inside of Prison	Folsom: Self Driving Tricycles			
2:30 PM			Weaver: Using Art to Connect Grad Clinicians to Community				
3:00 PM	Bardhagen: Inclusion/STEAM/Workforce	Think Box Field Trip (Sign Up)		Odenbrett: Civic Engagement 101 - Definitions, Goals, Strategies			Talley: Learn Through the Universe
3:30 PM							
4:00 PM	Grapski, Berroa, Browne: Civic Eng. Rising Teachers						
4:30 PM	Browne, Holzer, Monaghan: Civic Eng. Veteran Teachers						
Session Block III - Saturday, August 3rd							
10:30 AM	Klingbyll: LIGHT-Learning Inner Global Higher Thinking	Oates, Koupelis: Supporting First Generation Students	Seiser: Same Fish, Different Ponds: Adapting to Change in Higher Education	Ucko, Semmel: SENCER ISE- Cross-Sector Collaborations	Assessment Mini Symposium (Continued)		
11:00 AM	Wood, Hasager, Franco: Environment and Indigenous Knowledge: Transcending Barriers to Success						Aoh: Higher Ed, Industry, and Middle School Collab. to Foster STEM Engagement
11:30 AM							
Session Block IV - Saturday, August 3rd							
1:30 PM	Atkins, Seals, Bennett, Cao: Interdisc. Research in Communication Sciences and Software Engineering	Rhoades, Rollins, Rollins: Problem Solving Through Interdisciplinary, Student-Led Design Teams	Wells: Keeping the 3R in STEM	Lerner: Power of the Campus Museum	Assessment Panel Discussion		
2:00 PM							
2:30 PM	Forum: Civic Engagement and K-12 (Browne, Monaghan, Holzer)	Forum: Academic Leadership (Oates, Shachter, Seiser)	Forum: Education's Role In Civic Renewal (Martin and KY Team)	Forum: STEM/Arts/Humanities (Semmel, Reilly)	Forum: Diversity and Inclusion (Broverman, Hasager)		
3:00 PM							
3:30 PM							
4:00 PM	Team Time						
4:30PM							
5:00 PM							
Session Block V - Sunday, August 4th							
9:00 AM	Higgins: Open Inquiry Laboratories	Morgan, Schapiro: Unusual Allies: Connecting Math Reforms to Civic Engagement	Minigan: Build Consensus and Facilitate Effective Decision Making with the Right Question Strategy	Smyth/Conefrey: E-Portfolios For Science Literacy	Fisher: Educating for Head, Hand, and Heart		
9:30 AM							
10:00 AM							
10:30 AM	Seiser: Weekly Student Seminar as SENCER Course	Koupelis: Co-Requisites-A Risky Experiment	Hall: Overcoming Math Anxiety	Smyth:Colleges as Ecosystems: Lessons to be Learned from Microbial Networks	Broverman: Working for Social Good: Beyond Human Centered Design		
11:00 AM							

GENERAL INFORMATION

Carbon Footprint!

The CWRU team has worked with the student sustainability organization to reduce the carbon footprint of the meeting. Water bottles have been provided to all attendees courtesy of S4HE. Breakfast and Lunch will be served on compostable ware, and leftover food will be composted. Because the hotel is only a mile from the meeting site, we did not hire buses for transport. There is an RTA bus stop less than a block from the hotel, and it is 5 stops to Adelbert Road and Allen Memorial Library. Detailed directions for taking the bus, walking, and buying RTA passes have been sent by email before the conference.

Session Locations

All SSI sessions and activities are in four buildings in close proximity: **Thwing Center, Ford Auditorium (Allen Memorial Library), Clark Hall, Guilford House**. The **Staff Office will be set up in Guilford House** on the first floor. There is also a Parlor and a Seminar Room in Guilford for off-schedule meetings that can be scheduled by request. Classrooms are “smart” and have AV equipment.

Internet Access:

"Case Guest" WiFi is accessible all over campus.

Printing:

If you need a few last minute copies there is a printing kiosk in Thwing Atrium and a CWRU faculty or staff member can print for you (and be reimbursed). There is also a Fed Ex office in Thwing Center that is open Thursday, Friday, and Saturday if you need printing or shipping services.

Coffee Breaks:

Coffee stand will be set up in Scholar in Thwing Center on Friday and Saturday for between session breaks.

Nautica Queen River Tour:

A chartered bus will pick people up at the Holiday Inn Cleveland Clinic at 6pm on Saturday, make a stop on campus outside Ford Auditorium, and proceed downtown. The bus will pick people up after the tour and return to campus and the hotel.

Think[box] Tour:

Please sign up for a tour of this remarkable facility/resource at CWRU (Friday 3:30-5:00). There will be a sheet at registration OR send email to eliza.reilly@stonybrook.edu Meet in Thwing Center Atrium and a guide will lead people to and from the think[box] for a tour by the Director.

NCSCE Staff are available to help you. Please visit the office or email:

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Carrie-Ann Miller: carrie-ann.miller@stonybrook.edu

Ahmad Pratama: ahmad.pratama@stonybrook.edu

THURSDAY, AUGUST 1ST

All sessions will be held on the Case Western Reserve University Campus

1:00 p.m. – 4:00 p.m.

SSI 2019 Check-in

Ford Auditorium, Allen Memorial Library

All SSI participants and facilitators should check in with SSI staff on campus 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. Late check in will be set up in the Staff office in Guilford House.

1:00 p.m. – 4:00 p.m.

Pre-Institute Workshops

Case Studies in Academic Leadership

Clark 205

Karen Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Amy Shachter

Santa Clara University/Success 4 Higher Education

We know that good academic administrators are hard to find and a poor leader can cause undeterminable damage to the department and institution. This pre-institute workshop will use a variety of case studies and vignettes, as well as focused discussion, to explore several dimensions of academic decision-making and leadership.

Introduction to the Question Formulation Technique: A High-Impact Practice for Student Inquiry

Clark 302

Andrew Minigan

Right Question Institute

This interactive workshop will provide participants an introduction to the Question Formulation Technique (QFT), a simple, powerful, evidence-based strategy used by over 350,000 educators to teach students how to ask their own questions. The QFT helps to advance teaching and learning goals across all disciplines through cultivating collaborative, student-centered learning. Participants will learn how to facilitate the strategy and will have the opportunity to plan on how to best integrate the QFT into their instruction to support ongoing work.

Assignment Design for Powerful Civic Learning in STEM

Clark 308

Yao Z. Hill

University of Hawaii, Manoa

Tom Wood

George Mason University

In this highly interactive 3-hour workshop participants apply design strategies to improve their own assignments and provide peer feedback. The facilitator will present exemplary assignment design strategies that empower civic learning in STEM fields and have participants apply these strategies and critique sample assignments that target civic learning outcomes. Majority of the workshop will be devoted to peer share and peer feedback. For those who are interested, the facilitator will provide consultation on assessing the impact of the improved assignment on their students. Participants are expected to bring 5 copies of assignments to the workshop to share.

2:30 p.m. – 4:00 p.m.

Civic Engagement 101

Clark 101

Glenn Clayton Odenbrett
Case Western Reserve University

Are you asking yourself “What is civic engagement exactly?” This interactive session is designed for faculty who are planning, or in the initial stages of integrating, civic engagement with one or more of their undergraduate courses. Participants will explore various types and examples of civic engagement in higher education at the course and institutional level. They will then match at least one civic engagement activity with one or more course learning goals related to KAS (knowledge, abilities, and skills) and/or 21st Century Skills acquisition. Participants will also develop strategies to generate and sustain support for their course-based civic engagement activities in their departments, institutions, communities, and professional associations.

4:30 p.m. – 6:00 p.m.

SSI 2019 Opening Plenary Session

Ford Auditorium, Allen Memorial Library

Welcome to the 2019 SENCER Summer Institute at Case Western Reserve University

Ben Vinson, III
Provost and Executive Vice President
Case Western Reserve University

Eliza Reilly, Executive Director
National Center for Science and Civic Engagement

SSI 2019 Opening Keynote: “Partnership Power” For Learning and Civic Engagement

Marsha Semmel
Marsha Semmel Consulting

Marsha Semmel is an independent consultant working with cultural and educational organizations on leadership development, strategic planning, and partnerships. She recently published *Partnership Power: Essential Museum Strategies for Today’s Networked World*, Rowman & Littlefield (2019). She currently serves as Special Initiatives Advisor to the National Endowment for the Humanities, Senior Adviser to the National Center for Science and Civic Engagement, and Adjunct Faculty at the Bank Street College Graduate School of Education’s Leadership in

Museum Education Program. Semmel was the Director for Strategic Partnerships, Deputy for Museum Services, and Acting Director at the Institute of Museum and Library Services (IMLS) from 2003-13. From 1993-1996 she was Director, Division of Public Programs, at the National Endowment for the Humanities. She also served as President and CEO of Conner Prairie, a history museum near Indianapolis, and President and CEO of the Women of the West Museum in Denver. She currently serves on the boards of the Institute for Learning Innovation and the Council of American Jewish Museums. Semmel is also chair of the Arlington County Arts Commission.

Aims for SSI 2019

Eliza Reilly

6:00 p.m. – 8:00 p.m.

Awards Dinner Recognizing Achievements in the NCSCE Community

Thwing Ballroom

Presiding:

Monica Devanas

Rutgers University

All SSI 2019 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. The team award goes to the New Jersey K-12 SENCER team, Kathy Browne, Jessica Monaghan, and Missy Holzer, for their important work advancing civic engagement in k-12 education. The Individual award goes posthumously to longstanding SENCER leader, advocate, champion, David Ferguson.

FRIDAY, AUGUST 2ND

7:30 a.m. – 9:00 a.m. BREAKFAST

The Jolly Scholar, Thwing Center

9:00 a.m. – 10:30 a.m.

All-Institute Plenary Session II

Ford Auditorium, Allen Memorial Library

Presiding:

Karen Kashmanian Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Partnership Power: Creating Collaborative Community Connections

Felton Thomas, Jr.

Executive Director, Cleveland Public Libraries

Felton Thomas, Jr. has served as Executive Director of Cleveland Public Library (CPL) since January 2009. Since beginning his tenure at CPL, Director Thomas has furthered the mission of CPL to be “The People’s University”, including launching initiatives aimed at addressing community needs in the areas of access to technology, education, and economic development.

Felton’s awards and accomplishments include being named a “Mover and Shaker” by the *Library Journal*, and acting as a fellow in the Urban Library Council’s Executive Leadership Institute. Nationally, in 2015, Felton was elected as President-Elect of the Public Library Association (PLA), served as President beginning in 2016; and now serves as Past President. Felton is also a member of the Aspen Institute Task Force on Learning and the Internet. He currently serves as Board President of the Greater Cleveland Food Bank, and a trustee on the boards of Sisters of Charity Foundation, University Circle Inc., United Black Fund of Greater Cleveland and United Way of Greater Cleveland.

10:30 a.m - 12 p.m. Session Block I (Workshops)

Designing a SENCER Course

Clark 309

Monica Devanas

Rutgers University

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. This workshop, which is presented by two founding “SENCER Model Course” authors, is recommended for those new to SENCER. It provides an engaging, hands-on experience that provides a step-by-step process for developing a new or revised course. whether it is intended

for students majoring in STEM or another discipline. Assessment strategies for the course and opportunities for civic engagement will also be explored.

Integrating Civic Engagement into the K-12 Curriculum: Higher Education Faculty and Informal Science Educators Can Help!

Clark 104

Kathleen Browne
Rider University

Missy Holzer
School District of the Chathams

Jessica Monaghan
New Brunswick Public Schools

Colleagues with expertise in STEM and STEM-Education fields are encouraged to attend this session to learn how they can help K-12 teacher infuse civic engagement into their students' learning experiences. A brief introduction to the Next Generation Science Standards (NGSS) will first be provided including synergies between engineering design components and SENCER ideals. Then participants will be guided to link basic science concepts to observable natural phenomena and related civic issues. Participants from all disciplines are encouraged to join this exercise. Results will be shared with K-12 teacher networks.

Clear or Fuzzy Vision: the Census in 2020

Clark 205

Robert Franco
Kapi'olani Community College, University of Hawai'i

Given our national political climate, there are valid and heightened concerns about the administration, integrity, and accuracy of the 2020 Census. The Census results will have a major impact on targeted resource allocations, the reapportionment of the US Congress, and legislative district boundaries; all of which can lead to policy changes that disrupt the public support systems and programs that underserved communities, families and individuals' need. What can we learn from history? What actions can be helpful now as we prepare for Census 2020? What can we do as institutions of higher education to work along side our respective communities to increase awareness, to stay current on the latest Census related news; and take action to ensure a representative count. For more than a year, the presenter has been facilitating a national iterative dialogue on Census 2020 with SENCER and Campus Compact colleagues and will invite place-based discussion of how the "science of the census is science for civic engagement for all our campuses and the communities they serve."

Expanding Opportunities for Undergraduate Research Experiences in STEM Through Integration with Civic Engagement

Clark 308

Jay Labov
National Academies of Sciences, Engineering, and Medicine (Retired)

Undergraduate Research Experiences (UREs) are part of an expanding toolkit of experiential learning experiences that can help students engage with the practices and processes of STEM. Civic engagement is another type of experiential learning experience that can offer students meaningful interactions in the wider community, thus leading to greater relevance and application of their learning. Research suggests that both civic engagement and UREs are high-impact practices. However, much of the work to date on experiential learning has been discipline-based. This may be due to challenges in getting faculty members from disciplines to work together, or because of issues with infrastructure, budget policies, credit hours, incentives, and/or the reward systems in higher education.

This workshop will explore opportunities for synergies in learning opportunities by integrating UREs in STEM with research and activities in civic engagement and other disciplines. Participants will be expected to have read the [Executive Summary](#) (freely downloadable) from the National Academies' 2018 report, [The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education: Branches from the Same Tree](#). A recent paper by the organizer and coauthors in *Science Education and Civic Engagement: An International Journal*. Discussions of opportunities and next steps will build upon these two references. The paper is available at: Labov, J.B., Brenner, K.A., and Middlecamp, C.H. 2019. Integrating Undergraduate Research and Civic Engagement. *Science Education and Civic Engagement: An International Journal*. 11(1):64-78. <http://new.seceij.net/articletype/review/integrating-undergraduate-research-in-stem-with-civic-engagement/>

Building an Inclusive Classroom

Clark 302

Sherryl Broverman
Duke University

There is a critical need to recruit and retain and empower first generation students, under-represented minorities and women in university programs. Programs, faculty, and financial investment often start by focusing on access and rectifying perceived deficits in students, such as coming from poor high schools or lack of AP courses. 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.

12:00 – 1:30 LUNCH

Jolly Scholar, Thwing Center

1:30 p.m – 5:00 p.m. Session Block II

1:30-5:00 p.m.

Mini Symposium on Assessment: Designing Assessments of Student Outcomes (Part 1)

Clark 309

Matthew Fisher
Saint Vincent College

Linden Higgins
University of Vermont and Education for Critical Thinking

Catherine Duckett
Monmouth University

Davida Smyth
The New School

Yao Zhang Hill
University of Hawaii, Manoa

This mini-symposium will consist of six 50-minute presentations, followed by a panel discussion. The first four presentations will take place on Friday, the next two presentations and discussion on Saturday. Presenters will guide participants through the process of designing student assessments and surveys to capture the outcomes of SENCER courses for research and evaluation. We start with the foundational issue of identifying the question(s) that you would like to answer, then present three sources of data: survey data, individual assignments, and student research projects. The design and use of rubrics to foster and document learning in SENCER courses provides a means for collecting data from student work. The mini-symposium ends with a discussion around ethical and logistical issues such as designing inclusive studies, communicating with your institutional review board, and provides additional time for participants and presenters to discuss the challenges of designing studies using multiple data sources. The order of topics and presenters will be:

1. Matt Fisher – What question(s) am I asking? Looking at the questions that can be asked from either an assessment or SoTL perspective, identifying the question(s) to start with 2. Linden Higgins – Analyzing survey data for reliability and validity – there will be a handout on different instruments, including the SALG, for different questions from Matt’s SoTL for STEM book appendix. 3. Catherine Duckett – Using repeating assignments to encourage and monitor student growth. 4. Davida Smyth– Assessing the breadth and diversity of student learning through project-based learning and undergraduate research experiences. 5. Yao Zhang Hill -- Using rubrics to foster SENCER learning 6. Panel discussion – Closing loop: Challenges and opportunities in using multiple sources of data to assess student-learning outcomes.

1:30 – 2:55 p.m.

Integrating Civic Engagement into the K-12 Curriculum: A Hands on Workshop

Clark 104

Jessica Monaghan
New Brunswick Public Schools

Kathleen Browne
Rider University

Missy Holzer
School District of the Chathams

Presenters will guide participants in work to infuse civic engagement into their K-12 science curriculum by leveraging the engineering design process in the Next Generation Science Standards (NGSS). A brief introduction to the NGSS standards will be provided to clarify the dimensions of the NGSS and how they should be integrated. Identifying local observable phenomena and/or issues will help get participants started in the process of designing their own lesson. Participants will get guidance for selecting components of the standards

to compose 3-dimensional learning objectives focused on a natural phenomena and civic issue. Lastly, participants will begin the design of a lesson in time that remains using resources provided by facilitators.

1:30 - 2:25 p.m.

A Course on Quantitative Approaches to Fair Representation

Clark 205

Ann Yust

The New School

Recent US Supreme Court cases targeting partisan gerrymandering have driven public examination of the fairness of the US political system. Evaluating fairness in representation is a complex and often ill-defined problem, requiring both qualitative and quantitative approaches. A team of three mathematicians at The New School designed an undergraduate course on the use of quantitative methods to assess fairness in representation entitled, Fair Representation: Gerrymandering and the Political Process. Students needed no prerequisite political or mathematical knowledge. The major theme of the course is racial and partisan gerrymandering, while additional topics include voting systems and apportionment. In this session, the presenter will give an overview of the course structure, student learning objectives, and topics. Then they will highlight a few key assignments and guest speakers who provided first-hand accounts of portions of the political process. Assessment of the course and revisions for its second iteration will conclude the session.

Integrating Art, Science, and Technology

Clark 302

Ina Martin

Burcu Gurkan

Umut Gurkan

Case Western Reserve University

This session will showcase art, science, and technology integration activities at Case Western Reserve University, which are carried out in collaboration with Cleveland Institute of Art.

Presentations include:

Ina Martin: “Integrating Optical Imaging and Data Science for Technical Art History”

Burcu Gurkan: “Animations and visual illustrations for understanding the fundamental science behind energy storage devices”

Umut Gurkan: “Science, Technology and Art (STArt) to integrate STEM education with visual arts pedagogy”

Strengthening our Approach to Responsible Civic Engagement

Clark 308

Elizabeth “Betsy”

Case Western Reserve University

While we have good intentions when designing the community engagement component of a program or course, these intentions don't always translate into community engagement that is helpful or responsible. In fact, we - or our students - may inadvertently approach community engagement in ways that perpetuate harm, including the reinforcement of paternalism and stereotypes. To provide a framework for planning and implementing responsible engagement programming, the Center for Civic Engagement & Learning at Case Western Reserve

University articulated a set of five best practices. This session will provide an overview of these best practices and share civic engagement scenarios that are problematic. We'll cover several simple activities you can adapt for use with your students to strengthen their understanding of responsible engagement, including an activity to get them thinking about how they might take action to contribute to social change beyond the conclusion of your course/program. Participants will also have the opportunity to share their own efforts to prepare students to engage responsibly in communities so we can all strengthen our approach and practice.

2:30 - 3:25 p.m.

Supporting First Generation Undergraduate College Students

Clark 205

Karen Kashmanian Oates

Worcester Polytechnic Institute/Success 4 Higher Education

Theo Koupelis

Broward College

The fastest growing demographic profile of students entering our higher education institutions is that of first-generation college students seeking undergraduate degrees. Many of these students will come from low-income homes and are 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* obtain a four-year degree ten years out from 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.

Self-Driving Tricycles

Clark 308

Tyer Folsom

University of Washington

Building an autonomous vehicle is an exciting area for STEM projects, but the costs have been prohibitive. Automation equipment typically costs \$40,000 and up, plus the cost of buying a car. The Elcano Project uses an electric bicycle or tricycle as the base vehicle and offers open-source automation software and hardware for about \$2000, including all sensors and actuators. The result is a person-carrying autonomous vehicle costing \$3000 to \$10,000. The trike offers a platform for real-world experiences in a number of STEM fields. Automated trikes may offer the best hope for zero-carbon urban transportation. When equipped with a body to protect from the weather, the trike can operate as an autonomous taxi. At a given speed, such vehicles use 30 times less energy per person than a single-occupancy car or 5 times less energy than a packed commuter train. Because of its light weight, the trike can be powered by a 25-pound battery and achieve the same performance as an electric car using 300 to 1000 pounds of battery. A light battery enables refueling by robotic battery swap, eliminating range anxiety. The bank of depleted batteries allows harnessing renewable energy anytime the sun shines or the wind blows.

2:30 – 2: 55 p.m.

Turning STEM Education Inside-Out: Teaching and Learning Inside of Prison

Clark 302

Karl Haushalter

Harvey Mudd College

The Inside-Out Prison Exchange Program is a national network of teachers and learners who work to break down walls of division by facilitating dialogue across social difference. In this model, which was first developed by Lori Pompa at Temple University, campus-based college students (outside students) join together with incarcerated college students (inside students) for a full, credit-bearing, college course that is taught inside of a correctional facility. Compared to other disciplines, STEM courses are underrepresented in the Inside-Out program. This presentation will discuss the challenges and opportunities of teaching a STEM course inside of prison, including the lessons learned from a pilot offering of an Inside-Out course on Infectious Disease in Society taught at the California Rehabilitation Center (CRC) in Norco, CA with a blended group of Claremont College students and incarcerated students from CRC. The class was structured to engage both sets of students to work together to address complex problems at the interface of STEM and society. Practical considerations for implementing a course with an experiential justice education component will be discussed.

3:00 – 3: 55 p.m.

STEAM-infused Education Retooled as TEAMS: Inclusion Leading to 21st Century Workforce Development Options

Clark 104

Susan Bardenhagen

Virginia Association of Science Teachers; American Association of University Women

STEM+ the Arts/STEAM, an acronym whose anagram, TEAMS, better delineates how collaboration and purposeful planning of instruction can result in educational preparation for 21st century careers. The National Academies of Science, Engineering, and Medicine published their report, aka “Branches of the Same Tree” in 2018, which validates STEM and Arts/Humanities inclusion in higher education which would also support PK-12 curriculum and instruction. For example, by incorporating civics education objectives into a study of literature-mythology and folklore; into the history of science, math, architecture, and cultures; and jointly applying space exploration’s outreach and the necessary ethics to be addressed- educators can collaborate with their many stakeholders to establish a meaningful design for career and workforce development.

Problem/Project-Based Learning and the engineering design process combined with the scientific method reinforces the value of inquiry and research. All disciplines include these. STEAM/TEAMS-infused education models can prepare students for careers in which they showcase a positive work ethic, critical thinking, and problem solving with inclusivity that transcends diversity- goals employers have sought for decades. The presenter’s experience in coordinating thirty gender-equity STEAM career conferences for students with research-based workshops for adults and coordinating six regional STEAM professional events, provides the expertise to share.

3:00 – 3:55 p.m.

Using Art to Connect Graduate Clinicians to the Community & Kindergarteners to Anatomy

Clark 302

Aurora Weaver

Auburn University

The link between art and education has been recognized for hundreds of years. In the past few decades, research has confirmed the benefits of the use of art and anatomy within medical education. Some of those benefits include the use of art to improve observational skills in clinical practice, to gain a greater understanding of disease, patient's perspective, and greater ability to empathize (Bell & Evans, 2014). Two semesters of a graduate anatomy and physiology course will be discussed with a focus on how art assignments were used. The first year this was measurably unsuccessful. Modifications, the following year, to how art assignments were designed and applied based on SENCER ideals, improved outcomes greatly (e.g., active learning, metacognition, teaching-effect, civic engagement).

Participants working in small groups will: Determine why the first year was unsuccessful and why the second application had a lasting impact; Share own what has been successful and unsuccessful in their own courses; identify a change in each project that might turn an unsuccessful effort into a rewarding outcome for the students and the community; Determine a project where the teaching-effect could be used to promote community and student knowledge on a course topic

3:00 – 4:55 p.m.

Learn Through the Universe: An Introductory Experience

Clark 308

Mercedes Talley

Pasadena, California

For the last two years, Learn Through the Universe (LTTU) has been developing a website that presents a new approach to learning based on the human experience of oneself and others in space and time. It makes clear the physical structure of the universe while focusing on how humankind perceives and interacts with the beings and things that compose it. In this way LTTU integrates what and how we learn with the fundamental questions of "What is the universe?" "Who are we?" and "Why are we here?" The approach has learners construct true-to-scale two-dimensional and three-dimensional models of the universe at powers of ten, starting with the scale of oneself, and proceeding down into the subatomic realm and out to the edge of the universe. The models are used to study relevant topics in the traditional disciplines of the humanities, social sciences, natural sciences, as well as in applied disciplines such as health, business and engineering. This workshop will introduce *Learn Through the Universe* (LTTU) and quickly transition to a group collaboration focused on the billion-times-smaller Earth-Moon System presented in the poster session. Mercedes Talley, LTTU founder, will lead the group through the design aims of several activities associated with the model and then elicit ideas for how the model could be used in their or other SENCER courses. Ideally this would lead to ongoing collaborations among a few members of the group with the aim of developing and vetting a wide variety of lessons for exploring the world at scale. People who are interested but unable to attend please pick up a card at the poster session.

www.learnthroughtheuniverse.org

3:00 – 4:55 p.m

Individual Consultations on the Scholarship of Teaching and Learning (SoTL) and on Publishing in *Science Education and Civic Engagement: An International Journal* (by appointment—sign up at registration)

Clark 110

Matt Fisher

St. Vincent College

Co-Editor, Science Education and Civic Engagement: An International Journal

3:30 – 5:00

Tour of the Sears *think[box]* at Case Western Reserve University (sign up at registration or by sending email to eliza.reilly@stonybrook.edu)

Ian Charnas

Director of Innovation and Technology, think[box], Case Western Reserve University

Richard Graham

Coordinator, think[box]

The *think[box]* is a seven-story, 50,000-square-foot facility on the CWRU campus that contains a world-renowned makerspace for prototyping and fabricating, as well as a full spectrum of legal and business resources for entrepreneurs to build and grow their business ventures and not-for-profit organizations. Uniquely, this space is free and open to the public and serves as a nexus for collaborations from science and engineering, business and law, art and design, by innovators from around the world, and by members of the community of all ages and backgrounds. In addition to a tour, the staff will describe some of the many community collaborations catalyzed by *think[box]* participation. Participants will meet in Thwing Center at 3:30 for the walk over.

4:00 – 4:55 p.m.

Civic Engagement 101 (one hour version of Friday a.m. workshop)

Clark 302

Glenn Clayton Odenbrett

Case Western Reserve University

Are you asking yourself “What is civic engagement exactly?” This interactive session is designed for faculty who are planning, or in the initial stages of integrating, civic engagement with one or more of their undergraduate courses. Participants will explore various types and examples of civic engagement in higher education at the course and institutional level. They will then match at least one civic engagement activity with one or more course learning goals related to KAS (knowledge, abilities, and skills) and/or 21st Century Skills acquisition. Participants will also develop strategies to generate and sustain support for their course-based civic engagement activities in their departments, institutions, communities, and professional associations.

4:00 – 4:25 p.m

Integrating Civic Engagement into the K-12 Curriculum: Perspectives from “Rising Teachers”

Clark 104

Kasmir Grapski
Socrate Berroa
Kathleen Browne
Danielle Jacobs
Peter Hester
Rider University

Undergraduate students preparing to become high school science or math teachers often take education courses and complete a major in the discipline they plan to teach. Two “rising teachers” at Rider University will present their perspective on how activities offered to complement their academic requirements can better prepare them to succeed as teachers working with underserved student populations. Focusing on some of the SENCER ideals provided a unique set of learning experiences and outcomes that enable “Rider Noyce STEM Scholars” (funded by an NSF Noyce grant) to address inequities in K-12 school systems.

4:00 – 4:25 p.m.

Integrating Civic Engagement into the K-12 Curriculum: Perspectives from Veteran Teachers & Informal Science Educators

Clark 104

Kathleen Browne
Rider University

Missy Holzer
School District of the Chathams

Jessica Monaghan
New Brunswick Public Schools

Sandra Lavigne
Great Swamp Watershed Association

Jeff Hoagland
Stony Brook-Milstone Watershed Institute

Although the NGSS have been adopted by 20 US states plus Washington DC, and adapted by 21 states, making the transition to the NGSS prescribed methods of teaching and learning has been a challenge for teachers and students. This presentation will share the efforts of two NJ teachers who created an equitable learning experience around local community civic issues. Students used disciplinary core ideas, science and engineering practices, and crosscutting concepts, the three dimensions of the NGSS, to design/engineer solutions centered on social justice and sustainability.

5:00 – 7:00 p.m. Poster Presentations and Reception

Thwing Atrium

We are pleased to invite you to attend a special poster session that features the work of SSI 2019 participants. Poster authors will be on hand to share their work, exchange ideas, and answer questions during the designated Poster Presentations time. A guide to poster presentations and presenters' contact information will be available as a handout at the session. Digital copies of the posters will be uploaded to the SENCER website after the Institute (with permission of the author).

A cash-bar and appetizers will be served in the Jolly Scholar, adjacent to the Poster Presentations.

Posters can be left in the SENCER campus office (Guilford, first floor) and set up in the Thwing Atrium by 3:00pm on Friday.

POSTERS:

Autumn Marshall, Lipscomb University

Milking Science for Undergraduate Student Learning Gains: The Lactose Free Research Project

Frances Solomon, Western Washington University

EDuCation about Endocrine Disrupting Chemicals: Bridging the Gap between Scientists and the General Public

Julia Nord, George Mason University

STEM Challenge: Exploring GMU's Energy Footprint

Karen Oates, Worcester Polytechnic Institute

Creating a Grand Challenge Scholars Program

Katie Gatto, Monmouth University

Developing a Pedagogical Compiler Aligned to Computer Science Coursework

Madhavan Narayanan, Mercy College

Chemistry and Civic issues to Improve Student Engagement in General Chemistry

Mercedes Talley

Learn Through the Universe

Rowan Hannan, Oberlin College

Developing a Cleveland Metro Region Environmental Dashboard: A Partnership between Oberlin College and the Great Lakes Science Center to Promote Community-based STEM Education

Ulla Hasager, University of Hawaii, Manoa

Transcending Barriers to Success: Integrating Indigenous Knowledge and Modern Science

Katie Gatto and Catherine Duckett Monmouth University

Thematic Learning in Information Technology: An Initial Assessment of Student Artifacts

SATURDAY, AUGUST 3RD

7:30 a.m. – 9:00 a.m. BREAKFAST

Jolly Scholar, Thwing Center

9:00 a.m. – 10:30 a.m.

All-Institute Plenary Session III

Ford Auditorium, Allen Memorial Library

Presiding:

Eliza Reilly

National Center for Science and Civic Engagement

How Asking the Right Questions Can Improve Learning and Build Civic Participation

Andrew P. Minigan

Right Question Institute

Andrew P. Minigan is the Right Question Institute's (RQI) director of strategy for the Education Program. He is a co-principal investigator (Co-PI) on a National Science Foundation funded research grant to help researchers, including doctoral students and faculty in higher education, learn how to formulate better, more transformative research questions. He has facilitated learning experiences for faculty and doctoral students at Brandeis University, Northeastern University, the University of Connecticut, the University of Massachusetts Lowell, Mt. San Antonio College, Citrus College, and the University of Prince Edward Island. Hundreds of faculty and students from around the country have participated in his active learning experiences, including a recent webinar for the American Society for Engineering Education. Andrew has written on the importance of question formulation and its connection to curiosity for *Education Week*, *Social Education*, *Educational Leadership*, and PBS.

10:30 a.m. – 12:00 p.m. Session Block III

10:30 - 10:55 a.m.

LIGHT – Learning Inner Global Higher Thinking

Clark 104

Tamara Klingbyll

Lipscomb University

The newest Quality Enhancement Plan (QEP) of Lipscomb University enhances the Serving And Learning Together (SALT) program, but also stands and shines alone – LIGHT: Illuminating Cultural Engagement. While LIGHT has other meanings, Learning Inner Global Higher Thinking is the motto for two general education courses, Foundations of Biology and Power of Science (a course which integrates biology and chemistry). In the past, education encouraged the amount of content a student could learn during their time of academic pursuit. In the information age, the amount of available content seems limitless; however, data indicate the ability to reflect and evaluate content requires assistance. The learners in the process are two-fold; professors must learn to glean information regarding global relevance and students must learn how to self-process the information. Deeper thinking occurs on two-fronts, professors and students. Professors cannot use time to regurgitate

unusable facts, instead more planning, pedagogy, is required to develop a fifteen-week course. Students must relearn how to focus and tie seemingly different concepts together. This session will discuss how this two-pronged approach encourages these changes to occur, and will provide SALG data from two years of development, examining which practices work best and how practices reflect differences in classes.

10:30 – 11:55 a.m.

Assessment Mini-Symposium (Continued from Friday)

Clark 309

10:30 – 11:25 a.m.

Engaging Students Through Mapping, Visualizing, and VR on Health Disparities

Clark 205

Amy Sheon

Scott Frank

Case Western Reserve University School of Medicine

Cleveland & Cuyahoga Health Data Matters (HDM) (healthdatamatters.org) was established in 2015 to make local data on health available to students, researchers, policymakers and community members regarding social determinants of health and health disparities. Data visualization including charting, dash-boarding, interactive mapping, and storytelling features were added in 2016 (hdm.livestories.com). These technologies have been integrated into teaching and student assignments related to community health assessment, dissemination of interventions, and capstone projects. The utilization of data and data visualization tools by community organizations and other academic institutions is evidence of the successful dissemination of the technologies. Recently, using HDM technology and data resources, a virtual reality simulation was created to provide an immersive, visceral experience of these data, enabling viewers to walk in the shoes of individuals in a highly segregated neighborhood with entrenched generational poverty. Strengths, limitations and lessons learned in the deployment of these cutting edge technologies with University and Community College students, clinicians, policy makers, community advocates and with entrepreneurs will be reviewed. Attendees will have the opportunity for hands on exploration of the tools.

Cross-Sector Collaborations Between Formal and Informal Education: Next Steps for SENCER-ISE

Clark 308

Marsha Semmel

Marsha Semmel Consulting

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.

10:30 - 11:55 a.m.

Same Fish, Different Ponds - Adapting to Changes in Higher Education

Clark 302

Robert Seiser
Roosevelt University

Faculty appointments are defined through traditional, arguably outdated measures of an individual's "fit" within an institution: Tenure-track, NTT and contingent. Time and effort spent on teaching, research and service. Big fish in small ponds vs. small fish in big ponds. But academic institutions are changing in scope and faster than ever. What do faculty members do when enrollment grows (or shrinks) dramatically? Or when trustees approve a sweeping new strategic plan? Or when a program goes fully online? Or when the faculty title stays the same and the job description changes?

In this session, participants will discuss their experiences in the light of academic employment trends, institutional mergers and evolving faculty responsibilities. We will examine ways to recognize and describe faculty contributions that go beyond traditional metrics, and will form a better understanding of how faculty can redefine their roles in the changing higher education landscape.

11:00 - 11:55 a.m.

Integrating Indigenous Knowledge and Modern Science

Clark 104

Ulla Hasager
University of Hawaii, Manoa

Tom Wood
George Mason University

Robert Franco
Kapi'olani Community College, University of Hawai'i

This session will describe national efforts to advance robust partnerships between indigenous peoples and local formal and informal educators to improve educational outcomes for all students, promote cultural understanding, and foster long-term collaborations on issues of common concern. Local environmental and health issues provide a context for inquiry-based learning that transcends perceived conflicts between indigenous, local, and "Western" knowledge systems.

11:30 - 11:55 a.m.

Collaboration and Engagement between Higher Ed, STEM Industries, and Community Schools to Improve STEM interest in Middle School Students

Clark 205

Quyen L. Aoh
Gannon University

Engaging students to increase their interest in Science, Technology, Engineering, and Math (STEM) is crucial to maintaining the STEM pipeline. In particular, studies have shown that students begin to lose interest in STEM in middle school and that students in low-income, socioeconomically disadvantaged schools are disproportionately

affected. As part of the Erie Public Schools and United Way of Erie County Community School Initiative, Gannon University piloted an afterschool STEM program *Feeding Minds and Families* at Strong Vincent Middle School. In this six-week program, students were mentored by Gannon University STEM faculty and local STEM professionals in topics ranging from DNA technology to computational thinking. The program used family meals as an opportunity for engagement across all stakeholders. This presentation describes the collaboration, program development, and outcomes for improving STEM interest through activities that engage students and their families.

Adapting Free Choice Learning Assessment Strategies for Undergraduate Education

Clark 308

Judith Koke

Institute for Learning Innovation

The SENCER-ISE projects emerged from the insight that SENCER's emphasis on student interest and topical relevance, as well as its emphasis on affective and dispositional outcomes, shared much common ground with the principles of Informal Science and free-choice learning. This session will explore how the assessment strategies that have been developed in ISE could be adapted for undergraduate curricula.

12:00 – 1:30 LUNCH

Jolly Scholar, Thwing Center

1:30 p.m. – 5:00 p.m. Session Block IV

1:30 – 2:25

Fostering Undergraduate and Graduate Interdisciplinary Research in Communications Sciences and Disorders and Software Engineering to Develop Online Phonetics Training Modules

Clark 104

Marisha Speights Atkins

Cheryl Seals

Abigail Bennett

Yang Cao

Auburn 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.

Problem Solving through Interdisciplinary, Student-Led Design Teams

Clark 205

Kurt Rhoads

Andrew Rollins

Lynn Rollins

Case Western Reserve University

The CWRU Center for Engineering Action (CEngA) directs, supports, and mentors interdisciplinary student design teams solving problems, specifically in low-resource communities. CEngA has two main objectives. The first is to teach students the skills they need to solve future problems by working on real-world problems. The second is to increase the capacity of communities to help them achieve their own goals. One of our core values is developing a true two-way partnership between our teams and the partnering communities. The partnership not only increases the chance for project success, but also better enables future success for both the students and the community partner.

During our collective experience participating in projects in Uganda, The Dominican Republic, Costa Rica, Cleveland, and elsewhere, we have learned lessons for improving student learning and project success. Technical skills are a necessary part of the solution, but communication, leadership, and cooperation are also necessary. Student-led teams (properly mentored) have unique challenges and characteristics yet offer the opportunity for student autonomy, confidence, motivation, and personal growth. Some of the remaining challenges for developing CEngA activities include sustainability, fundraising, maintaining student-led leadership, finding professional and faculty mentorship, and continuation of projects.

Keeping the 3 R's in STEM

Clark 302

Carroll G. Wells

Lipscomb University

The three R's (reading, writing, and arithmetic) are foundations for much of education, especially STEM. However, many schools are currently reporting that graduating seniors are reading at the third grade level. Also, educational research is indicating that student retain materials better if they take notes or do homework with pencil and paper rather than on their computer or iPad. Many are also complaining that students can't add or do simple arithmetic without a calculator or computer. Are these the outcomes that are desired? In this presentation, some methods used to address these issues will be discussed. The methods are being used by the presenter in teaching geometry and have been part of the materials used for the past fourteen years in professional development institutes for mathematics teachers K-12th.

The Power of the Campus Museum for Connecting Students, Faculty and the Community at Large

Clark 308

Heather Lerner

Earlham College

Campus museums are a ready-made place where powerful connections can be made between the college and the community. College museums have access to a broad community audience as well as expertise in informal

education that can be leveraged to make meaningful experiences for students and faculty. Furthermore, embedding outreach activities into the college curriculum and a departmental culture can help retain underrepresented minority groups in STEM (Puritty *et al.* 2017). We present examples from four types of museum-faculty collaboration: (1) a two-week museum outreach module embedded into existing STEM college curriculum, (2) a volunteer/extra credit opportunity for STEM college students and faculty, (3) a semester-long informal STEM outreach course and (4) student docents at a campus natural history museum. Valuable student benefits from these experiences include an increase in public-speaking confidence, commitment to STEM education, commitment to a STEM field, sense of community and commitment to the community.

Assessment Symposium Panel Discussion

Clark 309

Open discussion of insights, conclusions, and ideas emerging from the Assessment Symposium

2:30 – 3:30 p.m.

OPEN FORUMS

These facilitated topical forums are intended to provide an opportunity unscripted discussions on topics of strong interest and relevance to the SENCER/NCSCE community. Participants are invited to propose ideas for future work, national or regional programs, or research that might advance science education and civic engagement.

Civic Engagement and K-12 Education

(Facilitators: Browne, Monaghan, Holzer)

Clark 104

Academic Leadership

(Facilitators: Oates, Shachter, Seiser)

Clark 206

Higher Education's Role in Civic Renewal

(Facilitators: Martin, KY Team)

Clark 302

STEM/Art/Humanities Integration

(Facilitators: Semmel, Reilly, Labov)

Clark 308

Diversity and Inclusion

(Facilitators: Broverman, Hasager)

Clark 309

3:30 – 5:30 p.m.

TEAM TIME

This time slot is open for teams to work together, for individuals to network, or to meet with SENCER Sr. fellows for consultations. To request consultations or off schedule meetings go to Staff Office in Guilford House.

SUNDAY, AUGUST 4TH

7:30 a.m. – 9:00 a.m. BREAKFAST

Jolly Scholar, Thwing Center

9:00 - 11:30 a.m. Session Block V

9:00 - 10:25 a.m.

Designing Open-Inquiry Laboratories: It Needn't Be Chaotic!

Clark 104

Linden Higgins

Education for Critical Thinking LLC.

There is growing evidence that students need to be engaged in open inquiry at all levels of science course work. Exposure to experiences with uncertain outcomes accomplishes many things, among them increasing engagement with authentic scientific processes, countering the common misconception that experiments are designed to prove hypotheses, and helping students experience, interpret, and move beyond perceived failures. However, many faculty and departments avoid student driven open-ended laboratory activities in introductory courses for fear of chaos or added expenses. After a brief overview of the research into the impacts of inquiry on student persistence and retention, we will have a planned conversation about barriers to open-inquiry laboratories in foundation science courses at their home institution. I will then introduce an approach to laboratory design that allows open inquiry without greatly increasing expense or chaos. The remainder of the session will be spent developing model laboratory exercises for participants' classes.

Build Consensus and Facilitate Effective Decision-Making with the Right Question Strategy - Andrew P.

Clark 302

Andrew Minigan

The Right Question Institute

Regardless of whether one holds a formal leadership position, getting buy-in from different stakeholders can be challenging. How can asking questions and focusing sharply on key decisions lead to greater buy-in, more inclusivity, and better collaboration? The Right Question Strategy offers a powerful, yet simple process for jumpstarting an institutional or departmental change process that generates buy-in from the different stakeholders involved. The strategy focuses on the use of two key skills: the ability to formulate questions and the ability to participate effectively in decisions.

Session participants will leave with a deep understanding of the strategy and will know how to facilitate the strategy with colleagues, staff, faculty, and others to better effect change within your teams, department, college, or university.

9:00 – 10:25 a.m.

ePortfolios for Civic Scientific Literacy

Clark 308

Theresa Conefrey
Santa Clara University

Davida Smyth
The New School

Once the purview of composition courses, ePortfolios are a high-impact practice that have gradually transformed the entire curriculum. At the same time, critical thinking and reflection have become integral, not only to the humanities, but also to STEM courses. Our workshop will develop these connections further as we report on our efforts to promote folio thinking in both biology and advanced writing for science majors. We show how ePortfolios can be used to integrate curricular knowledge into solutions for authentic, real world science problems to increase student motivation and to develop the critical thinking skills necessary to evaluate science reporting in both scholarly and popular media sources. In addition, we show how ePortfolios encourage students to reflect on what is being learned in the course and how that learning connects to their other courses and to their lives outside the classroom. With rapid advances in science competing for public attention in the era of Fake News, we need a commensurate increase in information literacy for all graduates and, in particular, those in STEM fields. In this workshop, we offer suggestions for strengthening the acquisition of STEM concepts, as well as the promotion of critical thinking, self-efficacy and reflection to better integrate knowledge learned across the curriculum and to connect it to students' lives. We demonstrate how ePortfolios can be used to transform STEM courses to engage all students, especially those who are currently underrepresented in our fields, and to promote civic scientific literacy across the curriculum. (245 words)

Educating for Head, Hand, and Heart

Clark 309

Matt Fisher
Saint Vincent College

As professions, science and engineering both share a commitment to serve the general welfare of society. As William Sullivan wrote 15 years ago, "The idea of the professional as neutral problem solver, above the fray, which was launched with great expectations a century ago, is now obsolete. A new ideal of a more engaged, civic professionalism must take its place." Drawing on Sullivan's three apprenticeships of professional education – cognitive, skills, and ethical/moral – as well as the idea of "reflective practitioners," this session will explore how curricula for STEM majors can incorporate opportunities for students to grow in all three of Sullivan's dimensions. Participants will examine the relationship between Sullivan's apprenticeships and SENCER's ideals and approaches as well as important issues in various STEM disciplines to identify and develop specific

9:00 – 9:55 a.m.

Unusual Allies: Connecting Undergraduate Mathematics Reforms to Civic Engagement and Learning Opportunities

Clark 205

Nancy Shapiro

Dewayne Morgan

University System of Maryland

Colleges and universities have a mission to give students the skills they need for personal success as well as the values, ideals, and civic virtues on which American democracy depends. What might colleges and universities do to reinvigorate their commitments to their public mission? The University System of Maryland answered this question by creating a P-20 partnership framework that embraced the idea that strong mathematics understanding is not just a tool for science and technical fields, but critical full civic engagement. In October of 2015, USM's MMRI was awarded a \$3 million grant from the U.S. Department of Education's FIPSE program to revise its developmental mathematics course sequence and design a mathematics pathway that is more aligned with and responsive to the needs of non-STEM undergraduate majors. Presenters will share useful tools for cross-sectional engagement that meets students' immediate and long-term civic engagement needs. Finally, participants will leave the session with least three steps they can take and use immediately to assist their institutions in providing opportunities for students to process, understand, and apply various forms of data and information to solve critical world, national and local problems.

10:00 – 10:25 a.m.

Thematic Learning in Information Technology: An Initial Assessment of Student Artifacts

Clark 205

Katie Gatto

Catherine Duckett

Monmouth University

Thematic learning allows students to engage with new materials in ways that, ideally, will allow them to apply newly learned skills to real world problems. Students were given the opportunity to engage in a general education Information Technology course that emphasized thematic problem solving as related to climate change. This research evaluates the impact of the teaching of basic Technology/ Digital Literacy skills in a thematic classroom via the analysis of student artifacts (research papers) that should show students ability to apply technological/ digital literacy skills. Student in the thematic classes artifacts were compared to students who did not engage in thematic Information Technology learning, but did take a general education Information Technology with the same classroom professor.

10:30 – 11:30 a.m.

The Weekly Student Seminar as an Open-Ended SENCER course

Clark 104

Robert Seiser

Roosevelt University

Roosevelt University's Biochemistry 393 is a one-credit, student-led seminar course required for undergraduate biochemistry majors and also popular with biotechnology and biomedical science graduate students. Over the

last two years, the course has been adapted to include SENCER-inspired student practice in civic engagement and scientific communication.

The current course schedule incorporates external speakers, a film screening and discussion, followed by a written assignment on the theme of research ethics and broader impacts. Students make two presentations on a biochemistry topic, one framing the topic with respect to a societal issue and the other describing specific research results in context. They also write a brief review article with annotated bibliography. By allowing students to choose their own topics within a broad biochemistry framework, multiple areas of interest and “science and society” intersections can be explored on a weekly basis. In this session, we will look at examples of student work in the course and discuss the use of the seminar format as a low-risk, high-reward way to explore civic engagement in research practice.

A Risky Experiment to Improve Student Success Rates and “Throughput” in a Pathways Environment

Clark 205

Theo Koupelis
Broward College

In recent years the metaphor of “pathways” has replaced the more impersonal “pipeline” as a description of the students’ passage through post-secondary education on their way to jobs and careers. The American Association of Community Colleges has formalized the concept in its Gates Foundation funded “Pathways Project,” which now includes hundreds of institutions across the country. Similarly, efforts to accelerate students’ remediation work and enroll them in college-level courses are underway at many community colleges, supported by Complete College America. This session will describe a risky change to the math curriculum at Broward College that is based on the co-requisite model. This change is being shaped by the concurrent implementation of Pathways. The hope is to support students who need remediation but also those who could handle college-level math with additional support. There are clear benefits but also risks to this planned approach, and the college plans to explore ways that the SENCER approach could ameliorate some of the concerns about this effort. In addition to describing implementation efforts related to both the Pathways and co-requisite approaches at Broward College, which are not complete yet, the presenter invites constructive input and learning from the related experiences of participants in this session.

Overcoming Math Anxiety

Clark 302

Gary Hall
Lipscomb University

One problem that separates students in the math classroom is their fear of math and thinking that they cannot “do math”. Participants will look at twelve ideas to help teachers make the class room a safe place for students to learn mathematics. As there will be an emphasis on overcoming “math anxiety”, at the same time there will be an equal emphasis on the students actually learning.

Colleges as Ecosystems: Lessons to be Learned from Microbial Networks

Clark 308

Davida S. Smyth
The New School

While teaching microbiology at primarily undergraduate institutions, it has often crossed my mind how similar our college ecosystems are to microbial ecosystems. It is possible to identify the layers and the structures that stratify the institution and to elucidate the various interactions that are manifest among the persons residing in these educational habitats. From negative interactions like competition between faculty for resources, grants and space to more positive ones like cooperation and collaboration to generate research findings and to explore new ways of teaching, interactions between faculty and students, administrators and their environments can either propel the institution towards their goals or hinder progress at several levels and scales. Sometimes faculty must seek a new ecosystem in which to flourish and one such ecosystem is SENCER or Science Education for New Civic Engagements and Responsibilities. SENCER is the signature initiative of the National Center for Science & Civic Engagement, the project is focused on empowering faculty and improving STEM teaching and learning by making connections to civic issues. The international SENCER community is composed of professionals, informal and formal educators, and administrators in K-12 and higher education institutions. Notably, SENCER has been recognized as a community of transformation. My presentation will describe examples of ongoing actions that have been catalyzed by SENCER, helping individuals, populations and communities to improve the educational outcomes for students, professional development for faculty and support for administrative initiatives. I will demonstrate how SENCER is helping faculty to overcome negativity and to promote positive interactions in their college ecosystems and the larger academic community.

Working for social good: Beyond Human-Centered Design

Clark 309

Sherryl Broverman

Duke University

Academia has long used outside communities for research and education. However, not all of these interactions have been beneficial, rarely have communities had equal power in the relationships, and sometimes communities have been inadvertently exploited for student learning without leading to long term, equitable, or sustainable solutions. The 'human centered design' model would appear to make progress in putting community members at the center, but they generally attribute more power, control, and insight to the visiting students than the community partners. This talk will examine the possible pitfalls of design and other partnerships, with the goal of forming more just and respectful relationships, and yielding better outcomes.

11:30 – 12:30 LUNCH

Jolly Scholar, Thwing Center

12:30 p.m. – 2:00 p.m.

SSI 2019 Closing Plenary and Adjournment

SENCER: Past, Present, and Future

Clark 309

Eliza J. Reilly

National Center for Science and Civic Engagement

Jay Labov

National Academies of Sciences, Engineering, and Medicine (Retired), SENCER Sr. Fellow

This session will close out the 2019 SENCER Summer Institute with a look back at the intellectual and organizational origins of SENCER, and some reflections on its nineteen years of growth, development and innovation. It will offer a report on NCSCE activity since last year, new partnerships, next steps, and announcements about upcoming meetings and initiatives. Participants will be invited to offer closing remarks and observations about the way ahead for science education and civic engagement.

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