

Mar 22nd, 7:00 AM

## STEM Conference 2018

Institute for Interdisciplinary STEM Education, Georgia Southern University

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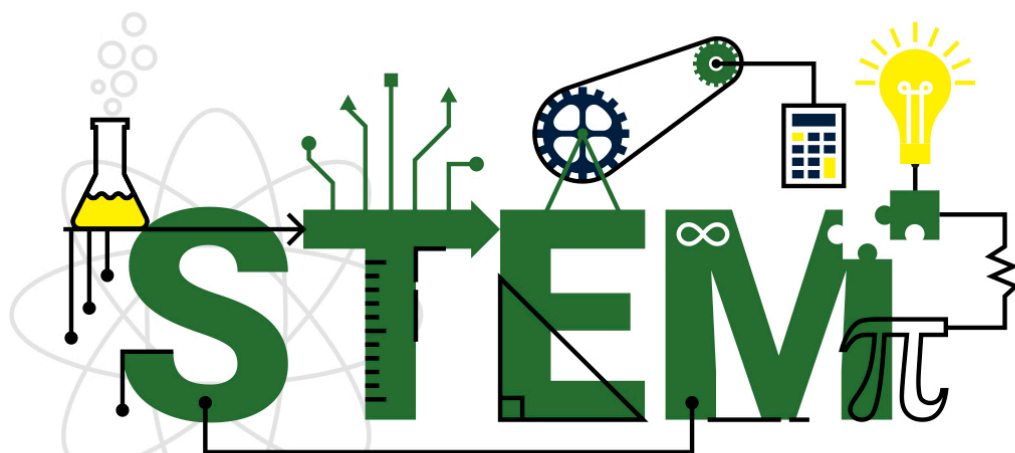
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Interdisciplinary STEM Teaching & Learning Conference

7th Annual i<sup>2</sup>STEM<sup>e</sup> Conference

March 22-24, 2018  
Coastal Georgia Center | Savannah, GA

## Special Thanks

*Thank you to our exhibitors!*



*Thank you to our committee members!*

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*STEM Outreach Specialist, i<sup>2</sup>STEM<sup>e</sup>,  
Georgia Southern University*

**Kania Greer**

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## Thursday, March 22

**6:00 PM** Conference Reception | Embassy Suites, Savannah, GA  
Poster Presentations

## Friday, March 23

**8:00 AM** Registration

**9:00 AM** Keynote, Myles Boylan

**10:15AM** Workshop 1 (90 minutes)

**10:15 AM** Session 1 (45 minutes)

**11:30 AM** Session 2 (20 minutes)

**12:00 PM** Lunch on Your Own, Visit Savannah

**1:45 PM** Keynote, Robert Hodgdon

**3:00 PM** Workshop 2 (90 minutes)

**3:00 PM** Session 3 (45 minutes)

**4:00 PM** Session 4 (20 minutes)

**4:30 PM** Closing Remarks

**5:15 PM** Enjoy Savannah

## Saturday, March 24

**8:00 AM** Registration & Breakfast

**8:30 AM** Student Showcase of STEM Projects

**10:00 AM** Workshop 3 (90 minutes)

**10:00 AM** Session 5 (45 minutes)

**11:00AM** Workshop 4 (90 minutes)

**11:00AM** Session 6 (20 minutes)

**11:30AM** Session 7 (45 minutes)

**12:30 PM** Session 8 (20 minutes)

**1:00 PM** Interactive Lunch Workshop

**3:00 PM** Closing Remarks/Conference Adjourns

# Speakers

## Keynote Speakers



### **Myles Boylan**

B.S., M.S., Ph.D.

Program Director (Emeritus) for Education & Human Resources,  
National Science Foundation

#### ***What is Effective Education and How do We Get There?***

Friday, March 23 | 9:00AM

Myles Boylan has been a Program Director at the National Science Foundation (NSF) in the Division of Undergraduate Education from 1996. Since 2009, he has co-led TUES (Transforming Undergraduate Education in STEM), WIDER (Catalyzing Institution-Wide Implementation of Evidence-Based Teaching Methods), and IUUSE (Improving Undergraduate STEM Education). His IUUSE program work has increasingly emphasized institutional transformation.

Myles' doctoral work was in industrial economics. He held a variety of academic appointments before joining the NSF. His academic research focused on the process and diffusion of technological innovation and at NSF is currently focused on accelerating the diffusion and propagation of effective teaching.



### **Robert Hodgdon**

7th Grade Life Science Teacher, Richmond Hill Middle School

#### ***The Rewards of Determination When Building a STEM Experience for Students***

Friday, March 23 | 1:45PM

Robert Hodgdon has been serving students for nearly 26 years as a behavioral intervention specialist, special education teacher, social studies teacher, and science teacher. He is a graduate of the University of Maine, Orono and Saint Michael's College in Vermont. For the past 13 years he has taught 7th Grade Life Science at Richmond Hill Middle School, the last four as the advanced content/gifted Life Science teacher. Robert also served on the State of Georgia Standards Revision Working Committee in 2016 and is a regular contributor to the Georgia Science Teacher Association's eObservations monthly newsletter. He is a member of the GSTA, NSTA, and NABT in addition to several local conservation groups. He currently lives in Richmond Hill with his wife, Stacey, a special education teacher for Savannah Chatham Schools, and his children Abigail and Connor.

## Featured Speakers



### **Sarah Bent**

M.A.

Mount Holyoke  
College  
(p. 23)



### **Felicia Cullars**

M.S. Ed.

Georgia Department  
of Education  
(p. 21)



### **Caitlin Daugherty Kokenes**

MSPP

Georgia Partnership  
for Excellence in  
Education  
(p. 21)



### **Scott Scheidt**

Doctoral Candidate  
Georgia Southern  
University,  
Armstrong Campus  
(p. 16)



### **Beth Smith**

M.S.

Texas Instruments  
(p. 16)

Thursday, March 22

6:00–8:00 PM

Poster Presentations

## **Building a Strong Foundation: Using a Shared Elementary Field Experience for Pre-Service STEM Educators**

*Kristin Apraiz, University of Florida*

We will present our redesigned initial field experience for pre-service secondary STEM educators in an undergraduate teacher preparation program for math and science teaching in grades 6–12. We collaborated with a local elementary afterschool program to prepare and teach STEM lessons each week during the semester. We will share information about the organization of the semester schedule to plan and implement 12 weekly-shared teaching experiences, details about our planning process in class and using online collaboration tools, insights gained during the shared teaching experiences, and the ways in which we debrief lessons and scaffold student reflection and self-evaluation. Finally, we will address the value of this experience as a foundation for preparing middle and high school STEM teachers.

## **Collaboration Between University of Alabama at Birmingham Center for Community Outreach Development (UAB-CORD) and Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) Birmingham**

*Melik Dizbay-Onat, University of Alabama at Birmingham*

GEAR UP is a competitive funding mechanism from the U.S. Department of Education that increases the number of low-income, minority students who are prepared to enter and succeed in postsecondary education. In 2014, the Birmingham City School (BCS) district, located in north central Alabama, was awarded a \$19.6 million GEAR UP grant. In addition to UAB-CORD programs, GEAR UP students receive tutoring, mentoring, advising from counselors, summer academic enrichment, and financial literacy skills. The current GEAR UP Birmingham cohort consists of 3,560 students, who will be followed for seven years. CORD offers K-12 students and teachers from all areas in-depth, hands-on, inquiry-based science experiences both during the school year and in summer programs. The partnership between UAB-CORD and GEAR UP Birmingham provides lab experiences designed to expose students to a wide breadth of STEM fields. Current subjects include various disciplines of engineering, computer science, mathematics, physics, and biology. These subjects are taught over a three-day hands-on lab experience.

## **Effectiveness of Homework Intervention in Impacting Scientific Reasoning Skills as Measured by the Classroom Test of Scientific Reasoning**

*Beulah Narendrapurapu, Georgia Southern University*

Students at risk of unsuccessful completion in college chemistry are reported to do poorly in tests of scientific reasoning. Literature reports a relationship between scores on validated scientific reasoning tests to standardized chemistry exam scores. Researchers in this study were interested in the importance of scientific reasoning skills to success in college chemistry. Studies were done on the relationship between the Classroom Test of Scientific Reasoning (CTSR) and final exam score for Georgia Southern University chemistry students. In addition, researchers determined the effectiveness of homework intervention in facilitating development of scientific reasoning skills and improving scores on the CTSR. Pre- and post-tests of the CTSR were used to indicate the effectiveness of the intervention.

## **Enhancing STEM Education for Student Success**

*David “Dylan” John, Georgia Southern University*

*Yunfeng (Cindy) Chen, Georgia Southern University*

*Shahnam Navaee, Georgia Southern University*

The objective of this study is to bridge a gap between skills emphasized in STEM curriculum, and skills expected by industry professionals. First, a qualitative study was conducted with students and industry practitioners to identify a preliminary list of skills with literature evidence. A list of 20 skill indicators were identified and ranked by industry practitioners on a Likert scale through a quantitative survey. The rankings were based on Mean score and Standard Deviation. The findings are expected to provide valuable insight into skills that should be further incorporated within the STEM curriculum.



## Thursday Schedule

### **Observatories at the Extreme Chilean Telescopes**

*David Lockett, Lake Wells Charter School*

The Astronomy in Chile Educator Ambassadors Program (ACEAP) is a National Science Foundation funded program that brings amateur astronomers, planetarium personnel, and K-16 formal and informal astronomy educators to US astronomy facilities in Chile. The ambassadors visit Cerro Tololo Inter-American Observatory (CTIO), Gemini-South Observatory, and the Atacama Large Millimeter-submillimeter Array (ALMA) along with smaller tourist observatories. In addition to their research, ambassadors also participate in local school outreach. In 2016, nine ambassadors were chosen from across the United States to travel to Chile and learn about the observatories, researchers, and science being conducted. The presenter will highlight those experiences and how group-discussion was used to engage students.

### **Preliminary Study for STARS (Self-Tracking, Assessment and Reflection Study) in Organic Chemistry Course**

*Isabel Thomas, Georgia Southern University*

The most successful students learn to master skillful application of time management techniques, while less successful students often struggle in this arena. Researchers in this study are interested in how the use of instructor-designed time management tools and intervention techniques relate to success as measured by exam grades and course grades in organic chemistry. The presenter recruited two sections of organic chemistry; the control and experimental sections were both given time management tools. The experimental section had the tools in the form of a calendar along with weekly intervention by the instructor defined by checking during lab time to see if students were using planning sheets and using small amounts of class time to emphasize various time management techniques. Surveys were given to both groups to ascertain whether the tools were used and how their helpfulness was perceived.

### **Solar Energy R&D Project: Teachers Incorporating STEM-Modules to Yield an Energy Literate Generation**

*Tricia Kirkland, Southeast Bulloch Middle School*

The purpose of this research was to design a dual axis tracking solar panel with microcontroller and sensors that was both efficient and cost effective. The sensors used to determine performance of the solar tracker depending on environmental factors include light, temperature, and humidity. SolidWorks software was used during the designing process to create a base and frame to house the two servo-motors, solar panel, and Arduino. The two motors moved the solar panel on the vertical and horizontal axis depending on the azimuth and elevation to allow optimum energy to be captured by the solar panel with the ability to track the position of the sun with an accuracy of  $\pm 1^\circ$ . A Ni-Cd 12V battery was used to store the energy captured by the solar panel. An Arduino microcontroller was used to collect information from the sensors and to control the motor movements, while a micro-SD card reader was used to collect the data of temperature, humidity, voltage, and time. Analysis of data showed temperature and power produced by the solar panel were directly proportional.



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## Friday, March 23

**8:00 AM-4:00 PM**

Lobby

**Registration**

**9:00-10:00 AM**

Auditorium (100)

**Keynote**

**What is Effective Education and How do We Get There?**

*Myles Boylan, Program Director, National Science Foundation*

This keynote presentation will focus on strategies for improving STEM education as well as pathways to institutional transformation.

**10:00-10:15 AM**

**Visit Exhibitors**

**10:15-11:45 AM**

Rooms 111/113/115

**Workshop 1 (90 Minutes)**

**Make Learning Meaningful with Interdisciplinary Lessons**

*Michele Dodge, Reinhardt University, Cherokee County Schools*

*Phil Dodge, Cherokee County Schools*

This workshop's activities are centered on the Middle Child, grades 4-8. Participants will experience and plan for interdisciplinary lessons. These lessons include Science and Technology along with other disciplines. Examples include but are not limited to the integration of Literacy and Science, and Social Studies and Science with Technology. Participants will begin this session as a learner with hands-on activities, and will follow up by generating lesson plans of their own. Participants will leave with clear understanding of what it takes to bring an interdisciplinary lesson to the next level, and then implement it in their own classroom in a meaningful way that supports content standards.

**10:15-11:00 AM**

**Session 1 (45 minutes)**

Room 210

**Student Superhero STEM: Making Superheroes out of ALL Students**

*Brandon Chason, Bessie L. Baggett Elementary School*

*Karen Buckner, Bessie L. Baggett Elementary School*

STEM in the Special Education and Gifted classrooms is guided through teacher-led instruction and challenges. A student-led STEM design challenge using technology applications gives the student superhero controls. Learn how to use multiple applications gives both gifted and special education students the designing power behind their own design ideas. The presentation will show how a classroom of students can use the Engineering Design Process to create their own project challenge. Students can take their plans and create digital presentations of their designs for others to follow. In a classroom with limited technology, this project gives students the opportunity to work in a flipped classroom format. During the presentation, the audience will see how to flip the Engineering Design Process for students to critically think and use higher order thinking skills in their design. The audience will see student work and other technology used by special education and gifted students.



## Join us for Saturday's Lunch!



**Project, Problem and Place Based Learning  
Mathematizing the Science: An Interactive Working Lunch**

Saturday at 1:00 PM | Rooms 111/113/115

Collaborate with others in an exciting working lunch! Engage and explore data gathering and math modeling of science concepts for best practices in project, problem and place based learning!



# Friday Schedule

Room 211

## **Graph it Out! Create Graphing Manipulatives to Explore Evolutionary Selection**

*Emily Harbert-Surber, Clayton State University*

*Cassie Lawrimore, Fayette County High School*

Students often struggle with the relationship between mathematical graphs and the data they represent. Truly, to understand the types of evolutionary selection, students need to be proficient with several different skills in math, science, and literacy contexts. With math, students must be able to identify variables, design appropriate graphs based on those variables, and convert data to graphical format. With science, students must be able to relate identified variables to scientific classifications and interpret those classifications based on evaluation of the scenarios presented. With literacy, students must be able to comprehend, dissect, and interpret a given passage. This presentation provides a cross-curricular approach to teaching about types of evolutionary selection by making and using graph-modeling manipulatives. Though the examples provided in this presentation are focused primarily for biology teachers, anyone who teaches students to interpret graph data could find the graphing manipulatives to be a useful tool as well.

Room 212

## **Ag in the Classroom: A Win for All**

*Tricia Kirkland, Southeast Bulloch Middle School*

*Jennifer Carroll, Carroll County Schools*

This presentation will focus on the methods and models of integrating STEM subjects and agricultural topics into an elementary classroom setting. One model is the Cluster School model of agricultural integration, which we titled “Ag in the Classroom.” We have created a partnership where our high school students teach our elementary students according to our state Science and Math standards, all while tying STEM and Agricultural Education concepts into the lesson. Additionally, a portion of the presentation will focus on the use of an agricultural pathway to obtain our STEM certification. Items that will be shared include local, state, and national resources, grant opportunities, and field trip experiences.

Room 217

## **Putting Lab into Lecture**

*Samantha Russell, Grand Canyon University*

Engineering classes at any level are divided into two separate components—lecture and lab. Often these two classes have little to no direct relationship, being taught by two different instructors with different objectives. Students struggle to see the relationship between the theory from lecture and the applications in lab. To bridge the gap, lab must be brought into the lecture. Students must experience the theory by building, measuring, and exploring the concepts. Instructors can bring these experiences into the classroom by breaking labs up into smaller activities that relate closely to the theory. This is not to say that larger labs should be eliminated, rather they should be augmented with minilabs embedded into the class. Example applications from electrical engineering courses will be shared and a discussion will follow of how to apply this in various courses.

Rooms 218/220

## **Grounding STEM Education Programs in NGSS Practices**

*David Lockett, Lake Wales Charter School*

Are you interested in exploring ways to support classroom teaching and integrating the NGSS practices? Do you want to move towards an inquiry-based approach in which students take more responsibility for their learning? In this presentation, participants will learn how to shift their existing STEM curriculum to align with NGSS. Participants will also discuss and learn the fundamentals of inquiry-based instruction, how to ask investigable questions, planning, and sharing results. Discover and share a multitude of hands-on approaches, curriculum, and to activities to discover how the NGSS design process can be brought into the STEM classroom. Learn to provide more responsibility to your learners: Utilize student engagement, curiosity, excitement, inventiveness, and joy of learning. Curriculum topics include indoor and outdoor activities, fieldwork experiences, data collection, and analysis. Takeaways include inquiry-based instruction, investigable questions, planning, and sharing results. Learn how to “shift” or change existing science activities into authentic inquiry-based activities that integrate NGSS science practices.

Room 221

## **The Real STEM Project**

*Robert Mayes, Georgia Southern University*

Often the STEM disciplines are taught within disciplinary silos independent of each other. When taught in this manner students miss the opportunity to participate in the interrelationship between the STEM disciplines, resulting in missed opportunities to build some of the important critical reasoning skills that are crucial to solving real problems. The Real STEM project focused on the development of interdisciplinary STEM experiences for students. The project was characterized by sustained professional development which was job-embedded, competency-based, and focused on the development of five STEM reasoning abilities within real-world contexts. The project promoted inclusion of tasks that drew on multiple STEM disciplines, embraced the use of authentic teaching strategies, and supported development of collaboration through interdisciplinary STEM professional learning communities and engaging STEM experts from the community. The presenter will emphasize four tenets of the project, and highlight the key findings.

**11:00-11:30 AM**

## **Visit Exhibitors**

**11:30-11:50 AM**

## **Session 2 (20 minutes)**

Room 210

## **Gamification of the Science Classroom: An Investigation of the Use of an Online Gaming Platform to Improve Student Performance**

*Rebecca Wells, Georgia Southern University, Armstrong Campus*

*Kaitlyn Demirjian, Camden County Middle School*

*Britton Hammel-Cobb, Winsor Forest High School*

*Lauren Kelly, STEM Academy at Bartlett, Georgia Southern University, Armstrong Campus*

*Charlton Riegner, STEM Academy at Bartlett, Georgia Southern University, Armstrong Campus*

Gamification is an instructional strategy recently introduced to K-12 classrooms where token economies are often used for behavior management. Previous research indicates that both entities can improve student motivation, learning, classroom participation, and behaviors. (Barlow & Fleming, 2016; Boniecki & Fleming, 2003; Buckley, Doyle, & Doyle, 2017). This multi-semester study is in progress and aims to determine if using gamification in the science classroom prompts improvement in student engagement resulting in better academic performance. The platform, Classcraft, has a built-in token economy system. This study is taking place in the classrooms of five teachers in two local public middle schools and one local high school. Content and grade levels include 7th grade Life Science, 8th grade Scientific Research, and 9th grade Environmental Science. Many of the students in these courses are low-level learners and/or students with an IEP, a 504, or a BIP. Preliminary data shows that gamification with token economy is having a positive impact on student learning and engagement.

Room 211

## **Business Engagement in STEM Workforce Development**

*Melinda Moore, University of Georgia*

*David Tanner, University of Georgia*

The Carl Vinson Institute of Government at the University of Georgia was awarded the President's Interdisciplinary Seed Grant to study business engagement in STEM workforce development. This session presents initial findings on how business engagement in K-12 and college STEM programs may impact students' decisions to pursue STEM education and careers. During FY17-18, the Institute of Government held eight focus groups with key stakeholders in STEM education, including K-12 STEM teachers and business partners, and university STEM faculty and business partners. Findings will include participants' perceptions of business engagement and student achievement (e.g. existing partnerships, student outcomes resulting from business and STEM partnerships, and ways to measure levels of business engagement). Focus group findings will inform the development of the business engagement index to support workforce development in STEM. Attendees will have the opportunity to provide feedback and insight after an in-depth discussion of the findings.

## Friday Schedule

Room 212

### **Using Google Forms to Inform Teaching Practices**

*Ha Nguyen, Georgia Southern University*

*Heidi Eisenreich, Georgia Southern University*

*Eryn Stehr, Georgia Southern University*

Do you need a quick way to assess your students' learning and identify misconceptions? Are you tired of collecting and/or grading papers? Google Forms can help, especially with some newly added features such as checkbox grids, intelligent response validation, and automatic grading. Through interactive activities during this talk, participants will hear about several uses of Google Forms to gather data, engage student learning, and create and score assessments. Additionally, participants will learn how to shorten an URL link with a desired name and generate a QR code for instant access to the link. This session can be beneficial to all K-College educators.

Room 217

### **The Effects of Integrating Lego Robotics into a Mathematics Curriculum to Promote the Development of Proportional Reasoning**

*Shelli Casler-Failing, Georgia Southern University*

This mixed methods, action research case study sought to investigate the effects of incorporating LEGO robotics into a seventh-grade mathematics curriculum focused on the development of proportional reasoning through the lens of Social Constructivist Theory. Quantitative data was collected via a pre- and post-test from the mathematics class of six students. Qualitative data was collected from each of the students as they worked in groups of two to complete purposefully designed investigations and activities, from whole class discussions, and student artifacts. The quantitative analysis showed development of proportional reasoning skills with the greatest increase being from low-performing students. The qualitative analysis supports the inclusion of robotics as an avenue to promote student engagement and discussion as the students develop proportional reasoning skills. Overall, the inclusion of robotics was productive for learning; however, future studies should be completed, on larger student populations, as a means to validate the quantitative findings and continue to improve the curriculum via action research.

Rooms 218/220

### **Using Cartoons to Make Connections and Enrich Mathematics**

*Janet St. Clair, Alabama State University*

This presentation will discuss the integration of cartoons into a finite mathematics college course. However, cartoon integration is appropriate for any educational level STEM course. The presenter and their students used an online comic strip creator, MakeBeliefsComix.com, to create cartoons that connected concepts to the real world and history. Following Cho, Osborne, and Sanders (2015), students wrote a paragraph about their cartoon and its mathematics. In addition to connecting mathematics to art and writing and unearthing students' creative side, cartoons helped show the humanistic side of mathematics and promote communication and excitement about mathematics. The presenter developed a rubric to evaluate students' cartoons. There was evidence that students who did cartoons were better able to explain a concept and give examples of its real-world connection than those who did not. The presentation has potential to encourage the audience to brainstorm about cartoon integration in their courses.

**Enjoying the conference?  
Share what inspires you!**

**#iSTEMTL18**

Room 221

## **Augmented Reality Chemistry: Transforming 2D Molecular Representations into Interactive 3D Structures**

*Derek Behmke, Georgia Gwinnett College*

*David Kerven, Georgia Gwinnett College*

*Robert Lutz, Georgia Gwinnett College*

*Julia Paredes, Georgia Gwinnett College*

*Richard Pennigton, Georgia Gwinnett College*

*Evelyn Brannock, Georgia Gwinnett College*

*Michael Deiters, Georgia Gwinnett College*

*John Rose, Georgia Gwinnett College*

*Kevin Stevens, Georgia Gwinnett College*

Spatial reasoning is defined as “the ability to generate, retain, and manipulate abstract visual images.” In chemistry, spatial reasoning skills are typically taught using 2D paper-based models, 3-D handheld models, and computerized models. Research has shown that increased spatial reasoning abilities translate directly to improved content knowledge. The recent explosion in the popularity of smartphones and the development of augmented reality apps for them provide a yet to be explored way of teaching spatial reasoning skills to chemistry students. Augmented reality apps utilize the camera on a smartphone to turn 2D paper-based molecular models into 3D models the user can manipulate. This presentation will discuss our development of an augmented reality app that transforms 2D molecular representations into interactive 3D structures. Attendees will participate in a series of interactive activities to demonstrate the use of the app in the collegiate chemistry classroom.

**12:00-1:30 PM**

**Lunch On Your Own**

**1:45-2:45 PM**

Auditorium (100)

## **Keynote**

### **The Rewards of Determination When Building a STEM Experience for Students**

*Robert Hodgdon, Richmond Hill Middle School*

In October 2013, looking over the lessons prepared for the day, Robert Hodgdon reached the honest conclusion that we were teaching a lot *about* science, but we weren't *doing* a lot of science in our classes. Our state science standards were so general that in our attempts to prepare for anything we were trying to cover everything. Over the next four years, Robert engaged in an effort to figure out how to put the science back into the science class. He will share his experience incorporating opportunities for students to participate in real-world ecological monitoring, survey, and research activities with partners from state and federal wildlife agencies and without. He will also discuss how he transformed their campus into an outdoor classroom and slowly began to find activities to incorporate into lessons. Robert will address challenges from the process: finding partners, vetting activities, funding for equipment and technology, time constraints, and more. He will also highlight the pay-off: students engaged in authentic site-based, problem-based, service learning, and citizen science activities that reinforce the curriculum, increase student engagement and motivation, teach career readiness skills, and provide a legitimate service to our community.

Richmond Hill Middle School's efforts have been recognized at the state and national level by organizations such as the Georgia Science Teachers Association, Environmental Education Alliance of Georgia, Georgia Department of Natural Resources, U.S. Fish & Wildlife Services, National Environmental Education Foundation, U.S. Environmental Protection Agency, and the White House Council on Environmental Quality.

**2:45-3:00 PM**

Lobby

**Popcorn Bar Snack Break**

# Friday Schedule

**3:00–4:30 PM**

Rooms 111/113/115

## **Workshop 2 (90 Minutes)**

### **AMP-IT-UP: Science and Math Curriculum Modules to Cultivate the Next Generation of STEM Innovators**

*Sabrina Grossman, Georgia Institute of Technology*

*Jayma Koval, Georgia Institute of Technology*

*Jeffrey Rosen, Georgia Institute of Technology*

*Doug Edwards, Georgia Institute of Technology*

*Mike Ryan, Georgia Institute of Technology*

*Marion Usselman, Georgia Institute of Technology*

*Meltem Alemdar, Georgia Institute of Technology*

*Sunni Newton, Georgia Institute of Technology*

The Advanced Manufacturing and Prototyping Integrated to Unlock Potential (AMP-IT-UP) project is an NSF-sponsored Math and Science Partnership between the Griffin-Spalding County School System and Georgia Tech's Center for Education Integrating Science, Mathematics and Computing (CEISMC). The AMP-IT-UP curriculum consists of engineering coursework for middle and high schools and 1-week modules that integrate STEM practices for middle school science and mathematics classrooms. Three modules have been designed for each core math and science class across grades 6–8 to integrate the Georgia Standards of Excellence and the Next Generation Science Standards. Each module focuses on one of the practices of Experimental Design Data Visualization and Data-Driven Decision Making, integrates math and science content, and uses grade-level core ideas as a backstory to engage students. Middle school math and science teachers will experience hands-on activities associated with the modules, learn how to implement them, and receive access to all curriculum materials.

**3:00–3:45 PM**

## **Session 3 (45 minutes)**

Room 210

### **Selecting, Sequencing, and Connecting: Using Technology to Support Area Measurement through Tasks, Strategies, and Discussion**

*Eryn Stehr, Georgia Southern University*

*Ha Nguyen, Georgia Southern University*

*Jia He, Augusta University*

This session supports grades 3–5 mathematics teachers and coaches in considering how technology in the classroom can be used to support “low threshold, high ceiling” tasks and productive discussion. In this session, participants will interact with and share resulting strategies from an online task designed to be open to multiple levels of strategies, reveal misconceptions, and support students in developing more sophisticated, conceptual understanding of area measurement. We will present a sampling of strategies created by teachers (who were pretending to be elementary students) in past activities. Participants will select and sequence these strategies to align with chosen learning outcomes. We will discuss approaches to connecting strategies for deeper understanding of area measurement. Participants will gain access to a set of online tasks that are free and work on any internet-capable device.

**Note: Bring an Internet-capable device to the session!**

Room 211

### **Deepening Place Value Understanding in K–2 through Explanation and Justification**

*Heidi Eisenreich, Georgia Southern University*

*Andria Disney, Georgia Southern University*

This session is designed for K–2 mathematics teachers and instructional coaches. During the presentation, participants will experience the development of place value concepts in the context of a candy shop. They will make sense of place value through a rich task that requires math talk focused on explanation and justification. Participants will discuss possible student solutions and identify potential student misconceptions. A video of the task will be shared to give insight on how young children might engage in this task. Finally, participants will make connections between the content and process of this task and their own classroom context.

Room 212

## **Using Creative Writing to Facilitate Science Learning**

*Alma Stevenson, Georgia Southern University*

*Lacey Huffling, Georgia Southern University*

A literacy educator and a science educator, who worked collaboratively to create, implement, and refine science lessons during a week-long summer program for middle grade migrant students, will lead this session. The presenters created culturally responsive NGSS lessons that were infused with multiple literacy strategies culminating in a creative writing, where students incorporated the vocabulary and concepts learned, using story-boarding and Google Slides. Participants will engage in the mini-lesson and have a brief discussion on the components of the lessons based on NGSS, culturally responsive teaching, and literacy integration. Examples of student work will be shared for participants to get a more holistic idea of the full lessons developed and implemented by the presenters. Participants will leave with access to the full lesson plans, literacy strategies, and ideas about creating a collaborative group of peers to develop similar lesson plans.

Room 217

## **What Goes Right, When Things Go Wrong During a Project-Based Learning Field Experience**

*Gayle Evans, University of Florida*

*Kristen Apraiz, University of Florida*

According to the Partnership for 21st Century Skills (P21, 2009), today's students must move beyond the three Rs: reading, writing, and arithmetic—to master the “Four Cs”: critical thinking, communication, collaboration, and creativity. Project-Based Learning (PBL) fosters the skill building and inter-student interactions articulated in mathematical and science practices while engaging students to solve problems that are meaningful in local contexts (Krajcik & Blumenfeld, 2006). We will share the implementation of a semester-long PBL field experience with 5-8 graders in an afterschool setting with pre-service mathematics and science teachers (PST) using PST-designed PBL units focused on STEM concepts and using TI-Nspire technology as well as the successes and challenges encountered during the PBL field experience. We will also share lesson plans developed for the PBL unit using the TI-Nspire technology and opportunities to use TI-Nspires and motion detectors in a demonstration lesson.

Rooms 218/220

## **Strategies for Improving STEM Education: Pathways to Institutional Transformation**

*Myles Boylan, National Science Foundation*

This session will cover Writing an Effective Proposal to the Division of Undergraduate Education at the National Science Foundation. Participants will review an actual NSF proposal, discuss it in groups of 4-7 as if they were an NSF review panel, and then discuss their assessment with the broader group. Two NSF program officers will provide guidance on essential proposal features and will cover how to review proposals. Sanitized proposals will be provided in advance for attendees to read.

Room 221

## **Interdisciplinary Robotics**

*Bryan Fagan, Lumpkin County Middle School*

The challenges the presenter faces as an Engineering and Technology teacher are deciding what materials to use, what lessons to prepare, connecting activities to other disciplines and teaching career-relevant skills. The LEGO Mindstorms Robotics platform addresses all of these challenges. In this presentation, Dr. Fagan will share the practices he uses when teaching robotics, the challenging lessons he prepared, and how to monitor progress and provide direction. The presenter will share how he connected the robotics program to other disciplines such as Art, and Physical Science. Participants will gain an understanding of how to use a robotics kit in their classroom, how to prepare lessons for their students, and how to use the LEGO Mindstorms Robotics kits.

**3:45-4:00 PM**

## **Visit Exhibitors**



# Friday Schedule

4:00–4:20 PM

Session 4 (20 minutes)

Room 210

## **Content and Instructional Practice: A MSP Project**

*Janel Janiczek Smith, Georgia Southern University, Armstrong Campus*

Since October 2016, Armstrong's faculty has been working with SCCPSS teachers through an MSP-funded project. The CIP project focuses on math and science in 5th, 6th, and 8th grades. Design and implementation of the project will be discussed. Mid-project results will be presented along with plans for Year 2.

Room 211

## **Integrating Lego Robotics into a 5th Grade Cross Curricular Unit to Promote the Development of Narrative Writing Skills**

*Shelli Casler-Failing, Georgia Southern University*

*Mete Akcaoglu, Georgia Southern University*

*Valerie Woodrum, Nevils Elementary School*

*Valerie Morris, Nevils Elementary School*

*Jay McNeely, Nevils Elementary School*

This unit was designed to promote the development of narrative writing skills among 5th grade students using LEGO robotics. The students learned how to construct and program robots, write and present a proposal to complete a mission, and connected the learning to their personal experiences with Hurricane Irma. After learning the basics of building and programming robots, they were presented with a scenario similar to the impact of the bomb drop in Hiroshima—a city in ruins with survivors in need of supplies. Students took the role of engineers to work in pairs to create a proposal to pick up, and deliver, supplies through a specially designed course using their robots; mathematical skills were incorporated into their proposals by measuring distances and predicting travel times in order to traverse the course. A final culminating activity required the students to write a narrative piece to compare the activity to their personal experiences with Hurricane Irma. Informal findings and student feedback will be presented.

Room 212

## **Visualizing Geometrical Counterexamples Using Digital Tools**

*Tuyin An, Georgia Southern University*

*Ha Nguyen, Georgia Southern University*

In the presenter's study about pre-service secondary mathematics teachers' (PSMTs) understanding about the nature of theorems in geometry, they noticed that it was challenging for the PSMTs to visualize and draw counterexamples to disprove the given mathematical statements. The use of the dragging feature of some digital tools, such as The Geometer's Sketchpad (GSP), in teaching and learning critical proof and reasoning skills has been widely discussed, and has become an ongoing research trend. In this session, the presenters will introduce the background of the use of dragging feature in dynamic geometry environments and present two examples showing how this feature could be useful in helping learners find counterexamples for the two geometrical statements, and thus enhance their understanding about the meaning and usage of counterexamples in geometrical reasoning.

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Room 217

## **Using Active Learning Strategies in Calculus to Improve Student Learning and Influence Mathematics Department Cultural Change**

*Melissa A. Dagley, University of Central Florida*

*Xin Li, University of Central Florida*

*Brian Moore, University of Central Florida*

*Erin Saitta, University of Central Florida*

*Jacquelyn Chini, University of Central Florida*

*Michele Gill, University of Central Florida*

An interdisciplinary team of Physics, Education, Math and Chemistry faculty developed MATH-GAINS GAIN creating an ecosystem where Mathematics faculty persistently and sustainably apply active learning strategies in their teaching of Calculus courses. As a result of the implementation, MATH-GAINS proposed to affect positively the widespread adaptation of active learning strategies by department faculty as well as student learning, retention, and graduation of over 900 students annually. The objective of the session is to provide attendees with details on how the project was conceived and implemented; the instruments, research methodologies, and active learning strategies used; examples of faculty projects; and the preliminary results of the study. Results of the study add to the growing body of knowledge of how research-based instructional strategies designed in other STEM disciplines work in math courses, as well as an understanding of the critical factors that influence math faculties' teaching practices.

Rooms 218/220

## **Lesson Learned from PD on Problem-Solving and Sense-Making**

*Jennifer Albert, Citadel Military College of South Carolina*

*Robin Jocius, Citadel Military College of South Carolina*

*Richard Robinson, Citadel Military College of South Carolina*

*Deepti Joshi, Citadel Military College of South Carolina*

This presentation describes findings from a study of an integrated, interdisciplinary, and multi-faceted professional development program designed to support secondary mathematics teachers in integrating problem-solving and sense-making practices into their classrooms. We will discuss several elements of the PD, including computer science problem-solving sessions, mathematical literacy sessions, and a reflective video case study club, that supported teachers in increasing mathematical content knowledge and integrating interdisciplinary STEM instruction. Drawing on findings from a mixed methods analysis of survey results, teacher content knowledge tests, videotaped PD interactions, and classroom observations, we will offer implications for designing professional development programs to engage teachers in thinking critically about integrating interdisciplinary problem-solving and sense-making activities into content instruction.

Room 221

## **Writing Broader Impacts for Grants**

*Kania Greer, Georgia Southern University*

This session will look at what the broader impacts are on the institutional infrastructure, how to leverage resources, and what the experts and principal investigators have to say about broader impacts.

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## Friday & Saturday Schedule

**4:30–5:15 PM**

Auditorium (100)

### **Interactive Keynote**

*Scott Scheidt, Doctoral Candidate, Center for Applied Cyber Education, Georgia Southern at Armstrong Beth Smith, M.S., Texas Instruments*

The inclusion of cyber-focused education in the classroom today can be enhanced greatly by identifying and utilizing the best available opportunities for all children. We have all had to purchase a smart calculator at some point for our own or the work of our children in high school and college. The Georgia Southern Center for Applied Cyber Education is excited to partner with i<sup>2</sup>STEM<sup>®</sup> and Texas Instruments to promote the innovative contemporary use of technology integration to better prepare our youth to function in the cyber-focused world of tomorrow.

During this hands-on interactive session, participants will be exposed to opportunities to develop skills for 21st-century success through activities that help students explore, understand, and connect the principles of science, math, coding, engineering design, and electronics. Participants will use TI-Basic to program a TI graphing handheld to communicate with the TI-Innovator Hub and TI-Innovator Rover (robotic vehicle). Participants will learn how to engage students using this easy-entry into programming with activities that spark interest in coding, computer science, and robotics.

**5:15 PM**

### **Enjoy Savannah**

## **Saturday, March 24**

**8:00–8:30 AM**

Lobby

### **Breakfast**

**8:00 AM–1:00 PM**

Lobby

### **Registration**

**8:30–9:45 AM**

Rooms 111/113/115

### **Student Showcase of STEM Projects**

**9:45–10:00 AM**

### **Visit Exhibitors**

**10:00–11:30 AM**

Auditorium (100)

### **Workshop 3 (90 Minutes)**

#### **An Introduction to Using Geographic Information Systems (GIS) in the Classroom**

*Lisa Millsaps, University of Northern Iowa*

*David Jensen, University of Northern Iowa*

This interactive session will focus on examples of using GIS in multiple K-12 classroom settings, including but not limited to teaching climate change, history, natural hazards, and literature. Geographic information systems, or GIS, is an online mapping tool—used globally in a variety of professions (e.g., emergency management, city planning, engineering, scientific labs)—that is accessible and beneficial to use in the K-12 classroom! GIS helps us visualize, question, analyze, and interpret real data to understand relationships, patterns, and trends. Participants will not only walk through a demonstration of GIS' use and potential, they will partake in and practice using GIS with hands-on activities. Come join us—and bring your device!

**10:00–10:45 AM**

### **Session 5 (45 minutes)**

Room 210

### **STEM/STEAM @ Home**

*Sylvia Wallis, Heard Elementary School*

What do a book bag, an engineering book, and art supplies have to do with STEAM? In this session, you will find an easy and practical way to implement STEAM from school to home using STEAM book bags. Immerse your students and their families with constructive hands-on STEAM activities in one simple step. You will experience the benefits of the STEAM book bag through interactive demonstration to help you better understand the concept of STEAM@Home.

Room 211

## **Does More Engagement Lead to More Interest in STEM?: The Contribution of Extracurricular Activities in High School to Declaring a STEM Major In College**

*Rebecca Perdomo, University of Georgia*

*Karen L. Webber, University of Georgia*

While educators seek to learn what influences students' entrance, success, and retention in the STEM pipeline, few have examined the contribution of extracurricular activities to STEM engagement. Using data from the High School Longitudinal Study: 2009, guided by Social Cognitive Career Theory, and employing the concept of STEM educational dose (the amount of combined in- and out-of-classroom exposure to STEM study), this study examines the effect of extracurricular activities, high school course level, and course volume on college attendance and major intentions. Analyses also examine whether this relationship changes according to student characteristics (e.g., gender, race, parent education). Results of this study add to the limited body of research and can speak to the effectiveness of extracurricular activities in STEM persistence after high school.

Room 212

## **Using Notecards to Connect Area Formulas and Deepen Understanding**

*Heidi Eisenreich, Georgia Southern University*

*Ha Nguyen, Georgia Southern University*

*Tuyin An, Georgia Southern University*

This is a session for 5-7 grade mathematics teachers or instructional coaches. During the presentation, each participant will be given a notecard and scissors to construct new 2D-shapes using that notecard. Participants will use the area of the notecard to connect areas of the shapes. This interaction will help them (and their students) conceptually make sense of area formulas for a triangle, parallelogram, and square, starting with the area formula for a rectangle. Through this activity and the discourse around this activity, participants will be encouraged to collaborate and build on formulas explored earlier in the session to find possible formulas for the area of a trapezoid. This activity aligns with Mathematical Practice 7 (Look for and make use of repeated structure) and Grades 5-7 Geometry standards because students engage in visualization and spatial reasoning as they interactively compose and decompose shapes, and develop connections between area formulas.

Room 217

## **STEM Up Your Curriculum**

*Judy Ward, A.R. Johnson Health Science & Engineering Magnet School*

*Denise Cornwell, A.R. Johnson Health Science & Engineering Magnet School*

*Brian Williams, A.R. Johnson Health Science & Engineering Magnet School*

*Joseph Martin, A.R. Johnson Health Science & Engineering Magnet School*

*Robert Funsch, A.R. Johnson Health Science & Engineering Magnet School*

This session will focus on helping teachers use phenomena to design problem-based learning opportunities that integrate STEM to increase rigor and relevance in all science content areas. Participants will apply engaging student-focused activities that allow them to use critical thinking skills while solving real-world socially relevant problems as they work in collaborative groups. These activities are standards-based and encourage collaboration across different content areas. Presenters will guide participants through the process of planning a STEM-based unit with their colleagues and community sponsors that increase the depth of learning by breaking down the walls between classrooms. Participants will take home ready-to-go standards-based lessons and challenges that empower students to think outside the box to help them understand "why they need to know this."

# Saturday Schedule

Rooms 218/220

## **Planning for STEM with SMPs and SEPs**

*Janel Janiczek Smith, Georgia Southern University, Armstrong Campus*

Math, science, and technology teachers are often faced with planning for STEM lessons and units without a shared vision or vocabulary of content and pedagogy. One solution is to begin the planning stages with a shared discussion of the Standards for Mathematical Practice and the Next Generation Science and Engineering Practices as a guide. This interactive session will give background on the standards in their respective discipline as well as completing activities to compare and contrast the standards as they apply to K-12 classrooms. Several techniques for setting shared expectations of communication and data collection across math, science, and technology disciplines will also be shared. This interactive session will prepare teachers to discuss common elements of instruction as well as how to take the practices back to a PLC or school to engage one's peers.

Room 221

## **STEM-Sational Science with the Science Twins!**

*Donita Legoas, A.R. Johnson Health Science & Engineering Magnet School*

*Kristina Istre, A.R. Johnson Health Science & Engineering Magnet School*

STEM-Sational Science is a session in which we share our many cheap and easy STEM ideas and activities to use in your classroom. The activities will cover a variety of science standards in grades 1-7. This will be a hands-on session with visual samples and demos. All participants will receive a printed manual of all our activities with materials and procedures. So, come see us at STEM-Sational Science. You won't regret it!

**10:45-11:00 AM**

## **Visit Exhibitors**

**11:00 AM-12:30 PM**

Rooms 111/113/115

## **Workshop 4 (90 Minutes)**

### **Science Rotations**

*Debra Watson, Savannah-Chatham County Public School System*

The objectives of the session are for teachers to have a clear understanding of how to set the students in groups, what the stations would consist of, how to rotate the students, and also how to use cross curriculum to enhance the science topic. This is targeted for K-12 educators. Teachers will participate in science station rotations, in incorporating STEM activities through the rotations, and will gain knowledge of how to put students in groups, how to rotate, set up the stations as well as incorporate STEM activities and pull in your cross curriculum.

**11:00-11:20 AM**

## **Session 6 (20 minutes)**

Room 210

## **Creating STEM Opportunities in a K-8 School**

*Carolyn Rethwisch, Isle of Hope K-8 School*

*Barbara Serianni, Georgia Southern University, Armstrong Campus*

The objective of this session is to share the STEM integration experiences of a K-8 school resulting from collaboration among K-8 faculty, a local university, corporate sponsors, and a local historic site. Teaching and learning associated with a student astronaut club is the featured activity; presenters will share their first year experience of a middle school club that competed in NASA's Student Astronaut Challenge. Participants will learn how they can start their own astronaut club, how to integrate mathematics and engineering into the science classroom, and how to organize and plan extracurricular STEM clubs and activities that target students of all grade levels. This applied STEM education session will provide an overview of the school's projects, suggestions, and resources for creating similar activities, funding ideas, and a discussion of the challenges and learning outcomes of the student participants.

Room 211

## **A Personalized Metric for Effective Assessment of the Four Pillars of STEM Learning**

*Senthil Balaji Girimurugan, Florida Gulf Coast University*

At all levels of STEM education, it has become conventional to adopt a summative course grade based assessment. Even though this practice has been mostly effective, it does not offer a clear picture of a student's skill set. In particular, it does not correlate student abilities with the course grade. The proposed metric aims to assess a student on the four pillars of STEM learning: subject knowledge (S), technical/technological expertise (T), analytic abilities (A), and the ability to reason (R). The longitudinal metric assesses the student with every assignment. A cumulative score and a personalized portfolio can also be developed for a student using the metric. This would offer a formative assessment of the student. The presentation will describe the methodology behind collecting data, developing a cumulative score, creation of a portfolio using the metric, and the challenges instructors might face in implementing this strategy in the classroom.

Room 212

## **Using Supplemental Instructors to Bridge Math and Science**

*Donna Mullenax, Georgia Southern University, Armstrong Campus*

The transfer of math knowledge and skills to science classes has always been a point of interest in science education. The preliminary results of using supplemental instructors as a method of integrating science topics and problems in a pre-calculus class will be presented. Survey results will include students' view of the relevancy of the math course to their major and future courses.

Room 217

## **The Effects of Acute Omega-3 Supplementation on Delayed Onset Muscle Soreness and Recovery**

*Colin Butler, Georgia Southern University, Armstrong Campus*

*Gregory Ryan, Georgia Southern University*

*Stephen Rossi, Georgia Southern University*

Delayed-onset muscle soreness (DOMS) is the feeling of discomfort that occurs after being exposed to unaccustomed eccentric resistance training. Previous research has shown positive effects with omega-3 fatty acid (O3FA) supplementation to ameliorate DOMS. The purpose of this study is to investigate the effects of acute O3FA supplementation on DOMS, perceived ratings of exertion, and recovery after a prescribed lower body resistance training protocol in college-aged males. Twenty college-age males between 18-24 years old will be recruited from a southeast university. In this crossover study, participants will be randomly assigned to placebo (olive leaf oil) or experimental (O3FA) group totaling 3,000 mg of O3FA per day. A pre-determined 10-repetition maximum (10RM) for the leg press, leg extension, and lying leg curl exercises will be used for all testing sessions. Data will be collected using the Omni Sense RPE, PRS scale, and VAS for perceived muscle soreness.

Rooms 218/220

## **STEM Night: Engaging Students in Hands-on, Inquiry Activities**

*Michelle Thompson, Effingham College & Career Academy*

STEM Nights are great opportunities to engage students in hands-on, inquiry activities that encourage collaboration and critical thinking. Two different models of STEM Nights will be presented. The first will be a model used as a recruiting tool for rising 9th grade STEM students at the Effingham College and Career Academy (ECCA). The second model highlights the Elementary STEM Night held at Marlow Elementary School and developed by the STEM Academy students at ECCA. Session participants will be given access to the ECCA STEM website that contains planning tools and activities used in both of these models.



# Saturday Schedule

Room 221

## Looking for Resources for Your Science Classroom?

Lacey Huffling, Georgia Southern University

Britt Gantt, Georgia Southern University

Kristen Lecomte, Georgia Southern University

Zach Weaver, Georgia Southern University

Since its inception in 1989, Project Sense at Georgia Southern has provided science teaching kits for K-12 classrooms. These kits cover topics in earth, life, and physical sciences. With the new Georgia Science standards, the university is working to re-align the Project Science kits as well as infuse inquiry teaching practices within the lesson. Come to this session to experience hands-on, inquiry lessons from Life Science kits that have been redesigned by three Georgia Southern M.A.T. students. Engage in conversation with other science educators on how to infuse further inquiry into lessons. Leave with lesson plans and provide feedback on how Project Sense can best support teachers.

11:20-11:30 AM

## Visit Exhibitors

11:30 AM-12:15 PM

## Session 7 (45 minutes)

Room 210

## AMP up STEM learning in Middle School Connections Class

Jeffrey Rosen, Georgia Institute of Technology

This suite of 18-week STEM-ID engineering courses present students with a series of challenges, culminating in a design challenge, all set within a particular context. The challenges focus broadly on themes such as data, visualization, and systems, but also include reinforcement of appropriate math and science skills. The activities are hands-on, and any worksheets are delivered in an electronic format wherever possible (e.g., calculations are done in a spreadsheet, both with and without the use of built-in formulae.) The STEM-ID courses have been iteratively designed based on feedback from teachers and observations of the course in action. Our research results show that students who have taken at least two STEM-ID courses show statistically significant gains on state-level standardized science and math tests over those students who were never enrolled in these courses. Further, the results show a statistically significant increase in cognitive, emotional, and behavioral engagement in STEM and in academic self-efficacy. This session will provide an overview of each of the 6th, 7th, and 8th grade courses with some deeper explanations of introductory challenges. Session attendees will be able to access freely the complete suite of curriculum following the session.

Room 211

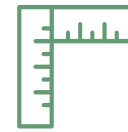
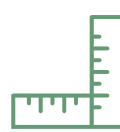
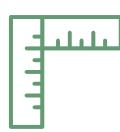
## Building a Sustainable Powerhouse

Laura Mills, Screven County School System

Aaron Specht, Savannah-Chatham County Public School System

Racheal Grillo, Stockbridge High School

Energy education is all around us. This hands-on inquiry-based activity can be incorporated into any course, which looks at energy. Through project and problem-based learning participants will develop ideas and solutions to issues of home energy efficiency and alternative energy sources. Participants will learn how to engage students around real-world problems of energy consumption and waste and get hands-on in the design and development of their own Powerhouse. Low cost alternatives will be provided and take-home supplies are available.



Room 212

## **Fostering Pre-Service Teachers' Understanding of Basic Arithmetic Principles**

*Veena Paliwal, University of West Georgia*

Arithmetic properties (commutative, associative, distributive, identity and inverse) provide one of the most critical avenues to higher-level thinking and conceptual understanding. The present study was designed to promote understanding and the use of arithmetic properties among 65 pre-service teachers enrolled in two Foundations of Numbers and Operations classes. The intervention employed involved using various models to promote conceptual understanding of the arithmetic properties and use them as a problem-solving tool while identifying any possible misconceptions. A pre- and post-test design was employed. The results revealed that the intervention was effective in promoting the understanding of the commutative, associative, identity, and inverse properties, and was somewhat effective in promoting understanding of the distributive property. The intervention also resulted in increasing participants' confidence level for using arithmetic properties to use as a problem-solving tool and addressing misapplication of the properties. The findings reveal an urgent need for pre-service teacher training programs to focus on content knowledge, and identifying and improving the areas where content knowledge is lacking.

Room 217

## **The Ecosystem Beneath the Tree**

*Kimberly Thomas, Carroll County Schools*

This session will focus on what inhibits our litter beneath the trees with a yearlong project for students to explore in the outdoor classroom setting. Fourth graders will explore and discover what lies beneath the tree while fifth graders discover plant and animal cells. Additionally, students will journal their findings and graph the monthly data results they collect. STEM lessons are leading the way—join the excitement!

Rooms 218/220

## **Georgia STEAM Asset Map**

*Caitlin Daugherty Kokenes, MSPP, Georgia Partnership for Excellence in Education*

The STEAM Asset Map is designed to show where investments have been made in STEM and STEAM education across Georgia. There are several layers of information in the map including information on schools, out-of-school opportunities, grants, and area conditions. The STEAM Asset Map is a tool for investors, advocates, parents, teachers, and students.

Room 221

## **STEM Education in Georgia**

*Felicia Cullars, M.S. Ed., Georgia Department of Education*

The Georgia Department of Education is dedicated to preparing students for the 21st Century workplace by providing high quality educational opportunities in science, technology, engineering, and mathematics (STEM) fields. In Georgia, STEM education is defined as an integrated curriculum (as opposed to science, technology, engineering, and mathematics taught in isolation) that is driven by problem solving, discovery, exploratory project/problem-based learning, and student-centered development of ideas and solutions. This session will highlight the Georgia Department of Education STEM Certification process and the impact of STEM education in Georgia.

**12:15-12:30 PM**

**Visit Exhibitors**



# Saturday Schedule

12:30–12:50 PM

Session 8 (20 minutes)

Room 210

## **Assessment of Practice-Focused Middle School Science Modules**

*Sunni Newton, Georgia Institute of Technology*

*Jessica Gale, Georgia Institute of Technology*

*Meltem Alemdar, Georgia Institute of Technology*

*Stefani Wind, University of Alabama at Tuscaloosa*

AMP-IT-UP is an NSF-funded K-12 program intended to promote math, science, and engineering learning through STEM integration-focused curricula. As part of this program, one-week modules were designed to teach specific science practices within the context of the appropriate grade-level content. Nine science modules were created, one focused on each practice (data visualization, experimental design, and data-driven decision making) at 6th, 7th, and 8th grade levels. In this presentation, we will focus on our assessment of the implementation of these modules across four middle schools during the 2016–2017 academic year. We will present our methodology for assessing this complex instructional effort, which includes classroom observations, online implementation surveys, and online teacher discussions about their experiences implementing the modules. We will also provide results from our pre- and post-assessments of student learning. Overall, the results indicate positive teacher experiences as well as significant increases in student learning in some modules.

Room 211

## **Open Education Resources in STEM Education**

*Scott Kersey, Georgia Southern University*

Open Education Resources provide students wide educational opportunities while freeing them of the burden of purchasing costly course materials. It has been shown in many studies that students perform just as well in OER classes as in classes using the traditional format. In this session, the presenter will describe the basic philosophy of OER, and present his experiences using OER course materials (OpenStax textbook and WeB-WorK) in Calculus. As well, we discuss the potential for interdisciplinary focus between mathematics and other STEM classes, and describe the development of the course Calculus for Engineers using OER. In this connection, OER materials provide the flexibility of designing courses.

Room 212

## **An Exploration of Climate Change in the K-12 Classroom**

*Lisa Millsaps, University of Northern Iowa*

*David Jensen, University of Northern Iowa*

Have you ever wondered how climate change is taught and portrayed in the school-age classroom? How current science is being translated and used to teach the next generation? This work explores the studies of climate change education occurring in North America. It seeks to understand the educational methods and content foci suggested as reliable practices in climate change education using a qualitative analysis of academic literature on teaching climate change. Findings summarize how climate change is taught, what recommendations are being made, and identifies opportunities for growth, and other possible concerns.

Room 217

## **People, Pressures, Progress, and a Plea: Collaboration to Create a STEM Center**

*Greg Baugher, Penfield College, Mercer University*

*Zipangani Vokhiwa, Mercer University*

Please join us for a report on our journey, the progress, and issues encountered as we attempt to focus our ideas and energies toward a common goal: the development of a STEM center to support our students and to reach out to the community at large. Start with a menagerie of personalities and interests, add even more as we seek to enlarge our task force, and you get a mix that seems overly difficult to meld into a single mindset. Then, after much collaboration on a tentative proposal, we decide to switch gears and seek funding to support the hosting of a conference to bring all the interested parties together, including K-12 educators, local business leaders, and other potential community partners. Our efforts will be summarized, and our goals and issues exposed, all so that we can ask session attendees for their comments and ideas as we continue to try to frame and finish our final proposal.

Rooms 218/220

**The Role of Social Justice in STEM Education***Stacey Britton, University of West Georgia**Rebecca Gault, University of West Georgia*

This study in progress will use surveys to poll current and pre-service teachers to understand better their perceptions of STEM education and the role social justice issues play in how they teach. It is our goal to address better the goals of social justice through teaching in STEM, and in order to do that effectively, we need to gain knowledge about what STEM currently looks like in schools, what teachers see as future needs, and what social justice issues exist in their minds. We intend to answer the question: What are the current perceptions of teachers regarding the role of social justice in STEM education?

**1:00–2:45 PM**

Rooms 111/113/115

**Project, Problem and Place Based Learning****Mathematizing the Science: An Interactive Working Lunch***Kania Greer, Georgia Southern University**Lacey Huffling, Georgia Southern University**Lisa Stueve, Georgia Southern University**Sarah Bent, M.A., Mount Holyoke College*

Across a collaborative working lunch, we will define levels of engagement, engage in hands out examples to model best practices in project, problem and placed based learning. Tables will work in small groups engaging in purposeful exploration, data gathering and mathematical modeling of science concepts. Shifting our pedagogy to allow students the opportunity to engage, explore, explain answers to questions they formulate across multiple disciplines.

**2:45–3:00 PM****Visit Exhibitors****3:00–3:30 PM**

Auditorium (100)

**Closing Remarks/Conference Adjourns***Kania Greer, Georgia Southern University*

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#### **The Effects of Integrating LEGO Robotics Into a Mathematics Curriculum to Promote the Development of Proportional Reasoning**

Shelli L. Casler-Failing (Georgia Southern University)

#### **Integrating LEGO Robotics into a 5th Grade Cross Curricular Unit to Promote the Development of Narrative Writing Skills**

Shelli L. Casler-Failing (Georgia Southern University)

#### **Deepening Place Value Understanding in K-2 through Explanation and Justification**

Heidi Eisenreich (Georgia Southern University), Andria Disney (Georgia Southern University)

#### **Graph It Out! Create Graphing Manipulatives to Explore Evolutionary Selection**

Cassie Lawrimore (Fayette County High School), Emily A. Surber (Clayton State University)

#### **Using Cartoons to Make Connections and Enrich Mathematics**

Janet St. Clair (Alabama State University)

#### **Using Google Forms to Inform Teaching Practices**

Ha Nguyen (Georgia Southern University), Eryn Michelle Stehr (Georgia Southern University), Heidi Eisenreich (Georgia Southern University), Tuyin An

#### **Using Active Learning Strategies in Calculus to Improve Student Learning and Influence Mathematics Department Cultural Change**

Melissa A. Dagley (University of Central Florida), Michele Gill (University of Central Florida), Erin Saitta (University of Central Florida), Brian Moore (University of Central Florida), Jacquelyn Chini (University of Central Florida), Xin Li (University of Central Florida)

#### **Incorporating the Dragging Feature of Dynamic Geometry Environments in Teaching and Learning College Geometry**

Tuyin An (Georgia Southern University), Ha Nguyen (Georgia Southern University)

#### **Selecting, Sequencing, and Connecting: Using Technology to Support Area Measurement through Tasks, Strategies, and Discussion**

Eryn Michelle Stehr (Georgia Southern University), Jia He (Augusta University), Ha Nguyen (Georgia Southern University)

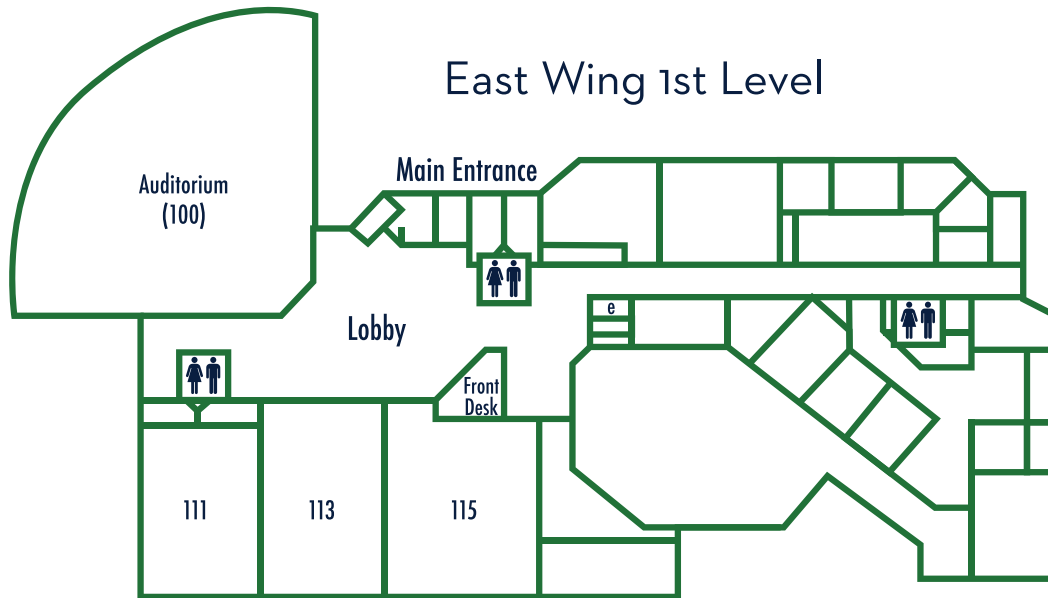








# Map



**Save The Date!**

**March 21-23, 2019**

Savannah, GA

