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Interdisciplinary STEM Teaching & Learning Conference

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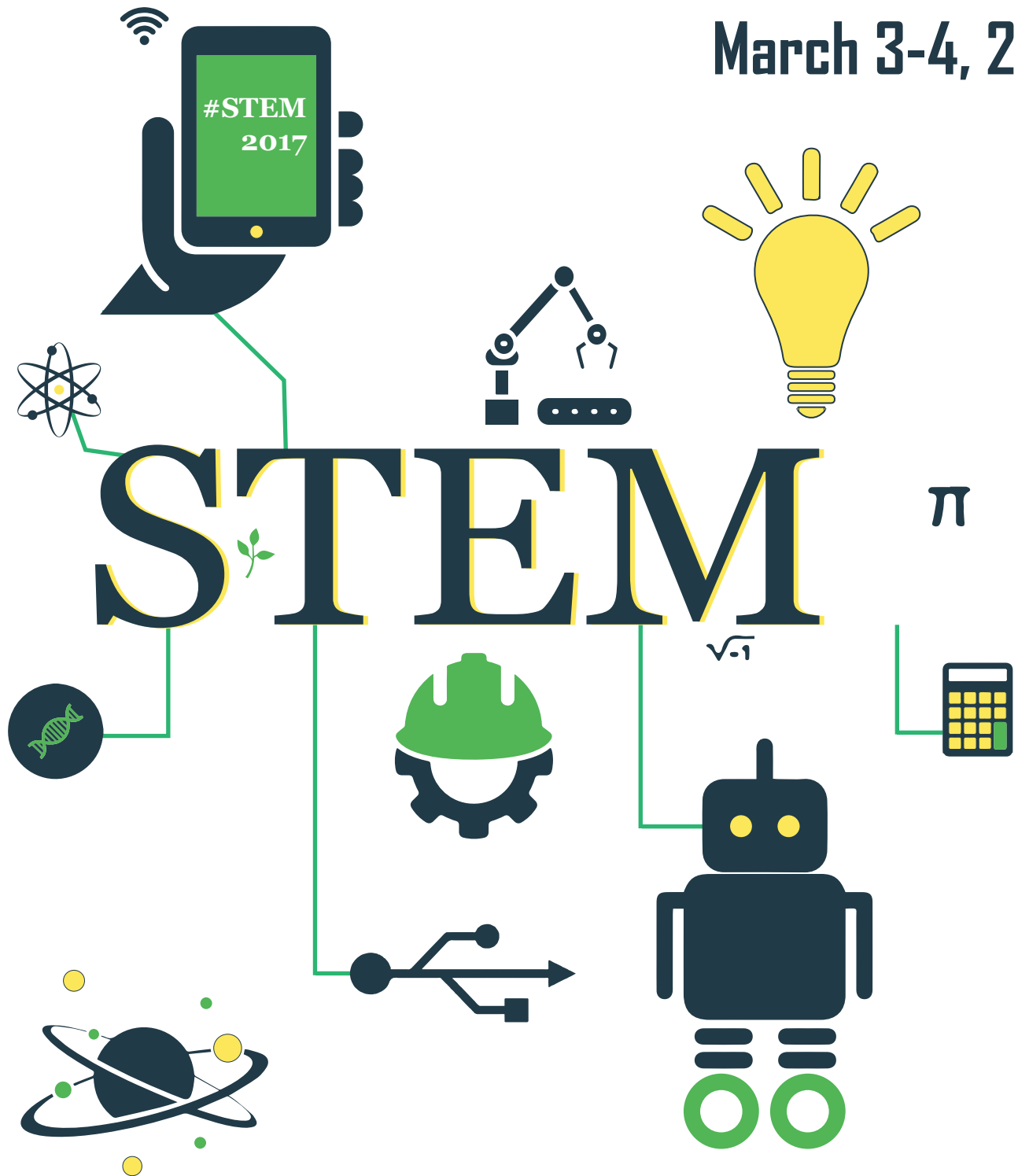
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March 3-4, 2017



SCIENCE TECHNOLOGY ENGINEERING & MATH

6TH ANNUAL GEORGIA SCHOLARSHIP OF STEM TEACHING & LEARNING CONFERENCE: COASTAL GEORGIA CENTER



Schedule at a Glance

FRIDAY, MARCH 3RD

| | |
|------------------------|--------------------------------------|
| 8:30 - 9:30 a.m. | Registration |
| | Continental Breakfast |
| 9:30 - 10:30 a.m. | Session 1 Concurrent Sessions |
| 10:30 - 10:45 a.m. | Refreshment Break |
| 10:45 - 11:45 a.m. | Session 2 Concurrent Sessions |
| 11:45 a.m. - 1:15 p.m. | Lunch |
| 1:15 - 2:15 p.m. | Session 3 Concurrent Sessions |
| 2:15 - 2:30 p.m. | Refreshment Break |
| 2:30 - 3:30 p.m. | Session 4 Concurrent Sessions |
| 3:30 - 3:45 p.m. | Refreshment Break |
| 3:45 - 5:00 p.m. | Opening Day Keynote - Chris Anderson |
| 5:00 - 6:30 p.m. | Poster Session |
| 6:30 p.m. | Close Poster Session |

SATURDAY, MARCH 4TH

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| 7:00 - 8:00 a.m. | Registration |
| 8:00 - 9:00 a.m. | Buffet Breakfast & Panel Presentation |
| 9:00 - 9:30 a.m. | Break & Interactive Student STEM Session |
| 9:30 a.m. - 2:00 p.m. | GSTA Workshop |
| 9:30 - 10:30 a.m. | Session 1 Concurrent Sessions |
| 10:30 - 10:45 a.m. | Refreshment Break |
| 10:45 - 11:45 a.m. | Session 2 Concurrent Sessions |
| 11:45 a.m. - 1:00 p.m. | Lunch |
| 1:00 - 2:00 p.m. | Session 3 Concurrent Sessions |
| 2:00 p.m. | Conference Concludes |

CONFERENCE KEYNOTE | Room 100 | Friday March 3, 2017



Chris Anderson

Chris Anderson is an educational consultant, adjunct and coach, specializing in integrative STEM (iSTEM) education, K-12. Since 2013, Chris has been working with teachers, administrators and students from over 70 school districts - in states including Pennsylvania, Georgia, New York, and New Jersey - to develop and implement innovative models for STEM programming, often on the behalf of The College of New Jersey's (TCNJ) Center for Excellence in STEM Education. Some of his other clients include McGraw Hill Publishers, Nickelodean, Boston Brewing Company, and The Educational Testing Service. Chris has also served as an adjunct at TCNJ for the last eight years, where he teaches design and pedagogy courses to future engineers and pre-service STEM teachers. Chris spent the first ten years of his career as a middle and high school teacher of Technology & Engineering Education, and earned his master's degree in Educational Leadership from the University of Pennsylvania in 2006. In 2016, Chris was named "Influential Alumni of the Year" by his hometown high school in Cinnaaminson, New Jersey (where he currently resides) for his leadership in STEM education amidst the state's adoption of the Next Generation Science Standards. Chris' personal interest in design, fabrication, and agriculture typically intersect with his career, as he is often tasked with creating new makerspaces (indoor and out) for schools, writing and piloting PBL units with their teachers, and delivering subsequent professional development.

SATURDAY BREAKFAST PANEL SPEAKER | Room 113/115 | Saturday March 4, 2017



Gilda Lyon

Gilda Lyon taught chemistry, biology, and physical science at Howard School in Chattanooga, TN for 30 years. She directed the Multimedia and Information Technology Academy at Howard for three years where she coordinated the integrated implementation of career technical and core content standards. She was also a member of the United States Department of Education's Teacher Training Initiative and conducted summer science professional development on differentiation throughout the United States. In 2007, she retired from Tennessee and joined the Georgia Department of Education (GaDOE) as a Science Specialist for three years where she was responsible for school improvement in the area of science. Gilda is presently the Science, Technology, Engineering, and Math (STEM) coordinator for the Georgia Department of Education where she is responsible for coordinating the initiatives and efforts of the GaDOE toward increasing the number of students who are STEM literate.

Georgia Scholarship of STEM Teaching and Learning Conference

Friday March 3, 2017 | Coastal Georgia Center, Savannah, GA

SESSION 1 CONCURRENT SESSIONS

9:30 - 10:30 a.m.

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| Room 210 9:30 - 11:00 a.m. | <p>Primary Source Use in STEM: Prosthetic Limbs (90 Minute Workshop)</p> <p><i>Josh Pfister</i></p> <p>The use of primary sources in schooling is strongly associated only with history education. That is unfortunate because KG-16 students are denied connections with famous STEM workers and interest that comes with engaging with primary sources. The Library of Congress (LoC), an unparalleled source of primary sources, holds a treasure trove of STEM primary sources, such as Alexander Bell's laboratory notes. The primary audience includes K-8 science teachers and science education faculty. This proposal will briefly describe the STEM resources at the LoC and then illustrate their use in a hands-on prosthetic limbs activity. Participants will gain an understanding of the power of primary source use in the STEM classroom and their availability via the LoC.</p> |
| Room 211 9:30 - 10:00 a.m. | <p>Bridging Gaps - Building Connections (20 Minute Session Non-Research Interdisciplinary STEM)</p> <p><i>Amanda Glaze</i></p> <p>We frequently talk about the need for more interdisciplinary teaching and authentic learning experiences, however, navigating the processes of building interdisciplinary approaches and partnerships can be daunting, especially for new teachers. This session will provide research and experience based background on outreach, connections, and creating professional learning communities for STEM interdisciplinary learning that can be used for formal and informal partnership building to connect STEM teachers, students, and practitioners. The audience is both classroom teachers in science and math as well as university professors and other researchers who are interested in working with teachers.</p> |
| Room 211 10:00 - 10:30 a.m. | <p>Digital Humanities in Georgia: Implications for STEM Teaching (20 Minute Session Non-Research Interdisciplinary STEM)</p> <p><i>Robert Batchelor</i></p> <p>In early December 2016, the calling of a state-wide summit on Digital Humanities indicated that the discipline was rapidly coming into its own both nationally and regionally. This may mean that in the future, much of the training for STEM education in areas like mapping, visualizing data, 3D printing, augmented reality and human-computer interaction more generally will emerge from the humanities. The rise of Digital Humanities suggest that we are moving beyond "STEAM" into a period when STEM teaching will become truly interdisciplinary.</p> |
| Room 212 9:30 - 10:00 a.m. | <p>The Progesterone Receptor - To Be or Not to Be: The Anti-Inflammatory Effects of Progesterone in RAW 264.7 Cells (20 Minute Research Project)</p> <p><i>Christopher Branden Jr. and Bagie George</i></p> <p>It has been widely established that, in addition to its role in reproduction, progesterone (P4) also has anti-inflammatory effects. While the precise mechanism has never been elucidated in RAW 264.7 cells, it seems logical to assume that this response is - in part - a consequence of the activation of the progesterone receptor (P4-R). However, it has been shown that in a rat model the anti-inflammatory effect is independent of the progesterone receptor. In this project, the aim was to characterize this response by assaying nitric oxide production from lipopolysaccharide-challenged RAW 264.7 cells. To determine the involvement of the P4-R, LPS-challenged cells were incubated in the presence and absence of RU-486 - a potent P4-R antagonist. Our results indicate that the anti-inflammatory response of progesterone was through activation of the P4-R as cells incubated in RU-486 show a reversal of the inhibitory effect of P4 as was seen in cells incubated in the absence of the antagonist.</p> |

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| <p>Room 212 10:00 - 10:30 a.m.</p> | <p>Assessing Student Progress and Performance across the Curriculum: A Tool to Evaluate Program Success Quickly</p> <p><i>Christopher Brown, Jennell Talley, Rebekah Ward, Christopher Brandon, Jill Penn, Elisabeth Javazon</i></p> <p>Evaluation of student learning is of paramount importance to the educational community and allows reflection on program successes and weaknesses; however, best practices are hotly debated. Three common problems include obtaining useful information about depth of knowledge, evaluating student progress longitudinally, and excessive time demands on educators. The format and timing of assessment can also affect interpretation; for example, easily graded multiple choice questions might not fully assess higher order thinking, and an assessment on a final exam may reflect “cramming” but not retention. This project designed and implemented an assessment system in which an identical mixed format assessment was given to all levels of students in the GGC biology program at the start of the semester. This system addresses the aforementioned issues and provides quick results for timely action, while reducing professor bias. Here we describe our method and report initial findings.</p> |
| <p>Room 217 9:30 - 10:00 a.m.</p> | <p>Managing and Maintaining a Vibrant Summer Undergraduates Research Experiences Program (20 Minute Session Non-Research Teaching and Learning in STEM)</p> <p><i>Karelle Aiken and Ria Ramoutar</i></p> <p>An intensive undergraduate research experience is a game changer for student success. Directing a summer undergraduate research experiences (SURE) program has many challenges. Faculty may find themselves involved in almost every aspect, from issues such as research mentorship and budget management to seemingly minuscule ones like solving glitches with Wi-Fi access and parking tickets. Regardless of the type of task, all, large or small, will impact the overall quality of the participants’ experiences. Ensuring that the program remains vibrant and relevant from year to year requires organization that also allows for flexibility and creativity. In 2017, we will direct the sixth cycle of Georgia Southern Chemistry Department’s SURE. Over the last few years, we have built a program that, with National Science Foundation (NSF) funding, now extends to students from other institutions across the US. We will reflect on our experiences and share lessons learned from managing and maintaining SURE.</p> |
| <p>Room 217 10:00 - 10:30 a.m.</p> | <p>Preliminary Assessment of an Undergraduate Biology Capstone Course for Gains in Research Skills and Attitudes.</p> <p><i>Pratima C. Darr</i></p> <p>Capstone courses are high impact educational experiences in any undergraduate major including those related to STEM. We designed a theme focused on microbial ecology for a preexisting undergraduate capstone course to enable biology majors to choose their own research focus from a wide array of possibilities, and then to use current techniques to engage in it. Here, we report the use of a newly developed quiz to assess gains in research skills. A survey already in use for all STEM courses targeted for the 4 year undergraduate research experience, was also used to gauge attitudinal changes that may relate to persistence in STEM. This new course theme appears to be effective, boosting both students’ self-efficacy and their research skills. We seek to share our course implementation and solicit feedback that will help to validate and/or improve on the course design and its assessment.</p> |
| <p>Room 218/220 9:30 - 10:30 a.m.</p> | <p>STEM Ahead! A Partnership for Innovating Middle Grades Education Through Interdisciplinary Projects and Professional Learning Communities</p> <p><i>Dr. Sandra M. Webb, Dr. Miriam Jordan, Nikki Grimes, Lindell Dillon, Tynisha Harris, and Daphne Epps</i></p> <p>STEAM Ahead engages teachers from two middle schools, university educators, and college students in professional learning communities (PLCs) concentrating on designing real world, interdisciplinary projects using a STEAM integrated and applied learning approach. Presenters provide an overview of the purpose and goals of STEAM Ahead, the conceptual framework, and forming PLCs guided by lesson study. In small groups led by project teams, participants will engage in conversations focusing on STEAM projects, involving water filtration systems, greenhouses, forensics, and pandemics. STEAM projects are informed by the 5-E model of inquiry and, along with core content curriculum, include arts integration, engineering design, and technology use. Presenters will share examples of their interdisciplinary planning process based on standards across the middle grades curriculum and the frameworks for each project. STEAM Ahead is made possible by an innovation grant for applied learning from the Governor’s Office of Student Achievement.</p> |

SESSION 1 CONCURRENT SESSIONS

9:30 - 10:30 a.m.

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| Room 221 9:30 - 10:30 a.m. | <p>A Software-Based Solution to Automate the Assessment Process for Engineering Program Accreditation (20 Minute Session Non-Research Interdisciplinary STEM)</p> <p><i>Rami Haddad and Youakim Kalaani</i></p> <p>In this work, an assessment tool was developed to automate the assessment data collection and report generation processes. This tool has a web interface and a centralized server with a database at the back end. It takes into consideration the 11 (a-k) ABET student learning outcomes and maps them into 6 SACS outcomes to streamline the assessment process. It also automates the process of uploading the course roster being assessed into the database and assigning the appropriate assessment rubric. In addition, this tool can automate the generation of assessment results' figures that can be used in the accreditation self-study reports.</p> |
| Room 208 10:30 - 10:45 a.m. | <p>Break</p> <p>Please enjoy refreshments in room 208 in between sessions 1 and 2.</p> |

SESSION 2 CONCURRENT SESSIONS

10:45 - 11:45 a.m.

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| Room 1005 West-Wing 10:45 - 11:45 a.m. | <p>"What Do You Teach a First Grader About Astrophysics?": Undergraduate Science Majors' Experiences with Reflective Tensions in a Science Service-Learning Course (20 Minute Research Project)</p> <p><i>Gretchen King</i></p> <p>Undergraduate STEM instructors adopt service-learning pedagogies to help students gain real-life experiences in their fields. A hallmark of service-learning is an emphasis on reflection to enhance student understanding. This interpretive case study examined the reflective tensions experienced by sixteen undergraduate science majors enrolled in a cross-age peer teaching, science service-learning course. Undergraduates were paired with local elementary and middle grades teachers to design and implement hands-on, inquiry-driven science lessons for twelve weeks. Students reflected on classroom experiences both individually (weekly journal entries) and collaboratively (case-based focus group discussions). Current findings suggest that the undergraduates experienced tensions in four distinct ways: science content, teachers and administration, students, and societal issues. University faculty interested in science service-learning can expect to hear the experiences of science majors in the classroom, research-based suggestions for improving student reflection in service-learning courses, and view a successful model of undergraduate service-learning in its 15th year.</p> |
| Room 211 10:45 - 11:45 a.m. | <p>What's in Your Schoolyard? Challenge Your Students to Explore Species Diversity in Local Outdoor Habitats (45 Minute Presentation Non-Research Interdisciplinary STEM Ed)</p> <p><i>Mare Timmons and Mary Sweeney-Reeves</i></p> <p>This presentation offers the nuts and bolts of STEM in an easy outdoor activity. Sampling and comparing natural outdoor habitats with students gives them an idea of the flora and fauna in their area. The authors will demonstrate how to use handmade scientific equipment to collect data. Participants will learn how to transect different habitats, compare and contrast species diversity, and employ a variety of ways in which to display the collected data in their classroom. This session is for teachers of all grade levels!</p> |



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| Room 212 10:45 - 11:15 a.m. | <p>Enhancing Interdisciplinary STEM Skills via Integrated Biology and Chemistry Curriculum (20 Minute Session Non-Research Interdisciplinary STEM)</p> <p><i>Dr. Ying Guo, Dr. Pat Huey and Dr. David Pursell</i></p> <p>Success in undergraduate biology courses relies upon a firm grounding in chemical principles. To raise students' awareness of connection between two disciplines, we carry out a pilot project with integrated curriculum of Principles of Chemistry II and Principles of Biology I in fall 2016. We will also introduce two integrated laboratory projects targeting the shared contents in both courses in spring 2017. With multiple chances to collaborate in integrated curriculum and laboratory projects, students are expected to form a biology-chemistry interdisciplinary learning community. Ongoing work will assess the effectiveness of the integrated curriculum in increasing students' understanding of course material and promoting supportive learning environment as a learning community. Administrative support to ensure same group of students are registered for both courses and instructors' interdisciplinary expertise in both disciplines are crucial to the success of the pilot project. The session will focus on possibilities and challenges of developing integrated curriculum.</p> |
| Room 212 11:15 - 11:45 a.m. | <p>Writing Across the Curriculum for Senior Biology Students: a Case Study (20 Minute Session Non-Research Interdisciplinary STEM)</p> <p><i>Dr. Rebekah Ward, Dr. Steven Shipman and Dora Curry</i></p> <p>Applications of writing for critical thinking in STEM fields have expanded rapidly over the years. However the perennial challenge is how to simultaneously explore many forms of writing and also cover specific content, especially in college courses that are prerequisites for later courses or professional exams. In this non-laboratory capstone course, the theme, disease ecology, facilitated a more interdisciplinary approach. Multiple types of writing projects were incorporated on a daily basis. In addition to a focus on formative assessment and professional preparedness, self-directed project-based applications of content were implemented. This session will share methods and preliminary observations of this ongoing project. Participants will engage in self-reflections about writing as learning as did the students in the course. This model may be adapted to a variety of content areas without fundamental alteration of the student-centered learning structure.</p> |
| Room 217 10:45 - 11:45 a.m. | <p>Critical Thinking: Engaging Creativity to Solve Problems in Science, Technology, Engineering, and Mathematics (S.T.E.M.) in the 21st Century (45 Minute Presentation Non-Research Teaching and Learning in STEM)</p> <p><i>Dr. Karen Hypolite</i></p> <p>In the 21st Century, it is up to the educator to provide a framework for teaching and learning in the classroom. This provision must lay a foundation in critical thinking and problem solving that will transcend the K-12 and college classroom to career-readiness, innovation, and lifelong learning. Educators will have the opportunity to hear the latest in instructional strategies that incorporate student-centric activities and academic programming that encourages such a framework. Teachers and students have the ability to engage in relevant research-based practices that maximize learning. During this process, each participant in the learning process has a role that encourages true learning. In this process, creativity is inherent. This presentation will provide momentum in the shift and transition from 20th Century to 21st Century teaching and learning practices.</p> |
| Room 218/220 10:45 - 11:15 a.m. | <p>Using GIS to Teach Climate Change in the Science and Agricultural Education Classroom (20 Minute Research Project)</p> <p><i>Lisa Millsaps</i></p> <p>This study used a mixed methods research design to explore the use of GIS to teach climate change. The work consisted of two parts: 1) teacher training, and 2) classroom implementation. Student-, teacher-, and classroom-centered data were collected to address student outcomes, teacher perceptions of GIS use in teaching climate change, and both students' and teachers' perceptions of challenges and successes of using GIS in the classroom. Students showed an overall positive growth in knowledge. Teachers shared a positive perception, going so far as to report that they will all continue to teach climate change and use GIS in their classrooms. Successes and challenges were observed in classrooms, recognizing the benefits of student engagement and learning, as well as the challenges of using technology and supporting student needs. This exploratory research supports the premise that using a GIS to teach climate change is practical, reproducible, and effective.</p> |

SESSION 2 CONCURRENT SESSIONS

10:30 - 11:45 a.m.

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| Room 218/220 11:15 - 11:45 a.m. | <p>How to Create Your Own Molecular Model to Learn Various Structural Aspects of Coordination Compounds (20 Minute Non-Research Teaching and Learning in STEM)</p> <p><i>Dr. Arpita Saha</i></p> <p>This proposed project emphasizes a unique and interactive teaching method where students make model compounds to learn various structural aspects of the compound. They can use any material (for e.g. Styrofoam balls, marshmallow etc.) to make their very own model compound. It could be an individual or group project where one compound will be allotted per group to study shape, geometry, bond angle, polarity, hybridization, symmetry elements and point group. The goal is to cover all types of coordination compounds up to coordination number seven by active learning. The audience can participate in creating models and learn from it. This project is very motivating and it promotes that chemistry is fun, thought provoking and challenging as well. I strongly believe that this presentation not only creates bonds between the molecules of a compound, but also, makes a bond between the audience and the subject of chemistry.</p> |
| Room 221 10:45 - 11:45 a.m. | <p>Let's Go for a Ride...STEM Presentation (45 Minute Presentation Non-Research Teaching and Learning in STEM)</p> <p><i>Dr. Gretchen Torbert</i></p> <p>Let's go for a ride....bridging the curriculum together to teach all subjects through the construction of a roller coaster. The educational professionals will work together to reflect and collaborate to learn how to incorporate STEM into all lessons. The audience will build a tower through the use of creative and innovative items (toothpicks and marsh mellowes). They will engage into some reflective thinking by reading and discussing a few articles that I have written. They will collaborative and review ways that Science, Math, Social Studies and English Language Arts are directly related to the skill presented.</p> |

12:00 - 1:00 p.m.



Enjoy dining in historical downtown Savannah or purchase a lunch onsite at registration by 9:30 a.m.

SESSION 3 CONCURRENT SESSIONS

1:15 - 2:15 p.m.

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| Room 210 1:15 - 1:45 p.m. | <p>Standing on the Shoulders of Giants: Questions of Use of 5-E Science Lesson Plan Bank (20 Minute Session Non-Research Interdisciplinary STEM)</p> <p><i>Josh Pfieser</i></p> <p>This research presentation aims to communicate preliminary answers to research questions surrounding the use of and tensions created by undergraduate student-generated 5-E lesson plan banks in site placements. The presentation will be of most use for K-5 science teachers and science education faculty. In the name of professionalism, Albert Shanker (the former American Federation of Teachers president), called for lesson plan banks two decades ago. Participants will be engaged by frequent pauses for understanding and survey of the audience of relevance.</p> |
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| <p>Room 210 1:45 - 2:15 p.m.</p> | <p>A Time-Sensitive Framework for Including Geographic Information Systems (GIS) in Professional Development Activities for Classroom Teachers (New Proposal)</p> <p><i>Lisa Millsaps</i></p> <p>This work shares a time-sensitive framework for teaching GIS to educators of all levels and disciplines. Existing relationships with teachers enabled the addition of GIS content in professional development activities. The amount of time devoted to GIS-related content varied depending on time made available for interaction with the audience. Content audiences included geography, history, social studies, science, agriculture, religion, and math teachers. The framework was developed, tested, and refined over a period of six years, during 34 trainings, and by 580 educators. Use of this framework emphasizes that not one size fits all in GIS education and that GIS can work for any teacher, their content, their classroom, and their time availability.</p> |
| <p>Room 211 1:15 - 1:45 p.m.</p> | <p>Incorporating “Just in Time” Teaching to Enhance the Lecture/Recitation Format in Calculus (20 Minute Research Project)</p> <p><i>Iman Chahine, Mark Grinshon, Andrew Fano, Kimbeni Mansion and Caroline Parnass</i></p> <p>The Department of Mathematics and Statistics at Georgia State University has recently switched MATH 2211/2212 to three hours of lecture and one hour of recitation instead of four hours of lecture weekly. This has left Calculus instructors with some difficulty adapting to less lecture time each week. This project was supported by STEM funds to prepare a major overhaul of the Calculus sequence at GSU to better fit the newly changed lecture/recitation format. The key objectives of the proposed work are:</p> <ul style="list-style-type: none"> • To incorporate “Just in Time” teaching methods to make more efficient use of the reduced lecture time. By preparing in advance a comprehensive set of review materials and pre-quizzes, we attempted to encourage students to do more preparation ahead of time making lectures more helpful and efficient • To enhance the use of technology in our instruction of Calculus by developing supplemental demonstrations using CAS. We focused on the more challenging topics, so that less class time was required to gain understanding of these difficult concepts. We made these available in advance to supplement other “Just in Time” materials • At all stages, we collected both qualitative and quantitative data on students’ learning and attitudes. |
| <p>Room 211 1:45 - 2:15 p.m.</p> | <p>Using Biomimicry Fundamentals to Teach Systems/Design Thinking and STEM Concepts (20 Minute Session Research Project)</p> <p><i>Jacquelyn Nagel, Peyton Pittman, and Ramana Pidaparti</i></p> <p>It is well known that engineering involves integrating broad knowledge towards some purpose, generally to address a need or solve a problem. Undergraduate STEM education must train students to not only solve engineering challenges that transcend disciplinary boundaries, but also communicate, transfer knowledge, and collaborate across technical and non-technical boundaries. One approach to achieving this goal is teaching biomimicry or bio-inspired design in an engineering curriculum. Bio-inspired design encourages learning from nature to generate innovative designs for man-made technical challenges that are more economic, efficient and sustainable than ones conceived entirely from first principles. Biomimicry touches on many areas of engineering including electrical, mechanical, materials, biomedical, chemical, manufacturing and systems, which makes it applicable in a wide range of engineering programs, from discipline-specific to general ones.</p> <p>For undergraduate education, incorporation of other STEM disciplines into complex engineering problems will provide a new context for students to apply knowledge that they already have.</p> |
| <p>Room 212 1:15 - 2:15 p.m.</p> | <p>Bobbi Ford Endorsement (45 Minute Presentation Non-research Teaching and Learning in STEM)</p> <p><i>Bobbi Ford</i></p> <p>During this session the STEM Endorsement will be reviewed through the lens of what course content might be included in this endorsement program as well as the process for applying for the endorsement. This will be an interactive session that will allow all participants to be involved in the discussion.</p> |

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| <p>Room 217 1:15 - 1:45 p.m.</p> | <p>Interdisciplinary Adventures in Laboratory Science Online (ALS-Online): The Ultimate Research and Discovery Experience (20 Minute Non-Research Teaching and Learning in STEM)</p> <p><i>Sharon Jenkins</i></p> <p>Interdisciplinary Adventures in Laboratory Science Online (ALS-Online) is an online innovative chemistry curriculum that explores the fundamental principles of chemistry through a series of original discovery-based research labs designed to engage students in the discovery of science in the “real world”. The labs are small-scale research labs done “at home” (or lab setting) using “house-hold” chemicals/materials to explore the chemistry of health, food, nutrition, much more. The purpose of this presentation is to share various ways of integrating basic skills in math, reading, and writing into “safe” home-based research and discovery chemistry labs. The overall ALS-Online project and the description of a research and discovery lab will be presented. ALS-Online targets students seeking an introductory science/chemistry course, science elective, nursing and/or health elective, basic math review or dual credit for high school student.</p> |
| <p>Room 217 1:45 - 2:15 p.m.</p> | <p>Digital Game-Based Learning in Advanced Mathematics and Its Effects on Achievement and Motivation (20 Minute Session Research Interdisciplinary STEM)</p> <p><i>Malcom Devoe Jr.</i></p> <p>This study will examine the effects of a computer game on students’ mathematics achievement and motivation, and the role of prior mathematics knowledge, computer skills, and English language skills on their achievement and motivation as they play the game. A case study embedded with a quantitative approach using Analysis of Co-Variance will be used to analyze the data. Viewing this presentation will provide mathematics instructors or teachers with a supplemental or an additional instructional approach to engage students to be motivated to participate in their classroom learning environments. We expect that there will be a significant improvement with students’ achievements and motivation with the use of the computer game.</p> |
| <p>Room 218/220 1:15 - 2:15 p.m.</p> | <p>Dismantling Deficit Thinking and Uprooting Fixed Mindsets through Possible Selves: A Potential Theoretical Framework for Supporting Underrepresented Groups in STEM (Roundtable Discussion)</p> <p><i>Andrea Frazier, Timothy Howard, Kimberly Shaw, and Cindy Ticknor</i></p> <p>Student fixed mindsets about intelligence, reinforced by instructors, can lead to surface engagement and an unwillingness to accept constructive feedback. Likewise, a major reason for the attrition of underrepresented groups in STEM is a non-inviting college environment, sometimes referred to as a “weed-out culture”. A weed-out culture potentially rests on a deficit orientation about students and is sustained by faculty and support staff. As an alternative to focusing on student deficits, we propose reorienting towards possible selves and the role future goals play in developing self-regulated learners. We will argue this reorientation has the potential to provide pathways for positively transforming an institutional culture. Discussions during this roundtable will explore 1) what participants see as problems in supporting underrepresented minority groups in STEM, 2) interventions that are being used/planned, and 3) how those interventions can be informed by identifying deficit thinking and highlighting possible selves in students.</p> |



#STEM2017



SESSION 3 CONCURRENT SESSIONS

1:15 - 2:15 p.m.

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| Room 221 1:15 - 2:15 p.m. | <p>Effingham College and Career Academy - STEM Program: A Different Model for Implementing STEM Education (45 Minute Presentation Non-Research Interdisciplinary STEM Ed)</p> <p><i>Marthajane Caldwell</i></p> <p>This fall the doors of a new STEM program opened at the Effingham College and Career Academy (ECCA) and in walked 110 sophomores and 145 freshman. This presentation has four main objectives. First, the decisions behind starting a STEM program that draws students from the two Effingham County high schools, rather than opening a dedicated STEM school or STEM school or program within one or both of the Effingham high schools, will be presented. Second, the ECCA-STEM program's philosophy, educational plan and incorporation of interdisciplinary STEM will be presented. Third, the program wide use of Schoology, Remind and other technology will be described. Finally, the paradigm shifts for county, parents, students, and teachers regarding the amount of homework, time management of assignments, rigor of classes at STEM, and the ultimate goal of the STEM experience as preparation for success will be discussed.</p> |
| Room 208 2:15 - 2:30 pm | <p>Break</p> <p>Please enjoy refreshments in room 208 in between sessions 3 and 4.</p> |

SESSION 4 CONCURRENT SESSIONS

2:30 - 3:30 p.m.

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| Room 210 2:30 - 3:30 p.m. | <p>STEM School (45 Minute Presentation Non-Research Teaching and Learning in STEM)</p> <p><i>Peter Ulrich</i></p> <p>The STEM Academy at Bartlett principal will share their story. With a mission to provide students with a rigorous, relevant curriculum of academic study that will advance their knowledge in the areas of science, technology, and other branches of scholarship, empowering them to become college and career-ready and prepared to work in the twenty-first century. The STEM Academy at Bartlett was selected as a finalist for a STEM Excellence Award from the Future of Education Technology Conference, among the nation's top 10 programs and identified as the first middle school in the state of Georgia to receive schoolwide STEM certification.</p> |
| 211 2:30 - 3:30 p.m. | <p>Diamondback Defenders: Conservation through STEM-Based Programming (45 Minute Presentation Non-Research Teaching and Learning in STEM)</p> <p><i>Katie Higgins and Kristen Zemaitis</i></p> <p>Since its establishment in June 2007, the Georgia Sea Turtle Center (GSTC) has substantially contributed to advancing conservation of Georgia's fragile coastal environment, endangered species, and "species of concern", particularly sea turtles and diamondback terrapins. The GSTC's conservation strategy works through an integrated approach merging rehabilitation, research and education. As such the GSTC offers a wide variety of educational programs to our K-12 audience, including several career based options designed for an audience of 7th grade and up and correlated to state and national curriculum standards. The combination of engaging subject matter, hands-on involvement and personal interaction with our accomplished staff allows a level of engagement unparalleled in a typical classroom setting. We would like to present our newly developed Diamondback Defenders program to conference participants allowing them first-hand experience with GPS technology and mapping strategies used for conservation management of the diamondback terrapin on Jekyll Island.</p> |



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| Room 212 2:30 - 3:30 p.m. | <p>Active Questioning (45 Minute Presentation Non-Research Interdisciplinary STEM Ed)</p> <p><i>Cheryl Flowers</i></p> <p>Think about this, it is the end of class and the bell is about to ring so you ask the students to complete their formative assessment in the form of a ticket out of the door. You are feeling really good about the lesson that you just taught until you see the results of the formative assessment. Only 20 percent of your students answered the questions correctly. You begin to think what could I have done differently? One thing was active questioning. Many teachers go through the lesson asking questions and then turn around and answer them. With active questioning we are pushing the students to think about answers to questions that will not be answered by saying yes/no or true/false. In this session we will dig deeper with how we are questioning our students. We will work on how to prepare ourselves to be better questioners. This session is for all grade level teachers of any content. We will work in groups, pairs, and as individuals to increase the skill of questioning.</p> |
| Room 218/220 2:30 - 3:00 p.m. | <p>Design and Development of an Interdisciplinary Nanotechnology Courses for STEM Education (20 Minute Session Non-Research Interdisciplinary STEM)</p> <p><i>Mujibur Khan, Ishraq Shabib, Rafael Quirino, and Aniruddha Mitra</i></p> <p>The purpose of this project is to design and introduce interdisciplinary nanotechnology courses for STEM education. The planned courses are: a first year experience course and an applied studio laboratory course. Inclusion of a first-year-experience (FYE) module will expose freshmen to nanotechnology, serving as a recruitment tool for the more advanced senior-level courses. The courses will be cross-listed in other colleges for additional cross-talk between disciplines and is meant to develop interest and excitement about nanotechnology. The 2nd course will be a four hours studio (lecture and Lab) course. Lectures will be divided into four modules where fundamental knowledge on nanoscale matter and nanotechnology will be taught, integrating engineering, chemical, physical, biological, manufacturing, environmental health, and economic aspects. The integrated laboratory section is designed to provide students with hands-on experience with fabrication and testing of a nanoscale materials, devices and characterization tools. The project is designed to produce intellectual fusion across the academic spectrum allowing students to engage outside of the traditional silos of education.</p> |
| Room 218/220 3:00 - 3:30 p.m. | <p>Does a Preparatory Chemistry Course Lead to Increased Student Success in General Chemistry? (20 Minute Research Project)</p> <p><i>Donna Gosnell</i></p> <p>In 2013 the Valdosta State Chemistry Department designed and implemented a preparatory course for Chemistry after analyzing DFW data (grades of D and F and Withdrawals) for general chemistry. The goal of the new preparatory course is to review basic chemistry, math and problem-solving needed for success in general chemistry. This presentation reviews data to date on the effect on grades in general chemistry for students who have taken the preparatory course. In addition to grades, other factors such as patterns in change of major and the extension of success to the second semester of general chemistry are analyzed.</p> |
| Room 1005 West Wing 2:30 - 3:30 p.m. | <p>Teaching Scientific Research from an Interdisciplinary STEM Perspective</p> <p><i>Michelle Thompson</i></p> <p>In a traditional science classroom, teachers often have difficulty in devoting time to student-centered, real-world, long-term projects. The Scientific Research course sequence affords teachers the time and students the possibility of embracing these projects while creating spaces for enriching opportunities that are meaningful. This session will share the framework of the Scientific Research I course at Effingham College and Career Academy and the tentative frameworks for future research courses. Taught from an Interdisciplinary STEM perspective, the Scientific Research I course addresses two essential questions: What is STEM? and How can I act locally to help solve a global problem? Participants will be led through the curriculum, providing examples of activities, projects and resources that can be used when developing an Interdisciplinary STEM research course. The culminating project for this course, the development of a research proposal that identifies possible solutions for helping to solve the Energy Crisis, and the utilization of community and business partners in developing the project will also be addressed.</p> |

OPENING DAY KEYNOTE

3:45 - 5:00 p.m.

Room 100
3:45 - 5:00 p.m.

Best Practices for Making Teaching, Learning and Life a More Integrative Experience through Engineering Design and Related Pedagogy

Chris Anderson

POSTER SESSION

5:30 - 6:30 p.m.

Lobby
5:00 - 6:30 p.m.

See descriptions on page 20-21.



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6th Annual

Georgia Scholarship of STEM Teaching and Learning Conference Saturday March 4, 2017 | Coastal Georgia Center, Savannah, GA

OPENING SESSION PANEL

8:00 - 9:00 a.m.

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| Room 111/113 8:00 - 9:00 a.m. | <p>Panel Discussion</p> <p><i>Dr. Robert Mayes - Institute Director, Christopher Anderson - Keynote, Gilda Lyon - GaDOE STEM, Gulf Stream Executive David Mining</i></p> <p>Engage in a conversation over breakfast with Robert “Bob” Mayes the Institute for Interdisciplinary STEM Education Director, The Center for Excellence in STEM Education iSTEM Consultant and conference key note Chris Anderson, Gilda Lyon Georgia Department of Education STEM Coordinator and Gulf Stream Executive David Mining about the impact of STEM in education and industry.</p> |
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INTERACTIVE STUDENT STEM EXHIBITS

9:00 a.m. - 9:30 a.m.

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| Lobby 9:00 - 9:30 a.m. | Interact with STEM Students showing off their work from regional STEM programs & schools each with a different focus to speak ideas for STEM opportunities where you are. |
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WORKSHOPS

9:30 a.m.- 2:00 p.m.

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| Room 111/1113 9:30 - 2:00 p.m. | <p>GSTA Workshop</p> <p><i>Katie Brkich</i></p> <p>Join us for a workshop introducing teachers to the three-dimensional approach to science learning based on A Framework for K-12 Science Education. Engage in a model lesson, explore the dimensions of the Framework, and identify phenomena for your students to explore. Three-dimensional learning is the research-based approach in which students simultaneously engage in science and engineering practices (e.g., engaging in argument from evidence) while learning and applying core ideas (i.e., GPS content standards) and crosscutting concepts (i.e., big ideas like patterns or structure & function).</p> |
| Room 210 9:30 - 11:00 a.m. | <p>Learn to Program in Python - By Teaching It! (90 Minute Workshop)</p> <p><i>Bryan Fagan and Dr. Bryson Payne</i></p> <p>A hands-on workshop in which you'll learn to code in the FREE, open-source programming language Python using Turtle graphics, plus exercises and activities with low-cost Drones, Bots, and 3D printers to get students interested and keep them engaged in coding. In this session, you'll learn: how to code turtle graphics in Python; how to engage children from pre-K through college with short, interactive, visual programs for every age level; and, how to build more advanced programming skills in Python. (Bring your own laptop or tablet to code LIVE during the session). Presented by an experienced middle-school programming/engineering teacher, along with the author of the #1 Amazon New Release and Top 10 Best Seller, “Teach Your Kids to Code”.</p> |
| Room 217 9:30 a.m - 2:00 p.m. | <p>Richmond County Mate PD Participants Only</p> <p>Registered Participants Only.</p> |

SESSION 1 CONCURRENT SESSIONS

9:30 - 10:30 a.m.

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| Room 218/220 9:30 - 10:30 a.m. | STEM Girls Rock! (45 Minute Presentation Non-Research Interdisciplinary STEM Ed) <i>Linelle Brunson</i> <p>This presentation helps participants alleviate barriers to females entering STEM related curriculum and careers. Participants will engage in activities that will enable them to more effectively introduce and encourage females to excel in science, technology, engineering, art, and mathematics in preparation of entering the workforce in STEM related careers.</p> |
| Room 211 9:30 - 10:30 a.m. | Lecture vs. Active Learning in STEM courses: Is It Really Either/Or? (45 Minute Presentation Non-Research Teaching and Learning in STEM) <i>Deborah Walker</i> <p>This presentation will explore the use of lecture as a method of course delivery in undergraduate STEM gateway courses. With the increasing number of students in beginning STEM courses, how can an instructor actively engage students in acquiring the desired knowledge and skills? Can active learning strategies be incorporated into a typical lecture? What does research say about active learning in STEM courses? What IS active learning? By utilizing what we know about how students learn, instructors can design course delivery in a way that results in learning, not just content acquisition.</p> |
| Room 221 9:30 - 10:30 a.m. | Importance of STEM Extracurricular Activities for Students with Disabilities (45 Minute Presentation Non-Research Teaching and Learning in STEM) <i>Karin Fisher</i> <p>Students with disabilities are under-represented in science, technology, engineering and mathematics (STEM) careers (National Science Foundation, 2013). The employment gap is a problem because the nation's competitiveness depends on diverse individuals with STEM knowledge, skills, and abilities to drive innovation that will need to new products and economic growth (Business-higher Education Forum/A Policy Brief, 2014; National Academies of Sciences, Engineering, and Medicine, 2016; National Science Board, 2015). The objectives of the proposed session is to discuss the current research on STEM education as it relates to extracurricular activities. The primary audience is anyone interested on the impact of extracurricular STEM activities on students with disabilities including educators, parents, and students. Participants will be engaged by the information presented through videos and audience participation. As a result of the session participants will understand the importance of offering extracurricular STEM activities and recruiting students with disabilities to participate them.</p> |
| Room 208 10:30 - 10:45 a.m. | Break <p>Please enjoy refreshments in room 208 in between sessions 1 and 2.</p> |

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 More details on page 23.

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| Room 210 10:45 - 11:45 a.m. | <p>The Basics of STEM: Challenge your students to Explore Species Diversity in the local Schoolyard habitat! (45 Minute Presentation Non-Research Interdisciplinary STEM Ed)</p> <p><i>Mary Sweeney-Reeves and Dr. Mare Timmons</i></p> <p>This presentation offers the “nuts and bolts” of STEM by using an easy outdoor activity. Sampling and comparing natural outdoor habitats with students gives them an idea of the flora and fauna in their area. The authors will demonstrate how to use handmade scientific equipment to sample a local area. Participants will learn how to set up a transect in different habitats, collect data, then compare, and contrast species diversity, and employ a variety of ways in which to display the data in their classroom. This session is for teachers of all grade levels.</p> |
| Room 211 10:45 - 11:15 a.m. | <p>Metacognition Strategies (New Proposal)</p> <p><i>Diana Sturges</i></p> <p>The purpose of this study was to explore the effect of different metacognitive strategies (exam wrappers, learning technique training and team learning) on metacognition, academic performance, perceived competence, and self-efficacy between early career and later career health and kinesiology students during fall 2016 semester. Three surveys were administered throughout the semester (week 1, mid-term and last week). Survey included demographic information, the Metacognition Awareness Inventory, Perceived Competence and Self-Efficacy questions. Final sample of participants included 386 undergraduate students. Roughly 56% of participants were enrolled in a lower division course, while 44.3% were enrolled in upper division courses. Mean levels of knowledge of cognition were high, while regulation of cognition were near the midline, but moderately high. Participants' initial perceived competence was at a mean level of 4.52 (SD = .69), while self-efficacy was at 3.65 (SD = .52). Information management strategies ($t(3, 360) = 2.69, p = .046$), and evaluation ($t(3, 360) = 5.83, p = .001$) were significantly different between groups. Tukey post-hoc analysis revealed that the control group was significantly different than the video group for information management strategies and evaluation.</p> |
| Room 211 11:15 - 11:45 a.m. | <p>Learning Computational Thinking Using Open-Source Hardware-Based Programming (20 Minute Research Project)</p> <p><i>Rami Haddad and Salman Siddiqui</i></p> <p>One of the first most fundamental skills that freshman engineering students learn is computational thinking. Computation thinking is the thought process carried out to solve problems. To develop this skill set usually computer programming fundamentals are introduced using a specific programming language. This approach falls short in sustaining the students' interest in engineering. To rekindle the students' interest in engineering, we proposed the utilization of the open-source electronics prototyping platform “Arduino”. Introducing the students to hardware programming and having them use project-based approaches to develop their computational thinking skill set increased their interest in the subject matter and significantly improved their performance.</p> |
| Room 212 10:45 - 11:45 a.m. | <p>Blended Learning Technology in Engineering Curriculum (Roundtable Discussion)</p> <p><i>Samantha Russell</i></p> <p>Engineering courses are traditionally packed with content that students are expected to work through on their own with little to no interaction with a faculty member. Today's curriculum is moving more towards active learning, hands on. With this movement, there is even less time in class for theoretical content which is still needed. This shift suggests a needed to utilize other methods of engaging students online in the theoretical content. These online tools and techniques are being used in blended learning and could be adapted for this purpose. Some examples of tools to be considered are a learning management system, Padlet, and Google Docs. On open discussion on how these tools are being used and how their application would be valuable to engineering courses.</p> |

SESSION 2 CONCURRENT SESSIONS

10:45 - 11:45 a.m.

Room 218/220
10:45 - 11:45 a.m.

The Evolution of a Regional STEM Center (45 Minute Presentation Non-Research Teaching and Learning in STEM)

Dr. Scott Eddins and Nikolas McGehee

The Millard Oakley STEM Center for the Teaching and Learning of Science, Technology, Engineering and Mathematics is a dedicated facility at Tennessee Tech University in support of a campus-wide initiative to enhance existing STEM education models and develop new educational strategies in STEM-related fields. The Oakley STEM Center fosters new partnerships with various units of our university to create new paradigms of student learning and teaching. This Center is a product of many years of strong connections between the Colleges of Arts & Sciences, Education, and Engineering. Our campus is a leader in offering STEM education courses in multidisciplinary settings at the undergraduate and graduate level. The Oakley STEM Center works closely with faculty from Curriculum and Instruction in the College of Education. We offer many opportunities for students who are learning to teach as they apply their strategies in both formal and informal settings. Multi-tiered outreach programs ranging from K-12 Expeditions to our mobile STEM lab will be presented as we discuss what the work of a STEM Center should be.

Room 221
10:45 - 11:45 a.m.

The Correlation between Extracurricular STEM activities and Student with Disabilities Performance on a Standardized Science Assessment (45 Minute Research Project)

Karin Fisher

Students with disabilities perform below their non-disabled peers in science (National Science Foundation, 2013). The purpose of the research was to determine if informal science learning activities offered in Florida districts make a difference on the performance of students with disabilities (SWD) on the 2015 8th grade Florida science assessment using quasi-experimental research methods. The primary audience is any individual interested in the benefits of extracurricular STEM activities on the science performance of SWD. The audience will be engaged through interactive presentation techniques. As a result of attending the session, the participants will understand the difference between SWD and their peers on the 2015 8th grade Florida science assessment, what type and percentage of SWD participate in STEM activities, and whether there is a correlation between the number of activities offered and science scores. Future research, recommendations and implications of the results from the study will be provided.

11:45 - 1:00 p.m.



Enjoy dining in historical downtown Savannah or purchase a lunch onsite at registration by 8:30 a.m.

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| Room 210 1:00 - 2:00 p.m. | <p>STEM Course Design - Learning Outcomes - Can't I just teach?</p> <p><i>Deborah Walker</i></p> <p>This presentation will discuss the components of a well-designed STEM course and how it should result in improved student learning and retention of students in STEM courses and majors. What makes a course "well-designed?" What does "alignment" mean? What should be aligned within my course? Practical strategies based on the book "Teaching and Learning STEM" by STEM education experts Richard Felder and Rebecca Brent, will be highlighted. Participants will come away with learner-centered approaches that can be incorporated into STEM course design.</p> |
| Room 211 1:00 - 2:00 p.m. | <p>Full STEM Ahead: Planning and Executing Successful STEM Integrated Activities (45 Minute Presentation Non-Research Teaching and Learning in STEM)</p> <p><i>Jennifer Fanning and Shay Dorch</i></p> <p>"Full STEM Ahead" will equip primary and elementary teachers with tools necessary for planning and executing integrated STEM activities within the classroom. Participants will view activities that presenters have conducted in their classrooms and view evidence supporting the learning and success of those activities. The STEM activities promote learning in science, technology, engineering, math, reading, research, and writing. Participants will leave with lesson plan format ideas for planning STEM activities and tips for successful execution of those activities. Participants will have a brief period of time for asking questions and sharing ideas with others.</p> |
| Room 212 1:00 - 1:30 p.m. | <p>Adapting to Trig: Using the ALEKS Adaptive Technology to Improve Students' Learning and Retention in a College Trigonometry Course (20 Minute Research Project)</p> <p><i>Iman Chahine, Mark Grinshpon, Andrew Fanoie, Kimbeni Mansion, and Caroline Parnass</i></p> <p>The Department of Mathematics and Statistics at Georgia State University has recently introduced the MATH 1112 "College Trigonometry" course designed to prepare students in several STEM majors for Calculus courses. This project received STEM funds to introduce the paradigm of individualized adaptive learning, offered by the ALEKS online platform, into teaching of College Trigonometry at GSU. The key objectives of the proposed work are:</p> <ul style="list-style-type: none"> • To incorporate the ALEKS adaptive learning technology into the College Trigonometry course. The project team designed a comprehensive course program that included both trigonometry topics and review topics necessary for students' success in the current and future courses. By its inherent design, ALEKS software automatically generated individualized learning paths for each student, reintroducing earlier topics and review topics as necessary • To facilitate self-directed learning initiatives by capitalizing on the adaptive nature of ALEKS's individualized learning paths, which places more responsibility on students to plan their work outside of class. We offered students additional guidance and tutoring support by making a lab space with a dedicated GTA available to them • To enhance the use of technology in the course by developing supplemental demonstrations using CAS • At all stages, we collected both qualitative and quantitative data on students' learning and attitudes |
| Room 212 1:30 - 2:00 p.m.. | <p>Relative Autonomy Index in Science Classes: An Examination of Student Motivation (New Proposal)</p> <p><i>Diana Sturges</i></p> <p>The purpose of the research study was to modify the Self-Regulation Questionnaire (SRQ, Ryan & Connell, 1989), a well-researched instrument used to examine motivation, to compute a Relative Autonomy Index (RAI) and determine the reliability of the instrument, align findings with theory and examine whether the increase in RAI correlate with the predicted academic performance by students enrolled in Human Anatomy and Physiology, Principles of Chemistry and Organic chemistry classes during fall 2014 and spring 2015 semesters. The 24-question survey was administered at the beginning and end of each of two consecutive semesters. One class in each section was also administered a mid-semester survey to confirm the test-retest reliability data. Based on a sample of 1,305 respondents (response rate 73%), the instrument's internal consistency reliability was measured at .87, and the test-retest reliability of the instrument was .82 and was found to be psychometrically-sound. Additionally, further correlational analyses demonstrated the quasi-simplex nature expected of the RAI, which supported the theoretical continuum proffered by RAI with those motivational styles that are closest on the continuum having the highest correlations with one another, and those motivational styles that are furthest on the continuum having the lowest correlations with one another.</p> |

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| Room 218/220 1:00 - 2:00 p.m. | <p>Integrating Wireless Gadgets into Science Lessons (45 Minute Presentation Non-Research Interdisciplinary STEM Ed)</p> <p><i>Joseph Covert and Markus Hitz</i></p> <p>Students carry around a wide range of mobile devices, including cellphones, tablets, laptops, and Chromebooks. At the same time, there is a wide range of inexpensive sensors and data collection tools, including the DIY Breadboard Computer that could be used in conjunction with these student devices. We will show you how to use low-cost BLE (Bluetooth Low Energy) and WiFi modules to connect the two worlds. Use of wireless technologies will allow your students to make measurements while not being tangled up in cables. Your students will be able to collect data in real time, from objects in motion, as well as log data for longer term experiments. Storage and a basic graphical user interface are provided by an app on the student device. Using these wireless technologies, your students will be able to collect data, while putting their - all too - familiar computing devices to good use!</p> |
| Room 221 1:00 - 2:00 p.m. | <p>Interdisciplinary STEM Badging - Online and On Time (New Proposal)</p> <p><i>Robert Mayes</i></p> <p>Learn about our STEM badging program that provides job embedded, competency-based professional development on integrating STEM into your school. The STEM badges address the new STEM Endorsement standards and support the requirement for STEM designated schools to have sustained professional development in STEM. Explore the five STEM reasoning modalities that are essential outcomes for interdisciplinary STEM research and design modules and courses: complex adaptive systems reasoning, scientific model-based reasoning, technological computational reasoning, engineering design-based reasoning and mathematical quantitative reasoning. The badges can be customized to fit the needs of your school.</p> |
| <p>Conference Concludes at 2:00 p.m.</p> | |



GEORGIA SOUTHERN UNIVERSITY

Bringing STEM to Rural School: Tennessee Tech STEMmobile

Nikolas McGehee and Scott Eddins

The STEMmobile is a mobile laboratory program developed in 2013 by the Oakley STEM Center of Tennessee Tech University designed to provide the greater Upper Cumberland rural schools with opportunities to engage in meaningful STEM learning experiences through participation in hands-on, project-based learning curriculum. Learn about the impact of a mobile lab curriculum on students and how this STEMmobile model has sustained itself for 4 years.

Determining What Factors Dictate STEM Student Retention

Kimberly Shaw and Chloe Chambers

The researchers have been working to study the factors that determine why undergraduate students who initially declare a science, technology, engineering or mathematics (STEM) major leave their field of study, as well as investigating potential means to improve retention rates in STEM majors. This study was inspired by Seymour and Hewitt's work, and our curiosity to know how things may or may not have changed in subsequent years. After conducting multiple one-on-one interviews with students at two University System of Georgia schools, data was analyzed from the recordings and coded independently by researchers to find common themes among students who chose to remain a STEM major, or among those that chose to change to a non-STEM major. Potential solutions for increasing the STEM retention rates were formulated for possible use by these programs in the years to come, and common themes among retained STEM majors will be discussed.

Collaborative Teaching in an Introductory Marine Sciences Course for Non-Science Majors: Are Two Graduate Laboratory Assistants Better than One?

Dr. Catherine Teare Ketter and James Deemy

Collaborative teaching provides benefits to students such as multiple perspectives, increased classroom contact with instructors, and increased availability of instructors outside of class meeting times. These benefits are teaching non-science majors in introductory level STEM courses. Our objectives were to (1) compare performance of students in marine science laboratory sections taught collaboratively with those taught by one teaching assistant, (2) compare lecture performance of students in collaboratively taught laboratory sections with those taught by one teaching assistant and (3) compare student attitudes exemplified in weekly reflections between collaboratively taught laboratory sections with those taught by one teaching assistant. Student grades were compared between collaboratively taught laboratory sections with those taught by one teaching assistant. We will provide participants with data that undergraduate instructors, particularly those teaching STEM courses for non-science majors, can use to inform decisions about implementing team taught labs when trying to improve student performance.

A Longitudinal Study of Veteran Student Efficacy in the College of Engineering and Information Technology at Georgia Southern University

Kevin Finley

The author will address the issues veterans face in their transition from military to academic life while pursuing a degree at Georgia Southern University's College of Engineering and Information Technology (CEIT). The goal is to provide solutions to the following questions. What are the issues facing veteran students? How can we assist veteran students in their transition from military to academic life? What effect can the implementation of a faculty/staff mentorship program have on veteran students as they navigate through the collegiate atmosphere? The authors will identify veteran students pursuing STEM degrees through CEIT. Veteran students will complete an initial meeting discussing the study. Students participating in the Mentorship program will be interviewed to gather personal data and paired with a CEIT faculty/staff mentor to assist them with obstacles they may encounter.



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Improving Student Interest in Engineering through Experiential Learning

Barry Hojjatie

At Engineering Studies Program at Valdosta State University (VSU) we have developed a Directed Study course (ENGR 4959) thought which sophomore and junior students participate in undergraduate research, and experiential and project-based learning. Through an Innovation grant we have developed hands on projects related to experimental and computational mechanics, robotic and control. We have also modified some of our introductory engineering courses (e.g., a CAD course) to involve more hands on and differentiated teaching and learning through which students with various level of background can chooses various CAD projects with different degrees of difficulty depending on their background and interest. Pre- and post-tests were used to have a better measure of student learning outcomes. Also, students responded to some survey questions related to the course modifications and impact of the modifications on the improvement of student learning. Based on the results and the feedback received from the students, it appears that the modifications have resulted in some improvement in teaching and learning and students' interest in engineering.

Fabrication of 5-Fluorouracil (FU) encapsulating Polycaprolactone (PCL) Nanoparticles (NPs) for implementing targeted drug delivery systems

Adeline Wagner

We report the fabrication of 5-Fluorouracil (FU) encapsulating Polycaprolactone (PCL) Nanoparticles (NPs) for implementing targeted drug delivery systems. PCL is chosen as the base polymer because of its biocompatibility and biodegradability, meaning that it will safely break down in the body after it serves its function without the need for surgical removal. PCL is also favorable due to its slow-degradation rate and low melting point. In previous experiments, success was achieved in encapsulating FU in PCL nanofibers using a coaxial electrospinning technique. However, the fiber structure is inconvenient for insertion into the body, and nanospheres can easily be injected into the blood stream and directly targeted to the tumor site. Therefore, the research progressed toward nanospheres. The MECC electrospinning machine was used to electrospray drug particles, while a nanoemulsion method was performed on the suspended drug crystals and a PCL solution to create the Polycaprolactone Nanoparticles. A nanoemulsion method is favorable due to the high stability of remaining in the emulsion state for a long period of time, compared to normal emulsions which often quickly re-separate and do not result in nano-sized particles. The purpose of the following experiments is to find the parameters that will manufacture the smallest possible Nanoparticles (NPs) for the sustained, controlled delivery of chemotherapy drugs to cancer cells.

Gamification of a Nursing Microbiology Course: Initial Impacts on Attitude, Engagement & Collaborative Learning

Wendy Dustman and Julia Shearer

Gamification of curriculum isn't just about using games in the classroom - it integrates game elements and game-thinking in course design to engage students, promote learning, motivate their action, and develop problem-solving skills. Using elements of game play (experience points, quests, PvP battles, etc.), students were guided along their educational journey which was transformed to make the learning experience more compelling while encouraging development of problem-solving skills, focus, and a drive to exceed minimum goals. Rewards and incentives motivated student-players to continually improve ("level-up") and add to the sense of enjoyment of participating. This session describes the transformation of a traditional Nursing Microbiology course into a richer learning experience using gamification. The gamified course design was modeled after a multiplayer role-playing game (like World of Warcraft) where fighting "monsters" and performing "quests" were regular events. Student feedback from two pilot semesters and current experimental design plan will be discussed.





GSTA 3D SCIENCE WORKSHOP

Three-dimensional approach to science learning.

Details on page 14.

Session 1: Room 111

Focus on K-5 Teachers and Administrators

Dr. Katie Brkich, Georgia Southern University, and Miss Tamra Lamb, GSTA Elementary Science Teacher of Promise 2017, 5th grade at Mattie Lively Elementary School in Statesboro, GA.

Session 2: Room 113

Focus on 6-12 Teachers and Administrators

Dr. Amanda Glaze, Georgia Southern University

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