Interdisciplinary STEM Teaching & Learning Conference Program [2016]

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5th Annual Georgia Scholarship of STEM Teaching & Learning Conference
Nessmith-Lane Conference Center
MARCH 4, 2016
5TH ANNUAL SCHOLARSHIP OF STEM
TEACHING AND LEARNING CONFERENCE

Conference At a Glance

STATESBORO HOLIDAY INN

THURSDAY, MARCH 3RD
6:00 - 9:00 p.m.
Registration
7:00 - 9:00 p.m.
Poster Session I & Reception

NESSMITH-LANE CONFERENCE CENTER

FRIDAY MARCH 4TH
7:15 a.m. - 1:00 p.m.
Registration
7:30 - 8:10 a.m.
Continental Breakfast
8:15 - 8:20 a.m.
Welcome & Announcements - Joy Darley & Tom Koballa
8:20 - 8:40 a.m.
Current Happenings with STEM in Georgia
Sheila Jones
8:45 - 9:15 a.m.
Morning Keynote Speaker - Savannah STEM Academy
Peter Ulrich
9:15 - 9:30 a.m.
Break
9:30 - 10:15 a.m.
Session 1 Concurrent Sessions
10:30 - 11:15 a.m.
Session 2 Concurrent Sessions
11:30 - 11:50 a.m.
Session 3 Concurrent 20 Minute Sessions
12:00 - 12:20 p.m.
Lunch
12:20 - 12:40 p.m.
Luncheon Keynote 1 - Duck Pond Project
Lee Bratton & Rich McCombs
12:45 - 1:05 p.m.
Luncheon Keynote 2 - STARBASE Robins
Wesley Fondal, Dr. Andrea McGee, Dr. Walter Stephens
1:10 - 1:40 p.m.
Session 4 Concurrent Sessions
1:45 - 2:30 p.m.
Session 5 Concurrent Sessions
2:45 - 3:30 p.m.

Advisory Board

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University

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Professor, Department of Biology, Georgia Gwinnett College

Mr. Charles Wilson
Superintendent, Bulloch County Schools

Mr. Charles Wilson
Superintendent, Savannah - Chatham
County Public Schools
**POSTER SESSION I** (see descriptions on pages 18-20)

Thursday, March 3, 2016

Holiday Inn

**POSTER SESSION II** (see descriptions on pages 18-20)

Friday, March 4, 2016

Nessmith-Lane Conference Center

**CURRENT HAPPENINGS | Room 1603 | 8:20 - 8:40 a.m.**

This talk will focus on the history, successes and some of the challenges of the University System of Georgia STEM Initiative 2008-2016. Information will be shared about the initiative moving forward. Georgia has a list of high demand STEM careers, and we will take a look at those careers to share what the System and the State is doing to address the need.

*Dr. Sheila Jones, USG STEM Initiative Coordinator, Georgia Board of Regents*

**MORNING KEYNOTE**

Educational R&D

How powerful are your dreams? What verbs are they spurring you to follow each day? Are you sharing those dreams? Are you allowing others to know them? Share theirs? Innovation has changed people’s most basic daily operation and revolutionized industry. Sustainable change requires creative problem-solving and steadfast inquiry. To continue trends in innovation and explore new, un-imagined possibilities, a partnership between innovation and education are paramount. Educators, administrators, and business leaders must research and develop collaborative solutions to prepare students to solve the problems of tomorrow, today.

*Peter L. Ulrich, Principal, The STEM Academy @ Bartlett*

**LUNCHEON KEYNOTE 1**

“The Duck Pond” Abstract

As Environmental Science class teachers, we want to always have a project involving students in real-life, real-world ventures designed to encompass an entire year in order to teach students environmental science principles, community involvement, and civic duty as well as work ethic along with team-work. This project does this and carries with it the notion of creating something big while improving and continuing the legacy for other classes at Statesboro High and the benefit of the community. The project is called, “The Duck Pond” and was so named by the 2014-15 Environmental Science classes of Statesboro High School students. The premise of “The Duck Pond” is to take a piece of school property and create an outdoor classroom for all classes at the high school to use with an ongoing outdoor science lab. The students are involved in all aspects of development including making all the decisions from the design, to the labor intensive building, through the maintenance phases. This project helps us in the continual growth of the “The Duck Pond” and the growth of the students at Statesboro High as we delve into this endeavor in a deeper scale.

*Ms. Lee Bruton, Ed.S., Environmental Science Teacher, Statesboro High School*  
*Mr. Rich McCombs, M.Ed., AP Environmental Science Teacher, Statesboro High School*

**LUNCHEON KEYNOTE 2**

Department of Defense STARBASE Robins: Maintaining the STEM Pipeline through K-12 Partnerships

STARBASE ROBINS is a part of the national Department of Defense premiere STEM education STARBASE Program. DoD STARBASE offers a positive, proven approach to engendering excitement and interest in STEM. This knowledge is important to our nation’s future because during this decade, employment in STEM occupations is expected to increase at almost four times the rate for all occupations. STARBASE ROBINS focuses its efforts on the STEM pipeline with fifth grade students and middle school students from its partnering school districts. This panel will focus on how the STARBASE ROBINS 5th grade program and STARBASE 2.0 Afterschool STEM Mentoring Program at the middle school level helps in meeting the national need for students to be STEM literate and skill proficient along with meeting the needs of the school administrators and teachers in enhancing their STEM curriculum.

*Mr. Wesley Fondal, Jr., Executive Director, STARBASE ROBINS*  
*Dr. Andrea McGee, Principal, Eagle Springs Elementary School, Warner Robins, GA*  
*Dr. Walter Stephens, Principal, Thomson Middle School, Warner Robins, GA*
## 5th Annual Georgia Scholarship of STEM Teaching and Learning Conference
March 4, 2016 | Nessmith Lane Conference Center, Statesboro, GA

### CONCURRENT TRACK 1

<table>
<thead>
<tr>
<th>Session</th>
<th>Room</th>
<th>Time</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1a</td>
<td>Room 1601</td>
<td>9:30 – 9:50 a.m.</td>
<td>Video Game Design: Level Up Your STEM Curriculum</td>
</tr>
<tr>
<td>1.1b</td>
<td>Room 1601</td>
<td>9:55 – 10:15 a.m.</td>
<td>Lessons Learned in an Internship Program to Recruit Pre-service Teachers</td>
</tr>
<tr>
<td>1.2</td>
<td>Room 1909</td>
<td></td>
<td>Developing STEM Critical Thinking and Creativity through Team Building in the Classroom</td>
</tr>
<tr>
<td>1.3</td>
<td>Room 2911</td>
<td></td>
<td>Connecting STEM with Design Thinking</td>
</tr>
</tbody>
</table>

### Session 1.1a

**Room 1601**

**9:30 – 9:50 a.m.**

**Video Game Design: Level Up Your STEM Curriculum**

Corey Powell (Savannah STEM Academy): corey.powell@sccpss.com

For K-12 teachers and University Professors interested in integrating core content to learn coding while creating fun and exciting video games. A perfect way to build interdisciplinary STEM curriculum. [STEM K-12]

### Session 1.1b

**Room 1601**

**9:55 – 10:15 a.m.**

**Lessons Learned in an Internship Program to Recruit Pre-service Teachers**

Tim Howard (Columbus State University): thoward@ColumbusState.edu

Deborah Gober (Columbus State University): gober_deborah@columbusstate.edu

Kimberly Shaw (Columbus State University): shaw_kimberly@columbusstate.edu

Cindy Ticknor (Columbus State University): ticknor_cindy@columbusstate.edu

The Columbus Region Academy of Future Teachers of STEM (CRAFT-STEM) utilizes an internship program for university freshmen and sophomores and a STEM camp for pre-college students to encourage the interns to consider careers in teaching. Interns assist with camp activities and other projects, supported by funding from the National Science Foundation’s Robert Noyce Teacher Scholarship Program (award #1136356). As part of an ongoing research project, we examine four years’ worth of data to identify strengths and weaknesses of the experience, and propose adaptations based on these findings. [STEM Univ]

### Session 1.2

**Room 1909**

**Developing STEM Critical Thinking and Creativity through Team Building in the Classroom**

Kathy Marks (Gwinnett County Public Schools): kathy_marks@gwinnett.k12.ga.us

Learn how to turn your K-8 class into a team of problem-solving, risk-taking collaborators! Increase your students’ STEM success in developing critical thinking and creativity through experiential team building activities that can be used at any time during your school day. As you challenge them out of their comfort zones, your students will practice STEM skills like communication, problem-solving, cooperation, and compromising as they work as a team. Need to see this in action? Come on in and let’s get started! [STEM K-8 (Workshop)]

### Session 1.3

**Room 2911**

**Connecting STEM with Design Thinking**

Dawn White (Gwinnett County Public Schools): demwhite@gmail.com

Design Thinking is a creative way to excite students about STEM by empowering them to solve problems and take on new challenges. This problem-solving process encourages students to study many subjects, collaborate, and research in order to generate innovative and effective solutions. During this session, the presenter will cover the Design Thinking approach and the skills commonly integrated into design thinking such as empathy, observation, interviewing, and brainstorming. In addition, participants will review and discuss examples of elementary and middle grades STEM lessons that apply Design Thinking as the inquiry based pedagogy. The session will end with information about two schools—middle and high—connecting STEM with Design Thinking. Discover how STEM Design Thinkers are energized as innovators and creative problem solvers. [STEM 6-12]
<table>
<thead>
<tr>
<th>Session</th>
<th>Room</th>
<th>Title</th>
<th>Presenter(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>2903</td>
<td>STEM Labs that Can Be Done at Little or No Cost</td>
<td>Richard McCombs (Statesboro High School): <a href="mailto:rmccombs@bullochschools.org">rmccombs@bullochschools.org</a></td>
<td>In the classroom of today there are vast amounts of activities that can be done if there are funds available. This session will focus on how a unit on building paper airplanes can be used to have students fully engaged in the STEM principle by reviewing what concepts make the plane fly, video analysis of the plane's flight, developing engineering improvements to make it fly further, and the use of mathematical approaches to determine if improvements in fact have been significant. During this session participants will build their own planes and run through a series of improvements based upon the principles of the scientific method. Other examples of project based, low cost, STEM activities will be discussed and participants will be encouraged to share ideas with others that they are using and meeting success with in their classrooms (k-12 science teachers) [Science K-12]</td>
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<tr>
<td>1.5</td>
<td>2908</td>
<td>Crazy Good Chrome Apps for Educators</td>
<td>Daniel Rivera (Georgia Southern University): <a href="mailto:drivera@georgiasouthern.edu">drivera@georgiasouthern.edu</a></td>
<td>Come explore a curated list of Chrome apps and extensions that are essential for students and teachers for getting work done, teaching, and learning. Participants will leave with a list to use in the classroom and to share with their students. Bring your own laptop if you enjoy hands-on learning; just be sure to have Chrome installed! Good for all educators. [Tech K-12]</td>
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<td>1.6</td>
<td>2905</td>
<td>Using Risk and Intervention to Increase Student Success</td>
<td>Carrie Carmack (University of West Georgia): <a href="mailto:cthielem@westga.edu">cthielem@westga.edu</a></td>
<td>The purpose of this presentation is to describe a method for identifying students at risk of earning a D, F, or withdrawing from a course by placing them into a Risk Category (Low Risk, Moderate Risk, or High Risk) based on a pre-assessment. Once a student has been categorized, intervention can begin for those that need it, based on their level of need. We will look at the data that has been collected and discuss which on-campus resources are most effective for each Risk Category and how faculty can begin intervention within the first week of classes. Evidence shows that using this intervention technique can increase student success and create a more confident and happy student. The anticipated audience are faculty that would like to see an increase in student success, primarily in core classes. [STEM Univ]</td>
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| 1.7 | 2901 | Cultivating a Community of STEM Polymaths at UNG | Sarah Formica (University of North Georgia): sarah.formica@ung.edu
Royce Dansby-Sparks (University of North Georgia): royce.dansby-sparks@ung.edu
Margaret Smith (University of North Georgia): margaret.smith@ung.edu
Gregg Velatini (University of North Georgia): gregg.velatini@ung.edu | The University of North Georgia (UNG), Dahlonega, suffers from high attrition of STEM majors and low STEM graduation rates. In response to this challenge, a transdisciplinary (TD) team of UNG STEM faculty – from biology, chemistry, mathematics, and physics - has designed and developed hands-on laboratory experiments that employ empirical, interpretive, critical, and transdisciplinary research methodologies. The TD laboratory curriculum exposes undergraduate STEM students to cutting-edge techniques and new scientific frontiers, which will foster creativity and passion about scientific research, help undergraduates develop skills in analytical thinking and experimental design, and improve their technological fluency. In turn, this will improve persistence by stimulating student interest and participation in STEM. We will present examples of the transdisciplinary experiments that our students are engaging in and provide interactive activities to expose an interdisciplinary audience to the substantive scientific questions and real-world observations of the TD lab at UNG. [STEM Univ] |

**WIFI:** nessmithlaneevents
**PASSWORD:** NSLG$U2015
Using Pedagogy and Learning Theories to assist in Retention of the Under-Prepared Student in Gateway STEM Courses

Deborah Walker (Georgia Southern University): dwalker@georgiasouthern.edu
Ania Kowalik (Georgia Southern University): akawolik@georgiasouthern.edu

A common faculty complaint is that students are not prepared for the level of content and study required by college courses. This contributes to the high failure rate in STEM Gateway courses. While faculty cannot control the student population, faculty can control their instructional strategies and course design. This crash course in teaching in higher education will challenge faculty to move from “giving” knowledge to students to designing a learning experience. The premise of the presentation is that the under-prepared student can learn, it may just mean that the instructor must adjust how the course is designed and presented. This presentation will address several aspects of education pedagogy and how students learn including Bloom’s Taxonomy, Course Alignment, Active Learning, and forms of Assessment (formative and summative). With teaching designed for learning, the under-prepared student can develop into a lifelong learner and find success in the STEM classroom.

Investigating the Impact of Cutting Edge Devices on Perseverance in Intermediate Programming

Mai Yin Tsoi (Georgia Gwinnett College): mtsoi@ggc.edu
Evelyn Brannock (Georgia Gwinnett College): ebrannoc@ggc.edu
Robert Lutz (Georgia Gwinnett College): rlutz@ggc.edu

Entering our 2nd year of this study, we attempt to continue integrating cutting-edge devices in an intermediate programming course to impact student retention in the computing field, which is growing at a rapid rate. Past research states that students believe programming courses to be difficult and, as a result, many switch majors to avoid these courses. Our first year was focused on investigating motivation. This year, we explored the concepts of perseverance and grit among our students and how these factors related to the students’ perceptions of the cutting-edge devices used in class. Our preliminary findings indicate that the students with all levels of perseverance ascribed an element of “fun” and “enjoyment” to these devices and that a high number of students believed these devices were “relevant” to their future goals/career. Students’ level of perseverance seemed to relate to goal-setting. We present interview data and survey results to help inform educators on ways in which curriculum can be modified to harness students’ perseverance by appealing to students’ affective connections in learning. We also discuss the modifications made during the 2nd year of the project and how the implementation of a device-based teaching intervention was impacted by these modifications.

Improving the Effectiveness of Homework in an Accelerated Summer Courses through Classwork

Rami Haddad (Georgia Southern University): rhaddad@georgiasouthern.edu
Youakim Kalaani (Georgia Southern University): yalkalaani@georgiasouthern.edu

A novel approach to replace homework with classwork assignments in an accelerated summer course is proposed. The proposed approach uses a hybrid model combining traditional lecture-based and problem-based instructions designed especially for such offering. The proposed hybrid teaching model was implemented in summer 2015 in a senior-level communication systems course. It was demonstrated that this model was able to 1) help students solidify their understanding of the topics being covered, 2) provide students with timely formative feedback, and 3) increase the students’ overall performance and success in the course. To validate these findings, a quantitative and qualitative analyses were conducted using statistical assessment methods. Moreover, the model effectiveness was verified by assessing the students’ performance in two different offerings of the same course. Assessment results indicated that the students in the accelerated summer course using the proposed model performed much better than those enrolled in the regular semester offering.
<table>
<thead>
<tr>
<th>Session</th>
<th>Room</th>
<th>Title</th>
<th>Speakers</th>
<th>Email</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1b</td>
<td>Room 1601</td>
<td>Can Students Peer-Assess Project Presentations Effectively?</td>
<td>Rami Haddad (Georgia Southern University): <a href="mailto:rhaddad@georgiasouthern.edu">rhaddad@georgiasouthern.edu</a></td>
<td><a href="mailto:yalkalaani@georgiasouthern.edu">yalkalaani@georgiasouthern.edu</a></td>
<td>In this study, we analyzed the effectiveness of undergraduate electrical engineering students’ peer-assessing project presentations. The goal of this analysis is to determine whether students can effectively conduct peer-assessments using rubrics and what can be done to improve the integrity of their assessment. This analysis was quantitatively verified by assessing the performance of over 70 students in 2 different courses. We statistically analyzed students’ assessment results in these courses to conclude that students will on average overrate their peers’ presentations. In addition, we also concluded that a simplified rubric will result in smaller difference between the students’ and instructor assessment results compared to a detailed rubric. This indicates that integrating peer-assessment in the education process will give the students ownership of it and help them develop their judgment skills. However, to be successful a cognitive apprenticeship model in grounding students’ on how to effectively assess should be also used. [STEM Univ]</td>
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<td>2.2</td>
<td>Room 1909</td>
<td>Integrated Sciences for Pre-Service Teachers: Techniques in Place-Based Education</td>
<td>Christy Visaggi (Georgia State University): <a href="mailto:cvisaggi@gsu.edu">cvisaggi@gsu.edu</a></td>
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<td>Teacher preparation for Early Childhood Education majors in ISCI 2001 focuses on concepts in life and earth sciences modeled after the K-5 Georgia Performance Standards. Utilizing examples from Georgia is not explicitly encouraged as a pedagogical approach in the EPAAC recommendations for this course; however, use of place-based education may offer increased engagement by students, improved retention of underrepresented groups in STEM, and enhanced comprehension of material as it pertains to the world around them. Techniques founded in place are varied and not necessarily restricted to experiences beyond the classroom. This workshop will allow participants to explore activities that use place as a central framework for weaving content across life and earth sciences by building upon knowledge of local settings in Georgia. Ongoing work will examine the effectiveness of this approach in ISCI 2001 at Georgia State University. [Science K-5 (Workshop)]</td>
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<td>2.3</td>
<td>Room 2911</td>
<td>21st Century STEM Reasoning</td>
<td>Robert Mayes (Georgia Southern University): <a href="mailto:rmayes@georgiasouthern.edu">rmayes@georgiasouthern.edu</a></td>
<td><a href="mailto:smjackson@georgiasouthern.edu">smjackson@georgiasouthern.edu</a></td>
<td>The Georgia Southern University Real STEM Project is collaborating with 10 middle and high schools on development and implementation of an interdisciplinary STEM research and design course that actively engages students in real-world problem solving. We will discuss the expected outcomes of such interdisciplinary STEM experiences which is the development of 21st century STEM reasoning. Examples of using authentic teaching strategies to promote complex systems reasoning, model-based reasoning, computational reasoning, engineering design-based reasoning, and quantitative reasoning will be shared with participants. [STEM 6-12]</td>
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<td>2.4</td>
<td>Room 2903</td>
<td>Technology in Statistics Education: Where are we been? Where are we? Where are we going?</td>
<td>Patricia Humphrey (Georgia Southern University): <a href="mailto:phumphre@georgiasouthern.edu">phumphre@georgiasouthern.edu</a></td>
<td></td>
<td>Three of the revised GAISE guidelines for statistics education are: 1a. Teach statistics as an investigative process of problem-solving and decision-making. 2. Integrate real data with context and purpose. 3. Use technology to explore concepts and analyze data. In the beginning, there was no technology (well, there were slide rules…); students were “forced” to add columns of data to compute means (data might be presented in sorted order to find a median). Calculating means and standard deviations literally “by hand” was time- and labor-intensive (and prone to error). This gave rise to “statistics” that are no longer in vogue (midrange and pseudo-standard deviation, anyone?) as well as “realistic” data that made these computations easier. Graphics were only what could be produced by pencil and paper. Along came calculators (that could even compute a linear regression!), computers, and statistical packages. Access was still an issue, however. Today, practically everyone has a computer or smartphone, either of which have more computing power than mainframe computers of the past. Graphics have come a long way and “visualizations” are a current vogue. Web-scraping is possible as a source of “real” data. The internet is bursting with “big” data. How has the accessibility of technology changed how, what, and (especially) who we teach, in introductory statistics courses? This talk will be a look back at the development of technology, courses of the past, a brief survey of where we are now, and some prognostications about the future. [Stat 9-12/Univ]</td>
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| Room 2908 | Astronaut Challenge- The use of virtual immersion to develop student interest in STEM.  
John Melcher (Bryan County Schools): jmelcher@bryan.k12.ga.us  
This session will serve to introduce middle school educators to a new STEM competition for Georgia Middle School students. Richmond Hill Middle School faculty, STEM alumni, and experts in the aeronautics industry have developed the Georgia Astronautic and Engineering Challenge. The session will include information about the competition and its 3 components, as well as the basic operation of a classroom representation of the Richmond Hill Middle School space shuttle simulator Eagle. The goal of this session will be to spark interest in the Challenge, which will take place in May 2016. [STEM 6-8] |
| Room 2905 | Student by Student and Standard by Standard  
Jacob Collins (Statesboro High School): jcollins@bullochschoools.org  
Are you a teacher who wants to use common formative assessments to see what students know and need help on? Begin a journey toward more meaningful assessment, improved instruction, and better learning. See how we use assessments to drive instruction on a daily basis, and how teachers examine the results of their common assessments in small group PLC’s to better meet the needs of all students.  
Detailed Session Formative Questions -  
- Do you want to be able to reassess students by the standard(s) that they have not yet mastered?  
- Do you want your student to be exposed to much higher order thinking skills?  
- Do you want to set up flexible grouping quickly and easily?  
- Do you want to review students, only on the standards that they need to review, prior to the summative assessment?  
- Do you want your students to be better prepared for standardized testing like the EOC and SLO?  
- Do you want to work with your PLC to promote best instructional practices? [STEM K-12] |
| Room 2901 | Recruiting, Supporting, and Rewarding STEM Faculty  
Anu Bourgeois (Georgia State University): abourgeois@gsu.edu  
Paul Ulrich (Georgia State University): pulrich@gsu.edu  
For many academic institutions in the United States, the faculty model is increasingly differentiated, with different faculty members having different responsibilities and time commitments. Non-tenure track (NTT) faculty increased between 1995 and 2007 from 24% to 35% at public doctoral institutions and from 18% to 46% at private non-profit doctoral institutions. Support for both TT and NTT STEM Faculty is therefore key to institutional success. We will describe structural ways to provide resources to enhance NTT faculty personal development, professional advancement, research productivity, mentoring skills, and opportunities for innovation. Discussions will allow participants the opportunity to share issues and strategize change on their home campuses. Topics may include: a) ranks and promotion pathways, opportunities for undergraduate research in a course format, c) opportunities for research with undergraduates in a group setting, d) the role of questionnaires and interviews in promoting institutional understanding, and e) tapping creativity in faculty ranks. [STEM Univ] |
| Room 2904 | Origami Boxes as a Context for Rich Mathematical Thinking  
Arsalan Wares (Valdosta State University): Awares@valdosta.edu  
The session will allow participants to make a nontraditional origami box and explore various mathematical properties of the constructed box. The session will give participants, especially teachers, an opportunity to understand and experience how many of the process standards can be addressed through origami. For instance, the participants will solve challenging mathematical problems that involve geometric and algebraic thinking. Participants will get a chance to see how origami can create a context for rich mathematical thinking in middle-school, high-school and beyond. [Math 6-12/Univ] |
## CONCURRENT TRACK 2

### Trials and Tribulations of Converting Traditional Natural Science Lecture/Laboratory Courses into Integrated Experiences

Michael Morton (Georgia Gwinnett College): mmorton1@ggc.edu  
Alessandra Barrera (Georgia Gwinnett College): abarrera@ggc.edu  
Edward Forringer (Georgia Gwinnett College): eforring@ggc.edu  
Neville Forlemu (Georgia Gwinnett College): nforlemu@ggc.edu

Transitioning from a traditional separate classroom meeting followed with a stand-alone laboratory experience into an integrated classroom/hands-on experience course will be discussed for a variety of different Natural Science courses at different academic levels. Adapting the integrated model often applied in teaching of Anatomy and Physiology Courses, has been attempted in a number of other Natural Science Courses at Georgia Gwinnett College. Strategies for pedagogical teaching shifts, timing, hands-on activities, and content adaptation will be discussed along with personal experiences of techniques and ideas that worked, as well as those that didn't go exactly as planned. [STEM Univ]

## CONCURRENT TRACK 3

### “Dark Ops”: Programming and Hacking Drones

William Smith (Savannah Chatham County Public Schools): william.smith@sccpss.com

Our “Dark Ops” course utilizes current student interest in flying drones to teach them to program, test, and debug in order to perform auto-piloted secret missions. Students learn basic principles of programming, aerodynamics, problem solving, and collaborative teamwork. Once proficient, students can extend their “Dark Ops” experience into hacking and maker activities such as DIY, weaponry, and intelligence features. This course is cross-curricular as standards for technology, reading comprehension, science, and mathematics are all utilized. Our students really love this; our waiting list for this course is long. [STEM K-8 / Univ Educators]

### Aligning mapping tools to support successful learning in an introductory biology course

Erin Duckett (University of West Georgia): educkett@westga.edu  
Danilo M Baylen (University of West Georgia): dbaylen@westga.edu

Most undergraduate students take a science course during their first two years. One of the challenges of teaching an introductory science course is the reality that many undergraduate students are not prepared to be self-directed learners. Many students expect to earn a grade of A or B just like in high school. However, the failing results of the first exam can be a shocker to the students. Not only do the students not know the science content they studied, they had difficulties retaining and recalling the information.

This presentation discusses and describes the use of concept or visual mapping as a strategy in improving students’ achievement in a STEM related classroom, such as biology, which includes sharing of similar experiences from the audience. It will benefit those working with college as well as K-12 students who are interested in designing and engaging STEM related experiences for their students. [Biology K-12/Univ]

### Digital Badges, Bringing About Changes to STEM Credentialing and Instruction

Thomas Koballa (Georgia Southern University): tkoballa@georgiasouthern.edu

Over the past year, faculty of the College of Education at Georgia Southern University in partnership with the First District RESA, several South Georgia school systems and eCOM of Scotland, have initiated a digital badging project that targets the professional development needs of Georgia teachers. The intent of the project is to provide opportunities for teacher learning across the 10 Teacher Assessment on Performance Standards (TAPS) of the Georgia Teacher Keys Effectiveness System (TKES). The project features credentialing and instructional innovations linked to the collection and use of “metadata”. Metadata provide details about learner accomplishments and learning pathways at a level of specificity not possibly revealed through diplomas, course grades, certificates or professional learning units (PLUs). The objective of the session is to provide participants with information about the Georgia Southern digital badging project and highlight the potential for badging to change STEM credentialing and instruction in both K-12 and higher education. [STEM K-12/Univ]
<table>
<thead>
<tr>
<th>Time</th>
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<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
</table>
| 11:30 | 3.4   | Security MythBusters                                                   | Sean Yang (Georgia Gwinnett College): syang2@ggc.edu  
Yan Zong Ding (Georgia Gwinnett College): yding@ggc.edu  
Hongsik Choi (Georgia Gwinnett College): hchoi@ggc.edu  
Tacksoo Im (Georgia Gwinnett College): tim@gu.edu |
|       |       |                                                                      | Sound Information Technology (IT) structure is essential in today’s world. Like a recent security breach, HeartBleed, millions of people suffer from a security breach, and spend tremendous amount of time and money to clean up the mess. Well-trained IT professionals not only effectively patch a breach but also prevent possible weakness in advance.  
GGC endeavors to provide exceptional high-quality learning environments to produce quality IT professionals throughout the program, yet still engaging learning opportunity in need to strengthen its program. To enhance learning environment in security, we propose a radically interesting method, SecurityMyth Busters, to provide quality-learning materials in IT courses with research experience to IT major students.  
The students in the project pick a myth in computer security that many people believes, than research on it to find out it is really possible or not, like in the famous TV series Myth Busters. During the research, students build a computing environment as close as possible and perform hacking as in a myth. Also, students may consult with an IT professional to get some advice to complete their task. All of the activity will be recorded on a video and will be edited to create a classroom material that can be used in classrooms.  
In this presentation, attendees will gain the knowledge how it has been implemented and how the program achieves to enhancing students learning experiences.  |
| 11:30 | 3.5   | Prospective Science Teachers’ Understanding of Science Practices in Classroom Scenarios | Robert Idsardi (University of Georgia): boidsardi@uga.edu  
Barbara Crawford (University of Georgia): barbarac@uga.edu  
Maria Romero (Simmons College): maria.romero@simmons.edu  
Daniel Capps (University of Georgia): dacapps@uga.edu  
Jaclyn Murray (University of Georgia): jakspiel@uga.edu  
James Ammons (University of Georgia): jammons@uga.edu |
|       |       |                                                                      | The purpose of this study was to explore how to support prospective science teachers in meeting expectations of the Next Generation Science Standards, specifically understanding science practices in the classroom. We investigated if prospective science teachers had sufficient knowledge of science practices to use the NGSS’s framework of inquiry as science practices at the end of the teacher preparation programs. Prospective teachers were asked to accurately recognize and describe the enactment science practices in classrooms using written and video scenarios. While prospective science teachers were confident in their understanding of science practices, participants were unable to consistently recognize science practices or describe the level of depth of science practices in written or video scenarios. Our results highlight the need for additional support in not only understanding what science practices are, but what science practices look like in classrooms and how to enact science practices at various levels of depth.   |
| 11:30 | 3.6   | Professional Development: Teacher Quality Grant Workshops            | Janel Smith (Armstrong State University): janel.smith@armstrong.edu |
|       |       |                                                                      | For over ten years, ASU staff have partnered with schools to provide hands-on professional development in social studies, science, and math content knowledge to teachers by providing content knowledge from professors and in-field professionals. Teachers discuss not only the challenges involved in trying to cover all required content but also the problems that arise in science and social studies when many districts do not focus on these subjects. Yet, both disciplines are part of Georgia Standards, and components can be included within interdisciplinary lessons.  
The purpose of this session is to introduce the workshops to K-12 educators as a resource with emphasis in STEM fields. The workshops are sought after by teachers to develop content knowledge of state standards. Staff also provide modeling of best practices in literacy, math, and technology in content areas. Primary sources, expertise of experts in the field, photographs, videos, and artifacts are gathered by teachers to immediately be used in classrooms.  |
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<tr>
<th>Session</th>
<th>Room</th>
<th>Title</th>
<th>Authors</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>3.7</td>
<td>2901</td>
<td>Adding a Student Research Component to an Information Technology Ethics Course</td>
<td>David Kerven (Georgia Gwinnett College): <a href="mailto:dkerven@ggc.edu">dkerven@ggc.edu</a> Peter Meso (Georgia Gwinnett College): <a href="mailto:pmeso@ggc.edu">pmeso@ggc.edu</a></td>
<td>This brief report describes research into the integration of a student research project into an information technology professionalism and ethics course (ITEC 3900). Various investigators have introduced student research projects into other specific IT courses. These investigators have attributed educational benefits to the inclusion of research into these courses. The present research incorporates a student research project into the ITEC 3900 course content that not only enhances the students understanding of the underlying professional practice and ethics principles but also exposes the students to Structural Equations Modeling (SEM) as a research tool. The research project is designed to allow students (1) to ask questions beyond the materials presented in class, (2) to synthesize their own model of how the underlying principles in those materials are interrelated and (3) to experimentally test their model through survey-based data collection and SEM statistical data analysis. [STEM Univ]</td>
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<tr>
<td>3.8</td>
<td>2904</td>
<td>Course-based undergraduate research experiences (CUREs) as settings for producing competent graduates: grounding perception with measures of core competencies</td>
<td>Michael Sanderson (Georgia State University): <a href="mailto:msanderson1@student.gsu.edu">msanderson1@student.gsu.edu</a> Nancy Russell (Georgia State University): <a href="mailto:nrussell2@student.gsu.edu">nrussell2@student.gsu.edu</a> Mariya Campbell (Georgia State University): <a href="mailto:mcampbell29@student.gsu.edu">mcampbell29@student.gsu.edu</a> Therese Poole (Georgia State University): <a href="mailto:tpoole@gsu.edu">tpoole@gsu.edu</a> Paul Ulrich (Georgia State University): <a href="mailto:pulrich@gsu.edu">pulrich@gsu.edu</a></td>
<td>Most studies of course-based undergraduate research experiences (CUREs) are limited by reliance on self-reported gains through surveys, and we seek resolution of this limitation by directly assessing gains from an immersive CURE that integrates bioinformatics analysis and conventional molecular experimentation. Science literacy, self-directed learning, critical thinking, and ability to develop argument were measured using rubrics designed to semiquantitatively code writing assignments, journal club reports, and weekly learning logs. The CURE survey (Lopatto et al.) was modified to provide pre- and post-course measurement of perceptual gains in student skills, confidence, and science identity. Preliminary analysis of the initial cohort of students enrolled in the student indicates that gains in competence and self-directed learning are aligned with self-reported gains in science identity and scientific competence. We anticipate our tools and findings will inform efforts to build high-impact platforms for undergraduate research that can be scaled up throughout USG. [Science Univ]</td>
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<td>3.9</td>
<td>1905</td>
<td>Teaching a 21st Century Learner to Communicate in a Technology-Driven Classroom</td>
<td>Mary Ann Rogers (The STEM Academy @ Bartlett): <a href="mailto:mary.rogers@sccpss.com">mary.rogers@sccpss.com</a></td>
<td>As more classrooms move to 1:1 technology and the 21st century student continues to immerse him/herself in digital screens, the teaching of interpersonal communication is vital to the success of students in and outside of the classroom. Apps such as FlipGrid allow for students to self and peer evaluate their own communication styles. As well, It is important to assess and share the students ability to develop and manage accountability. In an interactive workshop designed for secondary educators, participants will practice answering a question on their own and peer evaluating the communication tactics, utilizing accountability talk during the process. [STEM 6-12]</td>
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| 4.1a | Room 1601  
| 1:45 – 2:05 p.m. | Increase students’ engagement, learning and achievement in a mathematics classroom using teacher made and or web-based videos - the Flipped instructional classroom model.  
Solomon Betanga (Gordon College - Barnesville): sbetanga@gordonstate.edu  
As a graduate student and a mathematics teacher, I have seen the tremendous benefits of using teacher-made and or internet videos on students’ engagement, understanding and performance in mathematics. Personally, I have benefited from such videos to help me master concepts that I didn’t quite get the first time I learn them. Usually referred to as the flipped classroom model, it is different from taking an online class. Students are still required to attend class face-to-face. Rather than listening to lectures from the teacher the entire class time, they are engaged in discussions, problem solving, inquiry, collaborative projects, etc. The purpose of this presentation is to shed light on the benefits of the flipped instructional classroom model and how it can be used by teachers at all levels (k-12 and university) to foster engagement, learning and success in their mathematics classrooms.  
[Math K-12/Univ]  
**Do Manipulatives Help Pre-Service Teachers in Understanding Mathematics?**  
Veena Paliwal (University of West Georgia): vpaliwal@westga.edu  
In a mathematics instruction, the use of manipulatives has long been debated. Some researcher support the use of manipulatives as a long-range pedagogical tool. However, some researchers advise manipulatives cannot be used as a tool guaranteed to be successful. The session presents an attempt to answer this question by investigating efficacy of manipulatives in facilitating understanding of probability concepts with pre-service teachers. The findings are based on a study with twenty-five pre-service teachers who participated in the study. The study employed a pretest and posttest design. The results revealed that the manipulatives were partially successful in promoting learning of the concepts. Manipulatives are effective instructional tools that are effective in actively engaging students in learning and instruction, but should be used with precaution and under complete guidance. The features in the study that may have contributed towards the success and educational implications of the findings will be discussed.  
[Math K-12]  

| 4.1b | Room 1601  
| 2:10 – 2:30 p.m. | Getting Physical with IPads  
Tracy Robinson (Bryan County Middle School): tracyrobinson1130@gmail.com  
Integrating technology into your content is easier than you think! You do not have to have a 1:1 classroom to make it work. Technology is everywhere and it should be in your classroom too for more than just Power Points and watching videos. Bring your IPad and learn how to start a google classroom, make a QR code lesson, use Flip Grid as a TOTD, have your kids make a stop motion or thing link presentation, teach using Pear Deck, get your kids organized in google docs, assess using socative and so much more. You can increase the rigor and relevance of your content by using I-pad apps to differentiate not only the products your students create to show mastery of standards but also the mode you deliver your instruction. You will be STEMulated to go back to your classroom and add some of these new ideas to your lessons that will engage your kids while meeting the TKES standards. Please bring your Ipad and be ready to get physical with learning!  
[STEM 6-8]  

**#STEMGS2016**
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<tr>
<th>4.3 Room 2911</th>
<th>Creating Flipped Student-Centered Classrooms</th>
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<tr>
<td>Amanda Fox (STEM Academy): <a href="mailto:amandafoxflipped@gmail.com">amandafoxflipped@gmail.com</a></td>
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</table>

Are you a K-12 or university professor interested in flipping your content, but don’t know where to start? Through flipped video examples we will cover the basic constructs of the flipped classroom, starting with the true flip, in-flip, and reverse/recycle. In this session I will help you discover your flipped teaching style, and offer several structures, and digital tools for implementation that I have found successful in my own practice. You can even co-teach with yourself, while taking care of remediation and enrichment, and shifting to a student-centered learning environment!

In this session you will learn:
- What a flipped classroom looks like with practical examples.
- How the flipped classroom naturally differentiates content and addresses individual learning differences.
- What your flipped teaching style is.
- Digital tools to enhance your pedagogy.
- How to shift from a teacher-centered to a student-centered classroom. [STEM K-12/Univ]

<table>
<thead>
<tr>
<th>4.4 Room 2903</th>
<th>You can publish!</th>
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<tbody>
<tr>
<td>Mare Timmons (University of Georgia): <a href="mailto:mare@uga.edu">mare@uga.edu</a></td>
<td></td>
</tr>
<tr>
<td>Mary Sweeney-Reeves (University of Georgia): <a href="mailto:msweeney@uga.edu">msweeney@uga.edu</a></td>
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You Can Publish! Anyone in the education field can publish! Suggestions include publishing STEM activities, classroom strategies, programs or curricula. Through publications, you might increase your chances of a promotion or a raise! Invigorate your colleagues to join you! Learn about bad writing, database searches, the peer review process, and appropriate journals with large audiences. Once you have published, you can use your writing skills to apply for grants for school projects! Let’s do this! [STEM K-12/Univ]

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<th>4.5 Room 2908</th>
<th>Computer Science, Information Technology, Information Systems, Computer Engineering - What’s the difference?</th>
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<tbody>
<tr>
<td>John O’Malley (Georgia Southern University): <a href="mailto:jomalley@georgiasouthern.edu">jomalley@georgiasouthern.edu</a></td>
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<tr>
<td>Adrian Gardiner (Georgia Southern University): <a href="mailto:agardine@georgiasouthern.edu">agardine@georgiasouthern.edu</a></td>
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<tr>
<td>Jim Harris (Georgia Southern University): <a href="mailto:jkharris@georgiasouthern.edu">jkharris@georgiasouthern.edu</a></td>
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<tr>
<td>Rami Haddad (Georgia Southern University): <a href="mailto:rhaddad@georgiasouthern.edu">rhaddad@georgiasouthern.edu</a></td>
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College and university freshmen frequently enroll in a program that turns out to be a poor fit with their interests and abilities. This is especially problematic in the computing disciplines. Consequently, students who start in a computing program they are not committed to, can take longer to graduate, have larger student loans, have a lower GPA, and may end up majoring in a field that they do not want to work in, or like.

There are 5 major computing sub-disciplines, and while they share a ‘computing’ theme, there are significant differences between the disciplines. Often, students do not know the difference between the sub-disciplines and will enroll in one based on incorrect assumptions about that sub-discipline. It is the belief of the presenters that a contributing factor to this problem is that STEM teachers and guidance counselors are not fully aware of the differences between the programs, due to a lack of information.

In this poster session, the presenters will provide coherent information about the computing sub-disciplines in a format that educators and counselors can use to assist students enter the sub-discipline that best matches their interests and abilities. [Tech 9-12/Univ]
### Preparing K-12 Pre-Service Educators for Interdisciplinary STEM Project Based Learning

Janel Smith (Armstrong State University): janel.smith@armstrong.edu

Today’s educational climate emphasizes project based and interdisciplinary lessons to engage K-12 students. National and international programs such as Georgia’s STEM Certification and International Baccalaureate strive toward interdisciplinary instruction that embeds subject skills within real world applications. Increasingly, lessons are sought to develop problem solving to prepare our nation’s students for STEM occupations.

A disconnect is found, though, in that pre-service educators are often taught subjects in isolation while minimizing experience in designing and implementing meaningful interdisciplinary lessons. In opposition, teachers are expected to work in school settings to implement successful tasks with an awareness of other content areas and standards.

This session’s aim is to create a dialogue with university professors to create an awareness of the benefits of interdisciplinary learning and how to be implementing lessons in college settings to foster interdisciplinary STEM lessons. Session participants will engage in planning activities through brainstorming and dialogue about content standards. [STEM K-12]

### Building a head of STEAM: Opportunities and challenges surrounding the implementation of STEM/STEAM programs

Joseph Covert (University of North Georgia): joseph.covert@ung.edu
Markus Hitz (University of North Georgia): markus.hitz@ung.edu
Paul Baldwin (University of North Georgia): paul.baldwin@ung.edu
Bryan Fagan (Lumpkin County Middle School): bryan.fagan@lumpkinschools.com
Mark Merges (Sequoyah High School): Mark.Merges@cherokee.k12.ga.us

STEM and the more recently created STEAM are buzzwords heard frequently in education. School leaders and politicians alike are very eager to use these buzzwords, but when it comes to implementing actual change there can be disconnect between words and actions. In this round-table discussion, our panel, which includes three college professors, a middle school teacher, and a former middle school principal, will discuss issues surrounding the implementation of high-quality, student-centered STEM/STEAM programs. We will bring several examples into the conversation from our own experiences, focusing on our combined efforts to integrate hands-on computer science learning into middle school settings. Then, we will widen the conversation to include the experiences of our audience members and the issues they have faced when undergoing change within a school. Our goal is to identify successful strategies/models for the development and implementation of STEM/STEAM programs and initiatives across the K-16 spectrum. [STEM K-12/Univ (Roundtable Discussion)]

### Stepping Up STEM

Gradesa Lockhart (Guilford County Schools): lockhag@gcsnc.com
Harold Chairs (Guilford County Schools): chairsh@gcsnc.com

Are you ready to begin the journey of starting a STEM program at your school? Well this is the session for you. Join me along the journey on how Bluford STEM Academy, an urban, Title I, predominantly African American school, became one of the few K-5 STEM magnet schools in North Carolina. The session will focus on instruction, professional development, student enrichment, and STEM integration as part of our 3-year STEM plan which began in 2012. [STEM K-5]
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<th>Session</th>
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<th>Abstract</th>
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<tr>
<td>5.1</td>
<td>1601</td>
<td>Improving Number Sense with Elementary Mathematics Teachers</td>
<td>Christopher Jett (University of West Georgia): <a href="mailto:cjett@westga.edu">cjett@westga.edu</a></td>
<td>Improving number sense in elementary grades has been found to foster positive dispositions about mathematics and propel students to further study STEM. As such, the author proposed a grant project with an objective to improve number sense among elementary teachers, ultimately influencing their students’ number sense knowledge. The elementary teachers were K-5 teachers employed by Atlanta Public Schools (APS). This ongoing partnership between UWG and APS seeks to improve teachers’ pedagogical practices, and this collaboration aligns with this year’s conference theme of “Partnership, Pedagogy, and Performance.” This research project was funded for the 2015-2016 school year. The teachers completed a weeklong number sense training during the summer of 2015. Throughout the year, observations and follow-up sessions have occurred to support the teachers’ mathematics pedagogical practices concerning bolstering students’ number sense understandings. This session is designed for K-5 elementary educators, university mathematics (education) professors, and STEM researchers. This project was funded by Improving Teacher Quality State Grants administered by the University of Georgia for The Board of Regents of the University System of Georgia. [Math K-5]</td>
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<td>5.2</td>
<td>1909</td>
<td>The 3.14 Things to Do When opening a STEM School, or STEM’s Not Easy as Pi</td>
<td>Peter Ulrich (Savannah-Chatham County Public School System): <a href="mailto:peter.ulrich@sccpss.com">peter.ulrich@sccpss.com</a></td>
<td>The STEM Academy at Bartlett opened its doors in August 2013 and is Georgia’s first and only certified entirely STEM Middle School. Listen to the thrills and chills involved with turning a 50-year old building into a sought-after educational setting with a waiting list to enroll. Hear the processes and procedures a principal could use to transform his/her school into a radical space of possibilities. [STEM K-12]</td>
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<td>5.3</td>
<td>2911</td>
<td>Effectiveness of a Supplemental Instruction Program in a Statistics Course</td>
<td>Emily Baum (Georgia College and State University): <a href="mailto:emily.baum@bobcats.gcsu.edu">emily.baum@bobcats.gcsu.edu</a> Brandon Samples (Georgia College &amp; State University): <a href="mailto:brandon.samples@gcsu.edu">brandon.samples@gcsu.edu</a></td>
<td>At most universities, an introductory statistics course is required for the majority of the students before they begin their specific major classes. Of these students, several will fail to retain the information, making future classes more difficult, or fail to successfully pass the course which increases the likelihood a student will not graduate on time. Providing academic support through the implementation of a Supplemental Instruction (SI) Program gives students the opportunity to receive extra help focused on student achievement in this course. Students are able to attend sessions to receive conceptual help while reviewing class material, developing study strategies, and collaborating with classmates. We will be focusing on the effects SI can have on student achievement in statistics classrooms. We will share our data analysis for using SI in a statistics course over a 4-year period, providing participants the opportunity to identify the positive effects SI has on student success. [STEM Univ]</td>
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Visit Georgia Southern’s own DRAGON!

March 3  Holiday Inn | 7:00-9:00pm
March 4  Nessmith-Lane | 7:30am-8:00am and 1:10pm-1:40pm
during poster session
<table>
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<th>Facilitators</th>
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| 5.4   | 2903   | Fishery Biologist for the Day                                         | Mary Sweeney-Reeves (University of Georgia)        | Cruise aboard an ocean trawler (via video) as it tows a shrimp net and learn how scientists collect data once the catch is on deck. Researchers must act quickly to sort, count, measure, and then release the fish back to the water. The education program is a multidisciplinary biology/math exercise allowing participants to observe sampling techniques and analyze the catch. Just like a fishery biologist participant's will:  
  - Identify fish  
  - Measure fish  
  - Calculate percentage of each species caught from the trawl sample  
  - Apply statistics (e.g. mean length) a variety of fish species  
  The session will include:  
  - Power point with trawling video available on website  
  - Paper fish to measure  
  - Teacher resources will be available [Biology 5-7] |
| 5.6   | 2905   | Mathematics in Chemistry: Professor and Student Perspectives on What the Numbers Mean | Karen Hypolite (Kennesaw State University)         | As the facilitator of learning, the chemistry professor has many challenges as it relates to pedagogical strategies. One of the many challenges that professors face is to make the connection with students on how to employ mathematics in the understanding of chemical principles. There must be a synchronization of strategy on the part of the professor and a sense of strategy on the part of the student. While the professor’s instructional delivery must be pedagogically sound, so must the student employ learning skills that are capable of receiving such content. As with many facets of life that require a transmitter and a receiver completely aligned, so must there be a succinct giving, receiving, processing, and application of chemical principles for chemistry content to be truly learned and applied. This presentation will provide chemistry professors insight and strategies to increase their efficacy that facilitates learning as it relates to S.T.E.M. fields. [STEM Univ] |
| 5.7   | 2901   | Helping STEM Students Find a Sense of Belongingness and Stay Excited about Their Studies | Margie Lewkowicz (Georgia Perimeter College)       | Georgia Perimeter College’s Educate and Nurture Leadership in STEM (ENLISTEM) Scholars Program, funded by an NSF S-STEM grant, has found that an extra-curricular program combining opportunities for students to interact with STEM experts, see STEM careers in action, and lead children in STEM activities helps collegiate STEM students find a sense of belongingness that encourages their persistence through the rigor of STEM coursework. ENLISTEM Scholars receive financial support and participate in advising sessions, but we have found great benefit to ENLISTEM Scholars through field trips to businesses that employ STEM professionals and speakers that present novel opportunities and/or real-world advice. In addition, ENLISTEM Scholars find serving the community by inspiring young children to discover the wonders of math and science very rewarding. The purpose of this discussion is to share the experience of the ENLISTEM Scholars Program so other schools can implement practices that excite students with little financial investment. [STEM Univ (Roundtable Discussion)] |
EFFECTIVENESS OF A SUPPLEMENTAL INSTRUCTION PROGRAM IN A STATISTICS COURSE
Emily Baum (Georgia College & State University): emily.baum@bobcats.gcsu.edu

At most universities, an introductory statistics course is required for the majority of the students before they begin their specific major classes. Roughly 25% of undergraduate students at a given university will take a statistics class during a single academic year. Of these students, several will fail to retain the information, making future classes more difficult, or fail to successfully pass the course, increasing the likelihood a student will not graduate on time. Providing academic support through the implementation of a Supplemental Instruction (SI) Program gives students the opportunity to receive free, out-of-class help focused on student achievement in this course. Lead by a SI Leader, students are able to attend sessions to receive conceptual help while reviewing class material, developing study strategies, and collaborating with classmates. Since statistics is a necessary and important course in several disciplines, proper academic help is crucial for the success of the students. This poster will highlight the positive effects SI has on student success in a statistics course. [Poster Session I & II]

ADVANCES IN STEM EDUCATION AT GEORGIA STATE UNIVERSITY
Anu Bourgeois (Georgia State University): abourgeois@gsu.edu
Paul Ulrich (Georgia State University): pulrich@gsu.edu

The past five years have brought significant advances in STEM education at Georgia State University. Mini-grants have allowed faculty and students to make strides in a number of areas including laboratory courses, integration of material across disciplines, and new developments in teacher education. Course-based undergraduate research is growing significantly. We have developed a new cadre of student leaders. We have also focused on enhancements of our administrative structure, including changes in advising, ways of enhancing faculty productivity, and academic support for students in the STEM disciplines. [Poster Session I & II]

EXPANDING THE VIEW: ADDING A GRAPHICAL INTERFACE TO THE DIY BREADBOARD COMPUTER
Joseph Covert (University of North Georgia): joseph.covert@ung.edu
Markus Hitz (University of North Georgia): markus.hitz@ung.edu
Paul Baldwin (University of North Georgia): paul.baldwin@ung.edu

The DIY Breadboard Computer is the product of an on-going collaboration between faculty and students from the Departments of Teacher Education and Computer Science. The goals of this project are: (1) decrease costs associated with owning handheld data collecting computers for use in science classrooms, and (2) involve students and teachers in the creation of these devices expanding their understanding of computers. Currently, our computer costs approximately $20 per unit, which is significantly lower than the $200 plus cost for commercially available units. The current generation of the the DIY Breadboard Computer integrates a 2.3” display with touch interface. This display greatly expands the options for the display of collected data, as well as possibility of interacting with the computer. The ever-changing nature of the computer technology allows for opportunities to customize and upgrade the device. Our poster will include hands-on interaction with the latest generation of our computer. [Poster Session I]

TAPPING THE POWER OF STUDENT CHOICE & DESIGN: A COURSE THEME DESIGNED TO PROMOTE CREATIVE, COLLABORATIVE UNDERGRADUATE RESEARCH EXPERIENCES
Pratima Darr (Georgia Gwinnett College): pdarr@ggc.edu
Rebekah Ward (Georgia Gwinnett College): rwardi@ggc.edu
Wendy Dustman (Georgia Gwinnett College): wdustman@ggc.edu

Providing authentic research experiences embedded into curricula is a popular vehicle for increasing research accessibility for STEM majors at colleges and universities. Several models involve students investigating microbes in specified contexts. Here we describe a course design which provides students great flexibility in selecting their research focus within the broad area of microbial ecology. This course is a special theme within a regular offering that aims to provide upper level undergraduates an experience which will prepare them for pursuing STEM careers. Students will immerse in the collaborative nature of real world research within instructor designated groups of 3-4 and will practice communicating effectively both orally and in writing. We will share and discuss our plan of implementation, as well as preliminary successes, shortcomings and, student feedback in an effort to provide a model for developing similar courses, especially where independent research opportunities are limited. [Poster Session I & II]
EFFECTS OF CONTENT ACQUISITION PODCASTS TO DEVELOP PRESERVICE TEACHERS’ CONTENT KNOWLEDGE IN MATHEMATICS STRATEGIES FOR TEACHING CHILDREN WITH EXCEPTIONALITIES
Katherine Green (University of West Georgia): kbgreen@westga.edu
Jessica Bucholz (University of West Georgia): jbucholz@westga.edu

The objectives of this poster session are to: 1) share the results of an innovative technique to develop undergraduate special education majors’ content knowledge in math strategies for teaching students with disabilities; 2) discuss lessons learned from the project, including teaching students how to create their own podcasts. The presenters will provide handouts of the project results, and the process of developing a Content Acquisition Podcast. The presenters will encourage discussion in utilizing this teaching technique in other courses and subject areas.

The audience for this poster session is college faculty. Participants will gain knowledge of utilizing the current teaching technique, the results of the study, lessons learned from the project, and future directions of the current research. [Poster Session II]

INCORPORATION OF MOLECULAR SIMULATION PROGRAM TO IMPROVE STUDENTS’ UNDERSTANDING IN GAS CHROMATOGRAPHY LABORATORY
Shainaz Landge (Georgia Southern University): slandge@georgiasouthern.edu

Organic Chemistry is known as one of the “difficult courses” in college curriculum. When any abstract theory is introduced, students have the misconception that they will not be able to learn the new material. Conventional teaching techniques can be blended with interactive teaching tools to convey the contents in an engaging manner. The major intention of this project was to utilize a free molecular simulation program such as NetLogo to deliver the “challenging” concepts such as Gas Chromatography in organic chemistry courses. The project was designed to promote “creative thinking” so students will understand and implement the information in advanced courses as well. The on-going study is carried over two semesters and this proposal will focus on the first semester (Fall 2015) results to see the impact of simulation program. The primary audience for this session would be the higher education chemistry students and professors. [Poster Session I]

UNIVERSITY OF WEST GEORGIA INSTITUTIONAL STEM EXCELLENCE (UWISE)
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UWise, funded by the Georgia BOR STEM II initiative, provides support to STEM majors through a summer bridge program. UWise also supports faculty members with mini-grants that focus on improving student success in STEM courses and involving them in faculty-directed undergraduate research. Students in the summer bridge program outperformed non-bridge students in English and STEM courses, as well as the overall GPA. A total of 30 STEM majors participated in UWise-funded research projects, which resulted in 14 student presentations and seven peer-reviewed publications. In conjunction with a Complete College Georgia (CCG) Grant, we have expanded the STEM to STEAM based ENGL 1101/1102 sections from 10 to 12 each term in 2015-2016. A total of 25 faculty members took part in the mini-grant projects, which focused on reducing DFW rates, and resulted in positive gains for students. Ten conference presentations and two peer-reviewed SoTL publications resulted from activities supported by mini-grants. [Poster Session I & II]

COMPUTER SCIENCE, INFORMATION TECHNOLOGY, INFORMATION SYSTEMS, COMPUTER ENGINEERING – WHAT’S THE DIFFERENCE?
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College and university freshmen frequently enroll in a program that turns out to be a poor fit with their interests and abilities. This is especially problematic in the computing disciplines. Consequently, students who start in a computing program they are not committed to, can take longer to graduate, have larger student loans, have a lower GPA, and may end up majoring in a field that they do not want to work in, or like. There are 5 major computing sub-disciplines, and while they share a ‘computing’ theme, there are significant differences between the disciplines. Often, students do not know the difference between the sub-disciplines and will enroll in one based on incorrect assumptions about that sub-discipline. It is the belief of the presenters that a contributing factor to this problem is that STEM teachers and guidance counselors are not fully aware of the differences between the programs, due to a lack of information. In this poster session, the presenters will provide coherent information about the computing sub-disciplines in a format that educators and counselors can use to assist students enter the sub-discipline that best matches their interests and abilities. [Poster Session I & II]
Scientific outreach is an effective tool for educating communities to particular areas of interest to the academic community. Active engagement with community partners may expand upon outreach programs by identifying the specific needs of a given community. Using outlined best practices of community engagement, graduate students of the Plant Biology department at UGA have taken a small outreach program that catered to Agri-Science classrooms and transformed this program in to a partnership with 7th grade life science teachers at a local middle school. This partnership identified subject areas of particular interest and need for the 7th grade students, in an effort for improved understanding of the current curriculum. This program seeks to increase student interest in the life sciences, as well as knowledge of subject material within their classrooms. The benefits, as well as the challenges, associated with this effort will be discussed. [Poster Session I]

BUILDING AND SUSTAINING HIGH STUDENT ENGAGEMENT IN STEM FIELDS: USING A DISCIPLINE-SPECIFIC COURSE-EMBEDDED RESEARCH MODEL (4YURCE) AND SERVICE LEARNING INTERNSHIPS

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Undergraduate Research, Service Learning, and Internships are three of the ten High-Impact Educational Practices for student engagement and learning listed by the American Association of Colleges and Universities. Course-Embedded Research and Service Learning Internships are components of GGC’s STEM Initiative for enhancing student engagement and learning in STEM disciplines. GGC’s STEM Initiative includes (1) a Four-year Undergraduate Research and Creative Experience (4YrURCE) based upon a novel discipline-specific course-embedded research model which scaffolds multiple research and creative experiences for all STEM majors during all four years of matriculation, and (2) a Service Learning Internship course designed to provide opportunities for STEM undergraduate students to gain teaching experience in science at the K-5 level. We will describe components of our STEM Initiative, progress made to date, and the impact of this model at GGC. GGC’s STEM Initiative is supported by a USG-STEM initiative II grant. [Poster Session I & II]

COURSE-BASED UNDERGRADUATE RESEARCH EXPERIENCES (CURES) AS SETTINGS FOR PRODUCING COMPETENT GRADUATES: GROUNDING PERCEPTION WITH MEASURES OF CORE COMPETENCIES

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Most studies of course-based undergraduate research experiences (CUREs) are limited by reliance on self-reported gains through surveys, and we seek resolution of this limitation by directly assessing gains from an immersive CURE that integrates bioinformatics analysis and conventional molecular experimentation. Science literacy, self-directed learning, critical thinking, and ability to develop argument were measured using rubrics designed to semi-quantitatively code writing assignments, journal club reports, and weekly learning logs. The CURE survey (Lopatto et al.) was modified to provide pre- and post-course measurement of perceptual gains in student skills, confidence, and science identity. Analysis of the initial cohort of students enrolled in the student indicate that gains in competence and self-directed learning are aligned with self-reported gains in science identity and scientific competence. We anticipate our tools and findings will inform efforts to build high-impact platforms for undergraduate research that can be scaled up throughout USG. [Poster Session II]
ACADEMIC MOTIVATION TYPES IN STEM UNDERGRADUATES
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This poster is geared towards university professors teaching undergraduate STEM classes. The study examined students’ academic motivation types: amotivation, extrinsic and intrinsic motivation based on the Self Determination Theory (SDT). The Self-Regulation Questionnaire was modified to compute a relative autonomy index (RAI) and was administered at the beginning and end of two consecutive semesters to undergraduate students enrolled in five classes: Principles of Chemistry I and II, Organic Chemistry I and II and Human Anatomy and Physiology I. 1,305 surveys (response rate 73%) were included in the data analysis. The poster will present the research design, instrumentation and results. Presenters will engage participants in conversations about the SDT, results of the study and implications for teaching STEM classes. [Poster Session I]

THE GEORGIA GEOGRAPHIC ALLIANCE: USING PLACE TO ENGAGE K-12 TEACHERS AND STUDENTS IN STEM
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The Georgia Geographic Alliance (GGA) is a non-profit organization of individuals dedicated to enhancing geographic education. Our objectives include a specific focus on place-based learning and activities in K-12 that emphasize the interactions between human and natural systems. We aim to provide professional development opportunities and curriculum-focused educational resources for individuals interested in using geography as a foundation for learning across disciplines, particularly in cultivating interdisciplinary linkages in STEM fields. Examples of previous and upcoming events sponsored by the GGA will be featured in this poster as we strive to increase opportunities for K-12 learning in STEM disciplines through place-based approaches. [Poster Session I & II]