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Interdisciplinary STEM Teaching & Learning  
Conference

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## 2012 Georgia Scholarship of STEM Teaching and Learning Conference Program

Georgia Scholarship of STEM Teaching and Learning Conference

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## Holiday Inn

6:00pm – 9:00pm Registration at the Holiday Inn

6:30pm – 9:00pm STEM Conference Reception

## Nessmith-Lane Building

7:45 – 8:15 Registration at Nessmith-Lane / Breakfast

## Room 1603

8:15 – 8:45 Welcome and Announcements

Dr. Joy Darley – Associate Professor, Mathematical Sciences, Georgia Southern University  
Dr. Thomas Koballa – Dean, College of Education, Georgia Southern University  
Dr. Bret Danilowicz – Dean, College of Science & Technology, Georgia Southern University

The National & State Context of STEM Education: Past, Present, and Future

Dr. Henry M. Huckaby, Chancellor, Georgia Board of Regents (video)  
Dr. Kamau Bobb, USG STEM Initiative Coordinator, Georgia Board of Regents  
Dr. Charles Kotal – Associate Dean, School of Arts & Sciences, University of Georgia  
Dr. Judy Awong-Taylor – Associate Dean, School of Science & Technology, Georgia Gwinnett College

## Room 1915

9:00 - 9:45 am - *Exploring the Impact of Studio Courses on Learning* - Dr. Delena Gatch, Georgia Southern University

A studio course seamlessly integrates lecture and laboratory courses into an active-learning, student-centered course. The effects of computer interfaced laboratory apparatus, web-based simulations, and online homework systems on student learning have been assessed through administering content and attitude surveys to students. Assessment has indicated students enrolled in Studio courses are experiencing greater success in achieving the desired outcomes.

## Room 2901

9:00 - 9:20 am - *Building Transformative Leaders in STEM Education* - Dr. Julia Metzker ,  
Dr. Karynne Kleine, Dr. Laurie Huffman, Georgia College

Representatives from Georgia College will use their experiences as members of the Innovative Course-building Group, a structured collaboration across departments and disciplines, to stimulate a discussion with attendees about building strong faculty leaders

capable of making the important structural changes needed to address curriculum issues in the STEM fields. Our goal is that you will leave this roundtable with an action plan for engaging STEM faculty at your institution.

9:25 - 9:45 am - *The STEM Initiative at Georgia Perimeter College* - Dr. Pamela Gore, Dr. Kouok Law, Dr. Pamela Leggett-Robinson, Dr. Marjorie Lewkowicz, Ms. Margaret Major, Ms. Bonnie Martin, Dr. Brooke Skelton, Georgia Perimeter College

This session will provide information on the grants that GPC has recently received, which are designed to increase the number of students majoring in STEM.

### Room 2903

9:00 - 9:45 am - *A Medley of Successful Active-Learning Methods* - Dr. Sarah Formica, North Georgia College and State University

This workshop will present a medley of active-learning methods that have been implemented successfully in physics courses. The participants will engage in methods that include Just-in-Time Teaching, clicker questions, whiteboard activities, and virtual experiments. The workshop goal is to show how these active-learning methods can be applied in a STEM classroom to increase students' conceptual understanding and problem solving skills.

### Room 2911

9:00 - 9:20 am - *Science Classes Online Can Improve Instruction* - Dr. Jenny Harper, Dr. David Pollock, Bainbridge College

Science courses online are commonly met with skepticism. People often wonder if online science courses will contain the same amount of content as traditional science courses. This presentation aims to demonstrate how moving science courses online can actually improve instruction, as well as student engagement based on the personal experiences of a science professor.

9:25 - 9:45 am - *On-line Homework in Organic Chemistry* - Dr. Dabney Dixon, Dr. Jeremiah Harden, Dr. Joan Mutanyatta-Comar, Dr. Pedro Vasquez, Dr. Keith Pascoe, Dr. Maged Henary, Georgia State University

Homework is a continuing issue in the STEM disciplines. It is a vital part of learning, allowing students the focused time to concentrate on the material and practice their skills. However, faculty time constraints preclude grading of significant amounts of homework. On-line homework may be a good solution to engaging students while conserving faculty time.

## Room 1915

10:00-10:45 am - *Curricular Materials based in Biological Animation* - Dr. Georgia Hodges, University of Georgia

This research reports the creation and testing of three interactive case study modules that combined dynamic 3-D animations and inquiry-based learning of biology. Each module includes a case study that examines a specific disease state and a fundamental biological process. This presentation will show examples of the animations, discuss issues related to teachers' implementation, and assessment of student learning.

## Room 2901

10:00-10:20 am - *Methodology and/or Technology: Making Difference in Improving Students' Problem Solving Skills* - Dr. Zdeslav Hrepic, Ms. Katherine Lodder, Dr. Kimberly Shaw, Columbus State University

Wirelessly networked, in-class computing opens a wide array of possibilities for active instructional methodologies (Hrepic, Rebello, & Zollman, 2009). Earlier studies showed a substantial potential that the pen input computers combined with interactive software like DyKnow ([www.dyknow.com](http://www.dyknow.com)) may have in facilitating students' problem solving ability. The session has two goals. The first one is to demonstrate the instructor-student classroom interaction dynamics enabled or facilitated by DyKnow software and pen-input computers. The second one is to present selected research findings associated with student learning while using this technology. The most recent of our studies was to isolate the effect of the methodology itself from that of the involved technology for improving student problem solving skills.

Hrepic, Z., Rebello, N. S., & Zollman, D. A. (2009). Remediating Shortcomings of Lecture-Based Physics Instruction Through Pen-Based, Wireless Computing And DyKnow Software. In N. H. Salas & D. D. Peyton (Eds.), *Reading: Assessment, Comprehension and Teaching* (pp. 97-129): Nova Science Publishers; [reprinted in *Journal of Education Research*, 3(1/2), 161-190 (2009)].

10:25-10:45 am - *The GPC & AMC MESA Program* - Dr. Abe Ojo, Atlanta Metropolitan College; Dr. Kouok Law, Georgia Perimeter College

Georgia Perimeter College (GPC) and Atlanta Metropolitan College (AMC) have established the Mathematics, Engineering and Science Achievement (MESA) Program since Fall-2007 academic year. The program was initially jointly funded by the MESA California Consortium and after the first year operation, completely funded by the Board of Regents of the University System of Georgia. The MESA model was established to assist in increasing the retention of educationally disadvantaged students (minorities, female, low-income, first generation college students) majoring in STEM areas and helping them transfer to four-year institutions

in Georgia and across the nation. This presentation describes the components of the MESA model (Academic Excellence Workshops, tutoring schemes, leadership training counseling/advising sessions, field trips, competitions) and its implementation in the context of a multi-campus institution of commuter students. Facts and statistics from both GPC and AMC will be exhibited as evidence of the success of the MESA Program, providing a strong argument in support of its continuation and expansion at the state and national levels.

### Room 2903

10:00-10:45 am - *Improving Learning Outcomes in Large Lecture* - Stephen Rehberg, Georgia Institute of Technology

Many faculty are turning to the principles of "Universal Design" to reduce the barriers to learning especially those found in large lecture classes. In this workshop find out how to:

- turn passive learning into active learning
- use multiple means of engagement to tap into learners' interest
- offer challenges and increase motivation
- give students valuable group experience

### Room 2911

10:00-10:45 am - *Using Caselets for Reflection on Teaching Dilemmas* - Dr. Kristen Miller, Ms. Jennifer Munhofen, University of Georgia

This workshop will introduce professional development materials for undergraduate science instructors who implement science education reform in laboratory courses. "Caselets" are mini-case discussions that offer practicing instructors critical opportunities to actively reflect and discuss teaching dilemmas that commonly occur when teaching science as inquiry. Caselets can be used during the limited time often devoted for undergraduate science instructor teacher preparation.

### Room 1915

11:00-11:45 am - *Guided Inquiry and Tablet PCs in Chemistry* - Dr. Laura Frost, Georgia Southern University

A system of networked tablet PCs were incorporated into a chemistry classroom using a guided inquiry learning approach. This session will demonstrate how the internet and a networked classroom can be incorporated into a cooperative learning pedagogy. Student feedback will be presented. The feasibility of this approach to other STEM disciplines will be discussed with the audience.

### Room 2901

11:00-11:20 am - *Fostering Meaningful Interaction in Online College Algebra Courses* - Ms. Kimberly Bennekin, Georgia Perimeter College

This study investigates the interactions and motivations of students in online college algebra courses and uses this information to create tailored activities for online mathematics courses. The purpose is to collect information that will be helpful in designing course materials that will enhance mathematical discourse in online college algebra courses.

11:25-11:45 am - *Student Success and Time Management in College Algebra* - Dr. Steven Wallace, Dr. Mary Wolfe, Ms. June Jones, Dr. Gaston Brouwer, Macon State College

The panel will illustrate how the students' completion of the instructional system ALEKS objectives correlates with student success and retention rates. The panel will also discuss the influence of factors such as time management on success and the promotion of good study practices for students using computer-based learning systems.

### Room 2903

11:00-11:45 am - *Preparing and Fostering Learner-Centered Faculty* - Dr. Lydia Soleil, Dr. Donna Llewellyn, Georgia Institute of Technology

This session will describe two programs Georgia Tech has in place to help nurture STEM education leaders, one for graduate students and one for faculty. Both programs use the learner-centered teaching paradigm, backwards design as a framework, and peer learning communities. Alumni of the two programs will share their experience and benefits in a panel format. Facilitators invite analysis of program ideas for possible transfer to other contexts.

### Room 2911

11:00-11:45 am - *Using Backward Course Design to Reinvigorate STEM* - Dr. Kimberly Cossey, Dr. Angel Abney, Dr. Chavonda Mills, Dr. Caralyn Zehnder, Georgia College and State University

This workshop will provide you with a roadmap for transforming your teaching through effective course design. After a brief introduction, workshop participants will explore and share strategies for designing innovative courses using the principles of backward course design. Our goal is that you will leave this workshop with a concrete plan for your own new or modified course. If you already have ideas, activities, and/or goals for your course, please bring them.

## Room 1601A

12:00-1:45 pm - Luncheon & Keynote Address - Dr. Craig Nelson, Indiana University

## Nessmith-Lane Building Lobby

1:45 – 2:00 pm – Poster Presentations

Ms. Kimberly Bennekin, Dr. Dabney Dixon, Dr. Sarah Formica, Dr. Pamela Gore, Dr. Farooq Khan & Dr. Myrna Gantner, Dr. Chuck Kutal, Dr. Rosalie Richards.

## Assembly Hall 1915

2:00-2:45 pm - *Fixing the Leaky Pipeline at the Source* - Dr. Craig Wiegert, University of Georgia

Building vibrant undergraduate STEM programs requires a strong foundation. We discuss our department's initiatives to improve that foundation by keeping first and second year students engaged.

## Room 1905

2:00-2:20 pm - *Bridging the Undergraduate Experience* - Dr. James Russell, Georgia Gwinnett College

A comprehensive research experience for Biology undergraduates at Georgia Gwinnett College has been implemented using local biodiversity and DNA barcoding technology. This approach aims to engage students in a cooperative longitudinal research experience that emphasizes connections across study subjects within the discipline. Our goal is to incorporate a research experience that spans the undergraduate program of study.

2:25-2:45 pm - *The Need to Teach Civility in ECE classrooms* - Dr. Michael Borders, Donna Borders, Gordon College

Methods for the teaching of civility to teacher education candidates—the why, what and how—are premised on the current societal need to emphasize altruistic behaviors. Survey results from 120 teacher candidates and 120 clinical supervisors within an eight-county Georgia area will be exhibited along with research literature reviews, lesson plans, and pre- and post-test data analyses.

### Room 1909

2:00-2:45 pm - *Using Mobile Game Development to Engage Students* - Dr. Sonal Dekhane , Dr. Xin Xu, Georgia Gwinnett College

In this presentation, we will share our experience of using free game development tool GameSalad to develop games for mobile devices in a general education IT course. We will provide information about GameSalad. Audience will have an opportunity to learn the basics of GameSalad and can test the games on an iPad.

### Room 2901

2:00-2:20 pm - *Redesigning an Undergraduate Engineering Course* - Ms. Elise Barrella, Georgia Institute of Technology

The presentation will consist of two parts: (1) description of the introductory engineering course and the experience of using a backwards design approach to create a more learner-centered and active course and (2) group discussion of simple, successful techniques for creating a more learner-centered course. The course was redesigned as part of a preparatory teaching program for graduate students.

2:25-2:45 pm - *STEM Enhancement Programs: The National Context* - Dr. Nathan Moon, Dr. Paul Baker, Ms. Braeden Benson, Georgia Institute of Technology

We present findings from a review of the scholarly literature and Web survey that were undertaken to develop a catalogue of STEM enhancement programs. Our research revealed that 42 states have developed such programs, 30 of which focus specifically on P-16 STEM education. This session will discuss our findings and report on other programs comparable to the USG STEM Initiative.

### Room 2903

2:00-2:45 pm - *Using the Sunspotter in the STEM Curriculum* - Dr. Richard Schmude, Gordon College

Attendees will be introduced to the Sunspotter in this workshop. This is a device that projects an image of the Sun safely. Attendees can expect to learn how to incorporate this instrument into their classroom.

### Room 2904



2:00-2:45 pm - *Isolating, Identifying and Characterizing Bacteriophages: New Course Designs that Target K-12 and Undergraduate Students* - Dr. Amanda Chase, Dr. Samuel Mutiti, Georgia College

We designed two courses around the isolation, identification and characterization of phages that are present in dirt and water-dwelling bacteria. Phages, also known as bacteriophages, are viruses that infect bacteria. The two courses target undergraduate biological and environmental science students who are chosen to become K-12 educators. In addition, a modified research protocol was designed for implementation in K-12 classrooms.

#### Room 2905

2:00-2:45 pm - *Teaching Teachers to Integrate Math and Science* - Dr. Jane Metty, Dr. Clemmie Whatley, Mercer University; Dr. Kimberly Emanuel, Dr. Lya Snell, Henry County Schools

Participants in this presentation will learn how one school district and one university worked with 76 teachers from kindergarten to 12th grade in both math and science concentrations to learn the appropriate math and science concepts and pedagogy needed to seamlessly integrate math and science as complimentary & integrated disciplines. Open discussion will follow this short presentation.

#### Room 2908

2:00-2:45 pm - *STEM II Initiative - Updates from Participating Institutions (Part 1)* - Dr. Nathan Moon, Dr. Tim Howard & Dr. Kim Shaw, Dr. Rosalie Richards, Dr. Judy Awong-Taylor

STEM II Initiative – Updates from Participating Institutions (Part 1) is made up of a series of “sampler sessions” so that interested individuals can get an overview but not comprehensive coverage. Dr. Nathan Moon will introduce this session by telling a few important lessons gleaned from the STEM I evaluations. Second, Dr. Tim Howard will talk about the STEM II Initiative at Columbus State. Third, Dr. Judy Awong-Taylor will provide information concerning the STEM II Initiative at Georgia Gwinnett College. Fourth, Dr. Rosalie Richards will discuss what is happening with the STEM II Initiative at Georgia College & State University.

2:00-2:10 pm - *Lessons Learned From STEM I Initiative* - Dr. Nathan Moon, (Georgia Board of Regents), Georgia Institute of Technology

Dr. Nathan Moon will highlight some of the important lessons gleaned from the STEM I evaluations. This “mini-session” will emphasize key accomplishments and ongoing challenges in STEM I.

2:12-2:22 pm - *STEM II Initiative at Columbus State* - Dr. Tim Howard and Dr. Kim Shaw, Columbus State University

We provide an update on institutional programs undertaken as part of the STEM-II Initiative at Columbus State University and describe additional programs that have grown out of the STEM Initiative. Current STEM Initiative projects include a peer instruction leader program for core math and science courses, a faculty mini-grants program to promote scholarship on teaching and learning and awareness of best practices models, and a service learning course. Offshoots of the STEM Initiative include a Math and Science Teaching Council, a Math & Science Learning Center to support student success and promote studies of math and science, a \$1.4 million UTeach replication grant, and a \$1.2 million Robert Noyce Teacher Scholarship Program grant.

2:24-2:34 pm - *STEM II Initiative at Georgia Gwinnett College* - Dr. Judy Awong-Taylor, Dr. Allison D'Costa, Dr. Greta Giles, Dr. Thomas Mundie, Dr. David Pursell, Dr. Clay Runck, Georgia Gwinnett College

GGC's 4-year undergraduate research experience (4-yr URE) incorporates research skills and experiences in key courses in all four years of the STEM undergraduate curriculum. We will describe how a USG-STEM initiative II grant funds the development of course-embedded research modules, SoTL projects, and individual faculty-student research projects.

2:36-2:45 pm - *STEM II Initiative at Georgia College & State University* - Dr. Rosalie Richards, Georgia College

At Georgia College, implementation of the USG STEM Initiative is flourishing and multi-faceted. Programs such as faculty STEM mini-grants, a STEM service learning course, and an undergraduate STEM retention initiative are all part of the broad array of STEM activities at GC focused on improving teaching, learning and student success. The STEM initiative at GC has not only made a positive impact on student performance and retention but also has helped create an environment that fosters local and institutional recognition of STEM related work. This positive environment increases faculty satisfaction and hence productivity, and this overall is good for retention of faculty.

#### Room 2911

2:00-2:45 pm - *Engaging STEM students in a "Flipped Classroom"* - Mr. Martin Okafor, Georgia Perimeter College

Participants will review Physics Education Research (PER) strategies for increasing interactive engagement of students, and current Technology Enhanced Active Learning (TEAL) models. Participants will engage in a brainstorming session to develop plans for implementing interactive engagement methods in their specific STEM courses.

#### Nessmith-Lane Building Lobby

2:45-3:00 pm - Poster Presentations

Dr. Judy Awong-Taylor, Dr. Tim Howard and Dr. Kim Shaw, Dr. Iman Chahine,  
Dr. Adrian Heinz, Dr. Catrena Lisse, Ms. Mary Katherine Watson, Dr. Caralyn Zehnder.

### Assembly Hall 1915

3:00-3:45 pm - *Educational Web-based Animations for STEM Courses* - Dr. Adrian Heinz, Dr. Xin Xu,  
Georgia Gwinnett College

In this presentation, we will demonstrate the development of educational web-based animations and games created by IT juniors and senior students to facilitate teaching and learning in STEM courses. Attendees will gain valuable knowledge in conducting interdisciplinary research with a team of students and using web-based technology to engage students in STEM courses.

### Room 1905

3:00-3:20 pm - *Assessing the Impact of Tutorial Services* – Dr. Cindy Henning, Dr. Kimberly Shaw, Dr. Tim Howard, Columbus State University

This is a preliminary report assessing the impact of tutorial services on student performance. We discuss a statistical approach, and why regression models do not appear suitable for the analysis.

3:25-3:45 pm - *Assessing and Improving Student Sustainability Knowledge in Civil and Environmental Engineering at the Georgia Institute of Technology* - Ms. Mary Katherine Watson, Mr. Joshua Pelkey, Dr. Caroline Noyes, and Dr. Michael Rodgers, Georgia Institute of Technology

Overview of a research study being conducted at the Georgia Institute of Technology (Georgia Tech) in Civil and Environmental Engineering (CEE) to assess and improve student sustainability knowledge.

### Room 1909

3:00-3:45 pm - *What STEM Faculty Could Learn From the Humanities and Other Disciplines: How We Stepped Off the Stage and Let the Students Run the Show* - Dr. Adeel Khalid, Dr. Bernice Nuhfer-Halten, Ms. Sonia Tosen, Dr. Mir Atiqullah, Dr. Craig Chin, Dr. Beth Stutzman, Southern Polytechnic State University

We will focus on the techniques that STEM faculty members can learn from humanities and other disciplines to make the classroom a learner centered environment.

### Room 2901

3:00-3:20 pm - *Promoting Students' Engagement in Scientific Argumentation* - Dr. Victoria Deneroff, Dr. Rosalie Richards, Georgia College

An upper-level physical science course for middle grades teacher candidates explicitly addressed the nature of science by engaging students in historical activities that led to the development of atomic theory. Participants will explore how to investigate students' understanding of science in order to move students from seeing science as activities and facts toward a conception of science as a human, cultural process.

3:25-3:45 pm - *Improving Education of Mathematics Majors* - Dr. Goran Lesaja, Georgia Southern University

In this talk we will explore and discuss different ways of improving instruction of upper level mathematics classes. Several case studies will be presented, including in Calculus and Operations Research courses. We will also discuss the importance of extracurricular activities in education of mathematics majors. In particular, we will describe activities related to undergraduate mathematics competitions.

### Room 2903

3:00-3:45 pm - *Inquiry-Oriented Pedagogy & the Nature of Science* - Dr. Leslie Jones, Valdosta State University

Have you ever thought about the way **All Natural Science Content** can be organized into a single, straightforward conceptual framework? Do you ever think about how the interplay of **Inductive and Deductive Reasoning** are more significant than the mistaken idea there is a rigid sequence known as The Scientific Method? This workshop will allow participants to try Inquiry-Oriented Activities that demonstrate these key aspects of the nature of science, and discuss the possibility of an Integrated Science Course that might be a new approach for Area D of the USG Core Curriculum for non-science majors.

### Room 2904

No session scheduled

### Room 2905

3:00-3:45 pm - *Building Capacity in a STEM Learning Community* - Dr. Sandra Webb, Georgia College; Mr. Robert Winborne, Ms. Jacqueline Bowman, Mr. Josh Hollar, Ms. Tara Jones-Lawrence, Ms. Michelle Braswell, Northeast High School; Mr. Thomas Miller, Georgia College.

This session reports on the progress of an interdisciplinary STEM learning community at one high poverty high school. This collaborative model of school improvement demonstrates the impact of STEM on developing school leaders, improving instruction and learning, and providing experiences that promote STEM visions for non-traditional students. Two projects will be highlighted: a year-long interdisciplinary lesson study in STEM and an outreach technology program. Attendees will participate in roundtables focusing on university-school STEM partnership and teacher leadership, interdisciplinary lesson study, and technology.

#### Room 2908

3:00-3:45 pm - *STEM II Initiative - Updates from Participating Institutions (Part 2)* - Dr. Pamela Gore, Dr. Dabney Dixon, Dr. Charles Kutal, Dr. Farooq Khan & Dr. Myrna Gantner

STEM II Initiative – Updates from Participating Institutions (Part 2) is made up of a series of “sampler sessions” so that interested individuals can get an overview but not comprehensive coverage. Dr. Pamela Gore will begin this session by discussing the STEM II Initiative at Georgia Perimeter College. Second, Dr. Dabney Dixon will talk about the STEM II Initiative at Georgia State University. Third, Dr. Charles Kutal will provide information concerning the STEM II Initiative at the University of Georgia. Fourth, Dr. Farooq Khan and Dr. Myrna Gantner will discuss what is happening with the STEM II Initiative at the University of West Georgia.

3:00-3:10 pm - *STEM II Initiative at Georgia Perimeter College* - Dr. Pamela Gore and Dr. Kouok Law, Georgia Perimeter College

The STEM II Initiative is contributing to the success of STEM majors at GPC by supporting Peer-Led Undergraduate Study (PLUS) Tutors, a Faculty Mini-Grant Program which is encouraging collaboration and producing innovating educational materials and experiences for students in STEM gateway courses, and providing workshops and seminars for faculty development. The Initiative also supports Project MESA, preparing educationally disadvantaged STEM majors for transfer to four-year institutions. The STEM Initiative stimulated faculty to apply for external funding, resulting in nearly \$3.5 million in new funding over the next five years. The grant has also allowed GPC to hire an executive-level administrator to coordinate STEM initiatives.

3:12-3:22 pm - *STEM II Initiative at Georgia State University* - Dr. Dabney Dixon, Georgia State University

The availability of funding from the State of Georgia has allowed significant advances in STEM education at Georgia State University. The largest fraction of the funds are dedicated to a series of mini-grants that are allowing 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. 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.

3:24-3:34 pm - *STEM II Initiative at the University of Georgia* - Dr. Charles Kutal, University of Georgia

The University of Georgia will discuss STEM Initiative II strategies focused on improving instruction and student achievement in STEM courses and assisting in the preparation and professional development of K-12 science and math teachers. Specific activities include a mini-grants program, learning communities, pre-service teacher recruitment, expanding Project FOCUS, and increasing faculty effort to improve instruction and student learning in the STEM disciplines.

3:36-3:45 pm - *STEM II Initiative at the University of West Georgia* - Dr. Farooq Khan, Dr. Satyanarayana Swamy-Mruthinti, Dr. Myrna Gantner, University of West Georgia

We will describe a BOR-funded program to enhance the STEM disciplines. We designed two approaches to support freshmen in STEM majors. The first is a bridge program focused on enhancing preparation for STEM coursework and college life. The second is an interdisciplinary seminar course designed to provide information about careers in STEM disciplines, including teaching in middle and high schools.

### Room 2911

3:00-3:45 pm - *Preparing Middle Grades Teachers to Use Drawn Models for Developing Arithmetic with Rational Numbers* – Dr. Andrew Izsak, Erik Jacobson, University of Georgia

We will report on-going efforts to design a research-based content and methods course for future middle grades teachers focused on numbers and operations. A main theme of the course is to solve problems using drawn models and to develop general numeric methods. Attendees will work on activities used in the course that elicit difficulties future teachers experience with this content.

4:00-5:00 pm - Keynote Address & Closing Session - Dr. Robert Mayes (Georgia Southern University)

### **STEM Teaching and Learning**

*A reflection on the Chancellor's comments on the goals of STEM education will be provided, with exemplification of some current trends as seen through existing and proposed grant funded projects. Come join the conversation in the closing session of the conference, explore*

*an online virtual conferencing tool live (just use the link below when prompted), and see the unveiling of the conference website.*

<https://sas.illuminate.com/m.jnlp?sid=2008263&password=M.9FBAC474A4A0B3EABF7DDB32204357>

## 1:45 – 2:00 pm – Poster Presentations

Ms. Kimberly Bennekin, Dr. Dabney Dixon, Dr. Sarah Formica, Dr. Pamela Gore, Dr. Farooq Khan & Dr. Myrna Gantner, Dr. Chuck Kutal, Dr. Rosalie Richards.

*Fostering Meaningful Interaction in Online College Algebra Courses*, Ms. Kimberly Bennekin, Georgia Perimeter College

This study investigates the perceptions and motivations of students in online college algebra courses and uses this information to create activities tailored to enhance engagement. The purpose is to collect information that will be helpful in designing course materials that will enhance students' mathematical discourse in online college algebra courses.

*STEM Education at Georgia State University: Innovation and Administration-* Dabney W. Dixon, Georgia State University

The availability of funding from the State of Georgia has allowed significant advances in STEM education at Georgia State University. The largest fraction of the funds are dedicated to a series of mini-grants that are allowing 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. 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.

*A Medley of Successful Active-Learning Methods-* Dr. Sarah Formica, North Georgia College & State University

This poster will present a medley of active-learning methods that have been implemented successfully in physics courses. Methods include Just-in-Time Teaching, clicker questions, whiteboard activities, and virtual experiments. The poster showcases active-learning methods that can be applied in a STEM classroom to increase students' conceptual understanding and problem solving skills.

*STEM Initiative at Georgia Perimeter College-* Dr. Pamela J. W. Gore and Dr. Kouok Law, Georgia Perimeter College

The USG STEM Initiative has stimulated a culture shift at GPC through the faculty mini-grant program, resulting in increased faculty collaboration, involvement in classroom research, and use of innovative techniques designed to promote student success. This has resulted in a number of publications and presentations by GPC faculty, and has resulted in several new grant-funded STEM programs to support and increase the pool of STEM students at the College. The MESA Program has supported about 500 educationally disadvantaged STEM majors, about half of whom have now transferred to four-year institutions.



*BOR-funded STEM Initiatives at UWG: Our Story* - Dr. Farooq Khan, Dr. Myrna Gantner, Dr. Satyanarayana Swamy-Mruthinti, University of West Georgia

We will describe a BOR-funded program to enhance the STEM disciplines. We designed two approaches to support freshmen in STEM majors. The first is a bridge program focused on enhancing preparation for STEM coursework and college life. The second is an interdisciplinary seminar course designed to provide information about careers in STEM disciplines, including teaching in middle and high schools.

*The University of Georgia STEM Initiative II Program* - Dr. Charles Kutal, Nancy Vandergrift, University of Georgia

The University of Georgia will discuss STEM Initiative II strategies focused on improving instruction and student achievement in STEM courses and assisting in the preparation and professional development of K-12 science and math teachers. Specific activities include a mini-grants program, learning communities, pre-service teacher recruitment, expanding Project FOCUS, and increasing faculty effort to improve instruction and student learning in the STEM disciplines.

*STEM II Initiative at Georgia College* - Dr. Rosalie Richards, Georgia College

At Georgia College, implementation of the USG STEM Initiative is flourishing and multi-faceted. Programs such as faculty STEM mini-grants, a STEM service learning course, and an undergraduate STEM retention initiative are all part of the broad array of STEM activities at GC focused on improving teaching, learning and student success. The STEM initiative at GC has not only made a positive impact on student performance and retention but also has helped create an environment that fosters local and institutional recognition of STEM related work. This positive environment increases faculty satisfaction and hence productivity, and this overall is good for retention of faculty.

## 2:45-3:00 pm - Poster Presentations

Dr. Judy Awong-Taylor, Dr. Tim Howard and Dr. Kim Shaw, Dr. Iman Chahine, Dr. Adrian Heinz, Dr. Catrena Lisse, Ms. Mary Katherine Watson, Dr. Caralyn Zehnder.

*STEM II Initiative at Georgia Gwinnett College-* Dr. Judy Awong-Taylor, Dr. Allison D'Costa, Dr. Greta Giles, Dr. Thomas Mundie, Dr. David Pursell, Dr. Clay Runck, Georgia Gwinnett College

GGC's 4-year undergraduate research experience (4-yr URE) incorporates research skills and experiences in key courses in all four years of the STEM undergraduate curriculum. We will describe how a USG-STEM initiative II grant funds the development of course-embedded research modules, SoTL projects, and individual faculty-student research projects.

*STEM II Initiative at Columbus State University-* Dr. Timothy Howard, Dr. Kim Shaw, Columbus State University

We provide an update on institutional programs undertaken as part of the STEM-II Initiative at Columbus State University and describe additional programs that have grown out of the STEM Initiative. Current STEM Initiative projects include a peer instruction leader program for core math and science courses, a faculty mini-grants program to promote scholarship on teaching and learning and awareness of best practices models, and a service learning course. Offshoots of the STEM Initiative include a Math and Science Teaching Council, a Math & Science Learning Center to support student success and promote studies of math and science, a \$1.4 million UTeach replication grant, and a \$1.2 million Robert Noyce Teacher Scholarship Program grant.

*Using Online Instructional Support in Precalculus-* Dr. Iman Chahine, Dr. Mark Grinshpon, Dr. Robert Clewley, Georgia State University

This research study employs online instructional support in precalculus concepts to advance undergraduate students' success in calculus courses. We employed five types of instruments to collect data. Results showed no significant effect on Calculus scores as a result of the intervention, however, our findings show an evidence of improvement in students' confidence level.

*Educational Web-based Animations for STEM Courses-* Dr. Adrian Heinz, Dr. Xin Xu, with students: Spencer Estes, Nick Pyron, Daniel Mackay and Michael Ritter, Georgia Gwinnett College

In this poster, we will demonstrate the development of educational web-based animations and games created by IT juniors and senior students to facilitate teaching and learning in STEM courses. Attendees will gain valuable knowledge in conducting interdisciplinary research with a team of students and using web-based technology to engage students in STEM courses.

*Chemistry & Climate: A New Vision for General Chemistry-* Dr. Catrena Lisse, Dr. Chavonda Mills, Dr. Julia Metzker, Georgia College

We present an innovative course re-design that reframes the content from introductory chemistry courses as an exploration of the chemistry related to important climate concerns. The course is divided into four general units; (i) Periodic Trends & Atomic Structure, (ii) Ground Level Air Chemistry & Air Pollution, (iii) Stratosphere Chemistry & Ozone Depletion, and (iv) Global Warming & the Greenhouse Effect. These units allow for sufficient coverage of the topics typically included in the first semester of a two-semester general chemistry sequence.

*Analyzing the Structure of Student Sustainability Knowledge using Traditional and Holistic Concept Map Scoring Methods-* Ms. Mary Katherine Watson, Mr. Joshua Pelkey, Dr. Caroline Noyes, and Dr. Michael Rodgers, Georgia Institute of Technology

Use and evaluation of traditional and holistic concept map scoring methods to compare the structure of student sustainability knowledge in a civil and environmental engineering (CEE) capstone design course and a CEE graduate transportation seminar.

*Teaching Techniques: A graduate teaching course developed to improve undergraduate instruction-* Dr. Caralyn Zehnder, Georgia College

A biology graduate teaching course was developed at Georgia College in order to improve undergraduate science laboratories which are primarily taught by graduate students. Course activities focus on active learning pedagogies, effective lecture techniques, and test writing skills. Assessment data from the course has shown that graduate students develop their teaching skills and gain confidence in the classroom.