


Mar 9th, 1:45 PM - 2:00 PM

## The University of Georgia STEM Initiative II Projects, Programs and Partnerships

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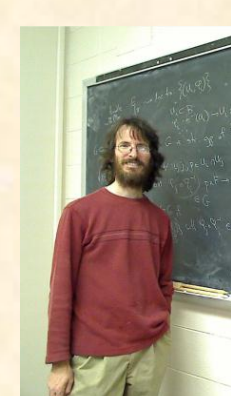
Kutal, Charles and Vandergrift, nancy, "The University of Georgia STEM Initiative II Projects, Programs and Partnerships" (2012). *Interdisciplinary STEM Teaching & Learning Conference*. 37.  
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# The University of Georgia STEM Initiative II Projects, Programs and Partnerships

## STEM Faculty Dedicated to Effective Instruction

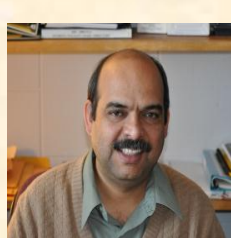
With STEM Initiative funding, **UGA hired four tenure-track faculty** dedicated to providing effective undergraduate instruction that enhances the likelihood that students will graduate with a STEM degree.



**Dr. David Gay**, Assistant Professor, Mathematics Department

**Teaching and Service:** Teaches courses for future high school teachers, graduate-level topology courses, research experiences for undergraduates, and high school outreach (MATH 5200/7200, MATH 5210/7210, MATH 8230)

**Research:** Geometric and differential topology; mathematics education and outreach, especially mathematics research with undergraduate and high school students



**Dr. Ajay Sharma**, Assistant Professor, Elementary and Social Studies Education Department

**Teaching:** Teaches EDMS 5460 (Student Teaching in Middle School); EDMS 5020L/5030L (Educating Young Adolescents Lab) and graduate-level courses

**Research:** Theoretical and ethnographic explorations of implications that climate change and neo-liberalism have for science education, the work of teachers, and the democratic agenda of schooling

**Recipient of UGA Grant Award in 2011:** Office of the Vice President for Research, Faculty Research Grants Program: "Preparing for Climate Change: Exploring Nature, Society, and the Individual in Middle Grades Science and Social Studies"



**Dr. Ji Shen**, Assistant Professor, Mathematics and Science Education Department

**Teaching and Service:** Developed a transformative modeling based unit on measurement for prospective middle school science teachers. Co-teaches CHEM 1060 to integrate content and pedagogy and infuse innovative technology into this pre-service middle school science teachers' course.

**Research:** Model-based teaching and learning in physical science; Modeling and visualization in technology-enhanced science education.

**Recipient of NSF REESE Grant Award in 2010:** To design transformative assessments to evaluate undergraduates understanding of interdisciplinary learning skills in introductory physics, biology, physiology, and science education courses.



**Dr. Joachim Walther**, Assistant Professor, Faculty of Engineering, Engineering Education Research

**Teaching and Service:** Designed and teaches a 4-course Synthesis and Design Studio sequence to introduce engineering students to the challenges of the 21<sup>st</sup> century engineering characterized by the interaction of technical, social, economic, cultural and ecological factors.

**Research:** The investigation of students' professional development in engineering programs and the use of interpretive research methods within the emerging field of engineering education research.

**Recipient of NSF CAREER Grant Award in 2012:** To develop improved methods for studying engineering education.

## The Scholarship of Teaching and Learning

UGA's highly successful **Mini-Grant Program** is designed to encourage faculty to undertake innovative projects that (1) improve STEM instruction and student learning, and (2) provide contributions to the scholarship of teaching and learning.

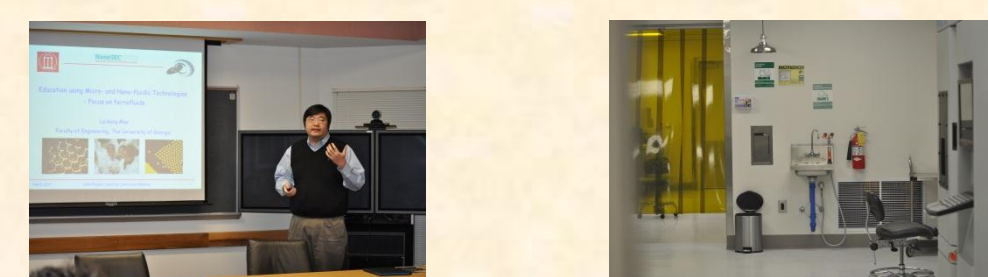
Armstrong, Norris: ***Moving from an Instructor-Centered to a Student-Centered Class in Introductory Biology***

Foutz, Timothy: ***Analyzing Faculty Attitudes and Beliefs about a Liberal Arts-Oriented Student's Interest in the STEM Disciplines***

Kong, Fanbin: ***Development of a Video Game as a Tool to Teach "Heat Transfer" Fundamentals in Undergraduate Courses at UGA***

Lemons, Paula: ***SOLVE-IT! Tutorials: How Do Online Problem-Solving Tutorials using Faded Scaffolding Impact Student Learning?***

Mao, Leidong: ***Lab-on-a-Chip Teaching Module for Undergraduate Students at UGA***



Miller, Kristen: ***Assessing the Use of "Caselets" to Solve Teaching Dilemmas in Instructional Undergraduate Biology Laboratories that Teach Biology as Inquiry***



Shen, Ji: ***Developing a Transformative Knowledge System (TKS) for Pre-service Science Teachers***

Stanger-Hall, Kathrin: ***Online Case-Studies for Learning of Biological Processes in Introductory Biology***

Stanger-Hall, Kathrin: ***"Science-Pets" Personal Teaching Species for Learning of Biology and Environmental Literacy***

Tippins, Deborah: ***A Case Study of Pre-service Teachers' Use of Argumentation in Learning to Teach Science: The Evolutionary Basis of Global Climate Change***

Walther, Joachim: ***Reflection as a Way of Integrating Student Learning across STEM***

## STEM Learning Communities

UGA's **STEM Learning Communities** are disciplinary and interdisciplinary working groups comprised of STEM faculty and (in some cases) local K-12 teachers who meet on a regular basis and work collaboratively to discuss, share, and implement ways to improve teaching and student learning.

Franklin, Chris, Statistics Department  
Maddox, Kaycie, Northeast Georgia RESA  
**A.P. Statistics Professional Learning Community**

Shifren, Ted, Mathematics Department  
Whitmire, Paula, Oconee County Schools  
**A.P. Calculus Learning Community**

State of LC	School Year	AP Calc LC	State	Nation
Prior to 2004-05		2.00	2.80	2.94
Began 12/05	2005-06	2.63	2.85	3.02
	2006-07	3.73	2.82	2.92
	2007-08	3.36	2.70	3.01



Dustman, Wendy, Microbiology Department  
**Biotech Boot Camp Learning Community**

White, Dorothy, Mathematics and Science Education Department  
**Mathematics Pedagogical Problem Solvers**

Kutal, Charles, Associate Dean of A&S; Director, Office of STEM Education  
Coleman, Dava, Jackson County Schools  
**Chemistry Learning Community**

Fertig, Chad, Physics and Astronomy Department  
**Physics Learning Community**



Brickman, Peggy, Plant Biology Department  
**College-Science Education Research Group**

Adams, Malcolm, Mathematics Department  
Blount, Sandy, Clarke County Schools  
**Mathematics Curriculum Team**

## Project FOCUS

**Project FOCUS** (Fostering Our Community's Understanding of Science) is a service-learning course whose goal is for STEM undergraduate students from any UGA college to bring their science knowledge into K-5 classrooms through inquiry-based lessons and, in turn, to gain an appreciation of teaching science to young students.

**This year:**

- 114 undergraduate students enrolled
- 8 elementary schools served



## Regional STEM Institute of Teaching and Learning

The Office of STEM Education will host  
**The 2012 Regional STEM Institute on Teaching and Learning**  
**Saturday, April 14, 2012**  
**8:00 am to 4:30 pm**  
**Classic Center, Athens, Georgia**

- Panels will discuss the importance of STEM education reform at the national, state, and local levels, as well as leveraging the NSF Broader-Impacts Criterion
- STEM faculty will share teaching approaches for large undergraduate courses that actively engage students
- Mini-grant recipients will discuss contributions to the Scholarship of Teaching and Learning

## Contact Information

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