



Be(e) STEM Symposium

"A plant does not bear fruit without it's stem." —Matshona Dhliwayo

**BUILDING,
CONNECTING,
IMAGINING A
STEM MINDSET.**

April 21, 2022
Lowman Student Center



THE STEM CENTER
SAM HOUSTON STATE UNIVERSITY

MEMBER THE TEXAS STATE UNIVERSITY SYSTEM

About the STEM Center at SHSU

In Fall 2017, Sam Houston State University received an award from the National Science Foundation (NSF) to establish a STEM Center on our campus. This award (proposal no. 1725674) was made by the Division of Undergraduate Education of the NSF, part of the Improving Undergraduate STEM Education (IUSE) program.

Mission

The STEM Center at SHSU seeks to increase the number and quality of STEM graduates by establishing a strong foundation for learning using innovative teaching practices and supporting students in finding research and internship opportunities and building lifelong skills needed for advancement and leadership in STEM careers.

Goals

The objectives of the SHSU STEM Center are to:

- Equip incoming STEM students with adequate preparation and tools for success in those courses traditionally difficult for Freshman STEM students.
- Aid students in developing skills to maximize performance in math, engineering and science classes and create positive attitudes required to acclimate to college life and succeed academically.
- Connect undergraduates with faculty members and graduate students; facilitate research experiences for undergraduates.
- Provide research-related networking and internship opportunities in addition to advising students about graduate school preparation and career opportunities.
- Improve the quality of STEM undergraduate education by expanding the use of Inquiry-Based Learning and Process-Oriented Guided Inquiry Learning across STEM disciplines.

The Be(e) STEM Symposium

The goal of the symposium is to share resources, plans, and lessons learned both internally (within SHSU) and externally (with other institutions in the TX region).

We have titled the symposium Be(e) STEM: Building, Connecting, and Imagining STEM Mindsets. The three aspects of the symposium reflect the three pillars of the STEM Center, which are promoting active learning, providing ramps into undergraduate research, and supporting students to success in STEM.

The symposium is a full-day program made up of local STEM Centers, SHSU Faculty and Staff, and other local STEM partners being curated by THE STEM Center.

We have named the symposium Be(e) STEM, as we see it as an opportunity to pollinate and grow the work of the STEM Center, both within SHSU and in the larger TX region.

Morning Keynote Speaker



Dr. Rosalyn (Roz) Hobson Hargraves is Division Director for the Division of Undergraduate Education (DUE). The Division of Undergraduate Education, in the NSF Directorate for Education and Human Resources, strengthens STEM education at two- and four-year colleges and universities. Dr. Hargraves is a Professor of Electrical

and Computer Engineering at Virginia Commonwealth University and previously served as an Intermittent Expert for NSF's Directorate for Education and Human Resources. She began her term as NSF division director for DUE on August 1, 2021.

In addition to STEM education, Dr. Hargraves' research interests also include diversity, equity, and inclusion in higher education, machine learning, biomedical signal and image processing, and the role of science and technology in international development. Dr. Hargraves received her Bachelor's, Master's, and Doctorate degrees in Electrical Engineering from the University of Virginia. During her 25 years at Virginia Commonwealth University (VCU), Dr. Hargraves co-founded the VCU College of Engineering Department of Electrical Engineering, and has served in numerous leadership roles, including Associate Vice President for Inclusive Excellence, the Director of the Virginia Commonwealth University - University of KwaZulu Natal International Partnership, Associate Dean in the College of Engineering, and Interim Co-chair in the School of Education Department of Teaching and Learning.

Dr. Hargraves has published over sixty peer reviewed conference and journal publications, been awarded two patents, given over 60 lectures/seminars domestically and internationally and served on expert panels across the United States. She has consulted with private industry in the area of machine learning and co-founded a start-up, SPT (Signal Processing Technologies), based upon her research in biomedical image processing. She has been awarded sponsored research grants as PI, co-PI, or senior personnel totaling over \$25 M from federal, state, foundation, and industrial sources primarily in the area of STEM education and training. Throughout her career she has served on over 80 review committees, conference organizing committees, professional, university, school and department committees. Her professional service has included membership on two National Academies Committees, and she currently is elected to serve on the American Council on Education Council of Fellows board, the Bon Secours Richmond Health System Board, and as a Richmond Memorial Health Foundation Trustee.

Dr. Hargraves has been recognized nationally for her mentoring, teaching, leadership, and diversity initiatives. From 2019-2020 she was one of 38 academic leaders selected for the nationally renowned American Council on Education (ACE) Fellowship, the premier comprehensive leadership development program in American higher education. In 2003-2004 she served as an American Association for the Advancement of Science Diplomacy Fellow at the U.S. Agency for International Development (2003-2004). Among her numerous awards, she received the 2018 National Association for Ethnic Studies Robert L. Perry Mentoring Award and 2006 Dr. Hargraves was named Engineer of the Year by the Richmond Joint Engineers Council.

Afternoon Keynote Speaker



Mardelle Atkins, PhD is a fourth–year assistant professor in the Department of Biological Sciences, and she currently holds the Roland Black Endowed Assistant Professorship. Since joining SHSU in 2018, Dr. Atkins has been engaged in multiple workshops and seminars on active learning, Diversity, Equity, and Inclusion [DEI], and pedagogical methods as well as being involved in multiple curriculum development projects.

These projects have been sponsored by grant funds from the STEM Center at SHSU and the SHSU Engaging Classrooms Quality Enhancement Plan [QEP]. In her research laboratory, Dr. Atkins supervises undergraduate and Master’s degree students to characterize developmental genes and to unravel the cellular processes that drive cancer cachexia.

Dr. Atkins has now taken her research from her lab and into the classroom to engage students in primary research in developmental biology. This action has already led to the discovery of multiple new genes required for eye and head development and provides the topic of her keynote “Developing Scientists: The Growth and Evolution of an Upper–Level Biology CURE.

Morning Agenda

7:30 – 8:30 a.m. Registration & Breakfast LSC 241B
8:30 – 9:45 a.m. Welcome LSC 241A

Dr. Taylor Martin
SHSU STEM Center Director

Dr. Alisa White
SHSU President

Dr. Michael Stephenson
SHSU Provost and Senior Vice President

Dr. Brian Loft
SHSU Assoc. Vice Provost for Faculty & Student Success

Keynote Address

Dr. Rosalyn Hargraves
NSF Division Director for the Division of Undergraduate Education

10:00 – 10:45 a.m.

Dr. Dustin Gross – SHSU LSC 230
Teaching Enhancement Grant Outcomes: Flipping the Organic
Chemistry Prelab Meeting

Dr. Adrian Villalta-Cerdas – SHSU LSC 241A
Integration of Virtual Chemical Experiences into General Chemistry
II via ChemCollective Labs

Ms. Clarissa Stone – SHSU LSC 241A
Underprepared STEM students

10:45 – 11:00 a.m. Break

11:00 – 11:45 a.m.

**Drs. Megan Hinze, Christopher Zall, Danhong Chen,
Reg Pecen, and David Thompson– SHSU** LSC 230
“Ramps into Research: Developing Subdivision Specific Training
Modules to Facilitate Student Growth Through Research
Experiences”

Dr. Niyazi Erdogan – Texas A&M LSC 241A

Afternoon Agenda

12:00 – 1:15 p.m.

Lunch with Group Roundtables LSC 241B

1:30 – 2:15 p.m.

Dr. Ross Guida – SHSU LSC 230

SHSU's NSF GEOPaths: Where We've Been, Where We Are, Where We're Going

Dr. Philip Urso – SHSU LSC 230

STEM Course Enhancement: Use of thermal scope to tranquilize deer for student involvement

Dr. Benjamin Flores – UTEP LSC 242

The Louis Stokes Regional Center of Excellence for Inclusive Mentoring in STEM: Advocating for Evidence-Based Mentoring Best Practices

2:15 – 2:30 p.m.

Break

2:30 – 3:15 p.m.

Dr. James Meen – UH LSC 230

Integrating High School and Undergraduate Researchers into a Research Program

Lain Sowell – SHSU LSC 242

Development of Virtual Reality Robotics Laboratory Simulation

Louanne Mozer-Sallo – SHSU LSC 242

Development of Augmented Reality Navigation Application for College Library

3:15 – 3:30 p.m.

Break

3:30 – 4:30 p.m.

Closing Keynote Speaker LSC 242

Dr. Mardelle Atkin

Roland Black Endowed Assistant Professorship
SHSU Department of Biological Sciences

Abstracts

Dr. Benjamin Flores – UTEP Electrical and Computer Engineering

Title: The Louis Stokes Regional Center of Excellence for Inclusive Mentoring in STEM: Advocating for Evidence-Based Mentoring Best Practices

Abstract:

The Louis Stokes Regional Center of Excellence for Inclusive Mentoring in STEM is dedicated to the review, curation, and dissemination of mentoring best practices developed for students participating in bridge to the baccalaureate, undergraduate and graduate research, industry internship, and national laboratory fellowship programs. Our Center brings together mentoring practitioners and experts from the Southwest and Rocky Mountains regions to develop and enhance inclusive mentoring approaches that potentiate students, especially those from underrepresented groups, for successful STEM careers. In this session we will discuss some of the ways in which the Center collaborates with its partners and stakeholders.

Dr. Dustin Gross – SHSU Chemistry Dept.

Title: Teaching Enhancement Grant Outcomes: Flipping the Organic Chemistry Prelab Meeting

Abstract:

The project described herein was aimed to increase student engagement in the organic chemistry teaching labs, specifically in the area of student preparation prior to the lab meeting. It involved partial flipping of the typical prelab meeting from in-person and lecture based to asynchronous delivery online. The prelab preparation was redesigned to be more engaging than simple videos, and the activities are available for use and refinement by future instructors of the course. The idea of a prelab redesign was in a way a serendipitous finding. Due to the need to go remote (or blended) during the current pandemic, we had already moved some of the prelab activities online. The scheduled in-person prelab meeting time now includes more team learning activities. Examples of these activities and student feedback will be discussed.

Dr. Meagan Hinzl, Dr. Kit Zalll, Dr. Danhong Chen², Dr. Reg Pecem³, Dr. David E. Thompson¹ – SHSU ¹Chemistry, ²Agricultural Sciences, ³Engineering Technology

Title: Developing Subdivision Specific Training Modules in Chemistry to Facilitate Student Growth Through Research Experiences

Abstract:

The Ramps into Research Initiative provides a framework to introduce students to research and facilitate student growth through meaningful research experiences. Although students are exposed to a variety of procedures in coursework required by their degree, specialized research procedures are inherently more complex or may invoke concepts or skills beyond the scope of the curriculum. This knowledge gap presents a challenge not only in training students but nurturing them to consider the underlying concepts of the new procedures they are performing. By having a deeper level of understanding and context, students develop critical thinking skills in addition to the background knowledge to rationalize unexpected outcomes. Furthermore, developing a standardized training plan facilitates an improved transfer of knowledge between student groups. The presentation will be divided between chemistry professors who will share the role that developing a Ramps into

Research module has had in their respective labs and future opportunities for student input on module development.

Dr. Ross Guida – SHSU Environmental and Geosciences Dept.

Title: SHSU's NSF GEOPaths: Where We've Been, Where We Are, Where We're Going

Abstract:

SHSU's NSF-funded GEOPaths- Informal Networks project, Geoscience Exposure and Training in Texas (GET TX), aims to build a geoscience learning community in Southeast Texas among high school students and teachers, community colleges, and SHSU. Historically, the geosciences have been one of the least diverse STEM fields. Further, a lack of earth science in the core of high schools across the country has been linked to declining geoscience program enrollment around the country. As an emerging Hispanic Serving Institution (HSI), SHSU partnered with HSI Lone Star College- University Park faculty to begin building community relationships to: 1) visit high school and community college STEM classrooms; 2) hold geoscience open houses; 3) develop applied materials for STEM high school teachers through workshops; and 4) host a multiday summer bridge program for STEM-inclined students potentially interested studying geoscience. Over the past year and a half, we have made progress developing partnerships for visits with schools in the community, extending from Houston ISD to Apple Valley ISD and out to Austin Community College. Students have been receptive to classroom visits, despite geoscience ranking poorly on pre-surveys of STEM interests. In fact, students often rank Algebra, Calculus, and Chemistry higher in pre-survey interests than geoscience. Further, students rank petroleum geology near the bottom of the geoscience subdisciplines, posing a challenge to traditional/ historical Houston-area geoscience recruiting models. After visiting with students and teachers, there is an increase in potential interest in geoscience, including students attending open houses in the evenings. However, getting into classrooms, both in terms of visits and integrating applied teacher workshop materials, has been a challenge given COVID and time limitations for teachers worried about standardized testing and meeting TEKS. For the more immersive bridge program, a large majority of students that are finalists have been female, a positive trend for diversifying the field.

Louanne Mozer-Sallo – SHSU

Title: Development of Augmented Reality Navigation Application for College Library

Abstract:

Morphing a custom reality into society has always been developed side by side with technology. In recent years, we have had the opportunity of having most technological needs compacted into our smartphones. With technology exponentially getting better, we now can develop a long-desired art form, Augmented and Virtual reality. While these types of realities have been in use for decades, it's not until recently where we can use these architectures optimally. Virtual and augmented reality have become popular in the STEM fields, from learning modules to real time robotic controls. Although companies continue to invest in mixed realities, the education sector is still in need to adopt AR/VR tools for its benefit. Therefore, this project may improve engagement, time and cost optimization of businesses, colleges, and recreational locations. We have developed augmented reality navigation application for incoming and existing students at XXX University library to locate the needed literature, which may reduce time spent interacting with the librarians as well as provide engaging and entertaining experience at the library. This project explores how the proposed AR mobile application provides students tools to find books, points of interests (POI), and study rooms with ease. This paper discusses the software used to develop the

application, real-world environments scanning techniques, interaction with virtual objects that could be morphed into navigational systems in the library, and t-Test comparative analysis to investigate the significance of the proposed application in timesaving and cost-effectiveness to both students and the library staff. Development of similar applications to all libraries may benefit the community and provide an entertaining engagement.

Dr. James Meen – University of Houston Chemistry

Title: Integrating High School and Undergraduate Researchers into a Research Program

Abstract:

I have been accepting high school and undergraduate students into my research labs for well over two decades. Initially, I did as I suspect many of us do: I assigned them portions of the broader research topics that the graduate students and researchers were working on. As we became enamored of more tightly focused aspects of the research, this became more difficult both for me to define and for the students to understand. The sort of work had not changed but the knowledge required to understand its relevance had moved to a different level. So I changed the modus operandi of assigning research tasks. I picked low-probability research topics in areas relatively free from previous data. In the present climate, research conducted by a graduate student has to have a high probability of success and so tends to be built on a relatively solid foundation, often requiring considerable background information. They are not given enough time to have no results and to start on a new project. Our short term or part-time students have no such constraints. If they conduct an experiment and there is no reaction, they learn just as much about the techniques and equipment as they do when there is a reaction. The basis for the research is usually much easier to explain. For me, large portions of the potential research volume can be eliminated quickly. And sometimes, just sometimes, the research provides a great surprise. Since adopting this approach, I find the research environment greatly improved. Some examples of “hits” and “misses” will be given.

Lain Sowell – SHSU

Title: Development of Virtual Reality Robotics Laboratory Simulation

Abstract:

Automation plays an important role in industrial manufacturing in improving efficiency, accuracy of tasks and preventing laborers from exposing to hazardous and dangerous situation. Since the introduction of robotic arms in manufacturing they have been widely used in several industries and became crucial for Engineering Technology students to land a job especially in STEM fields. An industrial robotics courses prepare students with knowledge associated with the automated machinery programming and controlling. In this study, researchers have developed a Virtual Reality (VR) simulation for robotic laboratory to provide access to the immersive robotic arm simulation, operate the arm controller remotely. This VR Robotic Arm Lab simulation is proposed to provide students fundamental knowledge and motivation towards automation and robotics. Furthermore, the VR Lab may benefit students develop muscle memory in the operation of robotic arm in physical environment as well as ensure personnel and equipment safety. The outcomes of the initial hypothesis, where the students will develop fundamental knowledge in safety and efficiency in learning, will be reported at the conference. Independent sample t-Test will compare the control group with a conventional teaching method to investigate the efficiency of the proposed VR simulation application.

Clarissa Stone – SHSU Statistics and Mathematics Dept.

Title: Underprepared STEM students

Abstract:

Students enter college with larger than life STEM dreams. Too often, underprepared students are forced to change majors because they cannot pass math. This talk dives into data surrounding the majors and success rates of our students labeled underprepared by the TSIA.

Dr. Philip Urso – SHSU Agricultural Sciences Dept.

Title: STEM Course Enhancement: Use of thermal scope to tranquilize deer for student involvement

Abstract:

Working hands on with white-tailed, fallow, and red deer is a key component of the Wildlife Management minor within the major of Animal Science. Through the generosity and help from SHSU partners at 3-S Ranches, this interaction with deer species is commonly achieved in our courses. Students are immersed in the day to day managing of a high fence ranch and taught how to interact with these animals in a safe way. Due to the wild nature of these animals, one of the most common methods utilized various courses is tranquilizing bucks/stags who possess antlers that will not work safely in the normal doe/hind facilities. This is a common practice in the deer breeding industry, but students are always surprised to see this technique in practice. Deer are tranquilized to conduct a variety of tasks including scoring, vaccinations, wellness checks, or moving to another home pasture. All of these are tasks that we readily utilize as learning opportunities for students. Due to the susceptibility of these animals to heat stress and considering the nocturnal nature of select species, most of these events occur after dark. As such, flashlights are utilized to see the animals and allow proper aiming and safe takedown. Thermal imaging has been utilized widespread across the industry, and being able to utilize this technology here, would greatly improve the safety of those involved with tranquilizing and the reduce stress of the animals. The purpose of this proposal is to state the case for procuring an ATN Thor 4 384 1.25-5X thermal imagine scope from ATN Corporation

Dr. Adrian Villalta-Cerdas – SHSU Chemistry Dept.

Title: Integration of Virtual Chemical Experiences into General Chemistry II via ChemCollective Labs

Abstract:

The project aims to improve student learning of the core chemistry ideas and scientific skills necessary to understand natural phenomena. The project proposed a thoughtful design of novel in-class activities and assessments for the General Chemistry II (CHEM1412) course to meet its goal. The work focused on core chemistry ideas related to acid-base equilibrium and thermodynamics of inorganic salts solubility in aqueous solutions. A suite of active-learning in-class simulations and virtual laboratory experiences were created to promote data analysis and interpretation using available ChemCollective resources (i.e., virtual labs and simulations). All activities had an assessment component to determine their impact on student learning and students overall course performance. The project outcomes will be discussed in light of their effect on the conceptual understanding of enrolled students in CHEM1412 during Spring 2021.

The STEM Center at SHSU staff would like to thank you for attending.

Staff

Dr. Taylor Martin, Director
Dr. Mary Swarthout, Assistant Director
Dr. David Thompson, Assistant Director
Dr. Faruk Yildiz, Assistant Director
Dr. Adrian Villalta-Cerdas, Educational Data Analyst
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“Partial support for this work was provided by the National Science Foundation’s Improving Undergraduate STEM Education (IUSE) program under Award No. 1725674. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.”

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